

UNECE

Tajikistan

Environmental Performance Reviews

Third Review



UNITED NATIONS

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

ENVIRONMENTAL PERFORMANCE REVIEWS

TAJKISTAN

Third Review



UNITED NATIONS

New York and Geneva, 2017

Environmental Performance Reviews Series No. 45

NOTE

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The United Nations issued the second Environmental Performance Review of Tajikistan (Environmental Performance Reviews Series No. 33) in 2012.

This volume is issued in English and in Russian.

Information cut-off date: 1 December 2016.

ECE Information Unit
Palais des Nations
CH-1211 Geneva 10
Switzerland

Tel.: +41 (0)22 917 44 44
Fax: +41 (0)22 917 05 05
E-mail: info.ece@unece.org
Website: <http://www.unece.org>

ECE/CEP/180

UNITED NATIONS PUBLICATION

<i>Sales: E.17.II.E.8</i>

ISBN: 978-92-1-117128-0

eISBN: 978-92-1-060169-4

ISSN 1020-4563

Foreword

It is essential to monitor progress towards environmental sustainability and to evaluate how countries reconcile environmental and economic targets and meet their international environmental commitments. Through regular monitoring and evaluation, countries may more effectively stay ahead of emerging environmental issues, improve their environmental performance and be accountable to their citizens. The United Nations Economic Commission for Europe (ECE) Environmental Performance Review Programme provides valuable assistance to member States by regularly assessing their environmental performance. Countries can then take steps to improve their environmental management, integrate environmental considerations into economic sectors, increase the availability of information to the public and promote information exchange with other countries on policies and experiences.

Last year, during the 20 years' anniversary of ECE Environmental Performance Reviews, we undertook a process of reflection and evaluation of the review process itself. One thing is clear: it has been a valuable mechanism in evaluating the implementation of the extensive environmental legislation enacted and the numerous environment-related conventions ratified by ECE member States. All the countries of the region have benefited from the discussions on the recommendations of the Environmental Performance Reviews, which entail the sharing of environmental data and knowledge and a frank exchange on best practices and lessons learned.

Recently, new instruments, such as the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change, have been negotiated and adopted to address sustainable development challenges. ECE peer review mechanisms, including the Environmental Performance Reviews, play an important role in assessing how well countries are addressing such challenges and meeting their commitments, both old and new. These mechanisms will also continue to provide an opportunity to evaluate whether policies are achieving results, whether there might be better ways to do so and how to address any shortcomings.

The third Environmental Performance Review of Tajikistan brings together a wealth of information to build a picture of the country's environmental governance and performance — both in terms of achievements and shortcomings. I trust that this third review will serve as a powerful tool to support policymakers and representatives of civil society in their efforts to improve environmental management and further promote sustainable development in Tajikistan. ECE wishes the Government of Tajikistan further success in carrying out the tasks involved in meeting its environmental objectives, including the implementation of the recommendations in the third review. I also hope that the lessons learned from the peer review process in Tajikistan will benefit other countries throughout the ECE region and facilitate the achievement and monitoring of the SDGs.



Christian Friis Bach
Executive Secretary
Economic Commission for Europe

Preface

This third Environmental Performance Review (EPR) of Tajikistan takes stock of progress made by Tajikistan in the management of its environment since it was reviewed for the second time in 2010 and assesses the implementation of the recommendations made in the second review. It covers issues of specific importance to the country related to legal and policy frameworks, the financing of environmental expenditures, greening the economy, air protection, water and waste management and biodiversity conservation. It also examines the efforts of Tajikistan to integrate environmental considerations in its policies in the agriculture, industry, energy, transport, housing and health sectors and highlights the progress achieved in the management of disaster risk associated with natural and man-made hazards.

The review further provides a substantive and policy analysis of the country's climate change adaptation and mitigation measures and its participation in international mechanisms. The successes of Tajikistan in the achievement of the Millennium Development Goals are highlighted, as well as the challenges to be addressed by the country when implementing the globally-agreed Sustainable Development Goals.

The third EPR of Tajikistan began in August 2015 with a preparatory mission to agree on the structure of the report and the schedule for its completion. A team of international experts took part in the review mission from 9 to 18 November 2015. The draft report was submitted to Tajikistan for comment in September 2016. It was submitted to the ECE Expert Group on Environmental Performance Reviews for consideration in November 2016. During its meeting on 7 and 8 December 2016, the Expert Group discussed the draft report with expert representatives of the Government of Tajikistan, focusing on the conclusions and recommendations made by the international experts. The recommendations, with suggested amendments from the Expert Group, were then submitted for peer review to the ECE Committee on Environmental Policy at its twenty-second session on 26 January 2017. A high-level delegation from Tajikistan participated in the peer review and the Committee adopted the recommendations in this report.

The Committee and the ECE secretariat are grateful to the Government of Tajikistan and its experts who worked with the international experts and contributed their knowledge and assistance. ECE would also like to express its appreciation to the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety and the German Federal Environment Agency for their support by providing funds through the Advisory Assistance Programme, and to Switzerland for its financial contribution. Sincere thanks also go to Finland, Portugal, the World Health Organization and the Joint United Nations Environment Programme/Office for the Coordination of Humanitarian Affairs Environment Unit for having provided their experts and to the United Nations Development Programme for its support of this review.

ECE also takes the opportunity to thank Austria, the Netherlands and Norway for their general financial support to the EPR Programme and expresses its deep appreciation to Belarus, Estonia, Georgia, Germany, Hungary, Montenegro, the Republic of Moldova, Romania, Sweden and Switzerland for having provided their experts for the ECE Expert Group on Environmental Performance Reviews, which undertook the expert review of this report.

TEAM MEMBERS



Mr. Antoine Nunes	ECE	Team leader
Ms. Iulia Trombitcaia	ECE	Project coordinator
Ms. Oksana Rott	ECE	Logistics coordinator
Mr. Jyrki Hirvonen	ECE	Introduction
Ms. Iulia Trombitcaia	ECE	Chapter 1
Mr. Valeriu Mosanu	ECE consultant	Chapter 2
Mr. Dieter Hesse	ECE consultant	Chapter 3
Mr. Vadim Ni	ECE consultant	Chapter 4
Mr. Cornelis Braams	ECE consultant	Chapter 5
Ms. Ana Katila Ribeiro	Portugal	Chapter 6
Mr. Juraj Farkaš	ECE consultant	Chapter 7
Mr. Zbigniew Niewiadomski	ECE consultant	Chapter 8
Ms. Anna Kuhmonen	Finland	Chapter 9
Mr. Yaroslav Bulych	ECE	Chapter 10
Ms. Irina Davis	ECE consultant	Chapter 11
Mr. Konstantin Glukhenkiy	ECE	Chapter 12
Ms. Irina Gentsler	ECE consultant	Chapter 13
Mr. Vladimir Kendrovski	WHO	Chapter 14
Ms. Dafina Dalbokova	ECE consultant	
Ms. Emilia Wahlstrom	UNEP/OCHA	Chapter 15

Ms. Naira Muradyan compiled annexes II and V.

EXPERT GROUP FOR THE THIRD EPR OF TAJIKISTAN



Ms. Marina Philipuyk	Belarus	Expert Group
Mr. Harry Liiv	Estonia	Expert Group
Ms. Mariam Makarova	Georgia	Expert Group
Ms. Katharina Lenz	Germany	Expert Group
Mr. Andras Guti	Hungary	Expert Group
Ms. Olivera Kujundzic	Montenegro	Expert Group
Mr. Adrian Panciuc	Republic of Moldova	Expert Group
Ms. Luminita Ghita	Romania	Expert Group
Ms. Ann-Sofi Israelson	Sweden	Expert Group
Mr. Xavier Tschumi Canosa	Switzerland	Expert Group
Mr. Viktor Badaker	ECE	Invited reviewer
Mr. Miquel Gangonells	ECE	Invited reviewer
Mr. Ariel Ivanier	ECE	Invited reviewer
Mr. Jose Palacin	ECE	Invited reviewer
Ms. Mirey Atallah	UN-REDD Programme Secretariat	Invited reviewer
Ms. Aykhon Sharipova	Tajikistan	Head of Delegation
Mr. Abdusalim Juraev	Tajikistan	Delegation
Mr. Timur Nazarov	Tajikistan	Delegation
Mr. Muzafar Salimov	Tajikistan	Delegation

LIST OF CONTRIBUTORS**Governmental authorities, institutions and organizations**

Committee on Environmental Protection under the Government

Mr. Khayrullo Ibodzoda
Ms. Aykhon Sharipova
Mr. Muzafar Salimov
Mr. Timur Nazarov
Mr. Abdusalim Juraev
Ms. Shahlo Azizbekova
Mr. Sayusmon Sudurov

Mr. Bozor Abdurakhimov
Mr. Kayumars Alimardonov
Mr. Anvar Eshonov
Mr. Djalil Khalilov
Mr. Rakhmatullo Khayrulloev
Mr. Abdukarim Kurbanov
Mr. Saymuddin Makhmadaminov
Mr. Khisrav Makhmadulloev
Mr. Zafar Makhmudov
Mr. Abdukodirkhon Maskaev
Mr. Egamberdi Rustamov
Ms. Gulrukhsor Tilloeva
Mr. Negmat Umonov

Majlisi namoyandagon (Assembly of Representatives)

Mr. Rustam Latifzoda

Agency of Statistics under the President

Mr. Firdavsi Asmatbekov
Mr. Kiemiddin Davlatzoda

Ministry of Industry and New Technologies

Mr. Bakhridin Abdurakhimov
Mr. Tokhir Azimov
Mr. Khaknazar Boboev
Mr. Khaidar Kholov

Ministry of Energy and Water Resources

Mr. Abdulkhakim Sattorov
Mr. Djamshed Shoimzoda
Mr. Dilshod Umarov

Ministry of Health and Social Protection of the Population

Mr. Samardin Aliev
Mr. Navruz Jafarov
Mr. Firdavs Khakrorov
Mr. Khotambek Khayrov

Ministry of Agriculture

Mr. Sherali Safarov
Mr. Sherali Vazirov
Ms. Nazira Zevarshoeva

Ministry of Economic Development and Trade	Ms. Zukhro Muktodova
Ministry of Transport	Mr. Ukumatsho Aksakolov Ms. Farida Yokubzoda Mr. Bedidzhon Ziyeev
Ministry of Finance	Mr. Masrur Mansurov Mr. Bakhrom Muzafarov Mr. Ilkhom Nozimov
Committee on Emergency Situations and Civil Defence under the Government	Mr. Mukhamadzhon Salimzoda
Committee on Architecture and Construction under the Government	Mr. Temur Negmatov
Anti-Monopoly Service under the Government	Mr. Nazar Odinzoda
Service of State Surveillance over Safety in Industry and Mining under the Government	Mr. Muzafar Nazimzoda
Agency of Land Reclamation and Irrigation under the Government	Ms. Fatima Abdulloeva Mr. Bakhrom Gafarzoda Mr. Shafoat Nazifov
Forestry Agency under the Government	Mr. Ubaidullo Akramov Mr. Khurram Bobokarimov Mr. Mubin Ironov Mr. Shodibek Kurbonov Mr. Madibron Saidzoda Mr. Sirodzhidin Salimov Mr. Rajabali Sharipov Mr. Giyosiddin Yatimov
Agency for Standardization, Metrology, Certification and Trade Inspection under the Government	Ms. Adiba Abdullaeva Mr. Mirali Olimzoda
Service of State Sanitary and Epidemiological Surveillance	Mr. Said Davlatov Mr. Kholmakhmad Nazarov Mr. Rakhmokhali Nasrudinov Mr. Murodali Melikov Mr. Azamdzhon Mirzoev Mr. Pirnazar Shodmonov

	Mr. Makhmadali Tabarov
Hydrometeorology Agency	Mr. Safar Mirzoev Mr. Khomidzhon Rasulzoda Mr. Makhmad Safarov Mr. Sangin Samiev
National Biodiversity and Biosafety Centre	Mr. Neimatullo Safarov
Dushanbe City Division on Environmental Protection	Mr. Tolib Rakhimov
Khatlon Oblast Division on Environmental Protection	Mr. Khabibullo Kodirov Ms. Zarina Nazarova Mr. Shamsidin Rakhimov
Office on Environmental Protection of the Khuroson District in Khatlon Oblast	Mr. Kurbon Beknazarov
Aarhus Centre	Ms. Sulhiya Sodiqova
Academy of Sciences	Mr. Mamadsho Ilolov Mr. Abdusattor Saidov
Academy of Agricultural Sciences	Mr. Davlatjon Komilzoda Mr. Jamshed Sattarov
Khojagii Manziliu Kommunalni (State Unitary Enterprise "Housing and communal services")	Ms. Rukhshona Abdulloeva Mr. Abdusator Boltaev Mr. Rakhmatullo Sultonov Mr. Alimurod Tagoymurodov
Nurek HPP	Mr. Rustam Fozilov
State Communal Unitary Enterprise "Trolleybus"	Mr. Abdulkhair Aliev
International organizations and financial institutions	
United Nations Development Programme	Ms. Khursheda Aknazarova Mr. Rustam Babadjanov Mr. Firdavs Faizulloev Mr. Shukhrat Igamberdiev Mr. Mirzohaydar Isoev Mr. Charles Kelly Mr. Anatoly Kholmatov

	Mr. Khurshed Kholov Mr. Jawad Nassim Mr. Ilkhom Safarov Ms. Nargizakhon Uzmanova
United Nations Office for the Coordination of Humanitarian Affairs	Mr. Valijon Ranoev
Food and Agriculture Organization of the United Nations	Mr. Viorel Gutu
Delegation of the European Union to Tajikistan	Mr. Emil Dankov
Organization for Security and Cooperation in Europe	Ms. Muhabbat Kamarova Mr. Mansur Sattorov Mr. Stefanos Xenarios
Asian Development Bank	Ms. Malika Babadjanova Mr. Hari Bansha Dulal
World Bank	Mr. Arcadie Capcelea Ms. Takhmina Mukhamedova
KfW	Mr. Manuchehr Bakoev Mr. Kristin Laabs Mr. Faridun Sanginov
European Bank for Reconstruction and Development	Mr. Jamshed Rahmonberdiev
GIZ	Mr. Benedikt Ibele Ms. Zara Mahmudova
International Fund for Agricultural Development	Mr. Sharofjon Rakhimov
USAID	Mr. Steven Welker
Aga Khan Foundation	Mr. Askarsho Zevarshoev
Tajik office of the Regional Environmental Center for Central Asia	Mr. Abdulkhamid Kayumov
Environmental Land Management and Rural Livelihoods Project	Mr. Murod Ergashev

National Water Resources Management
Project (Helvetas/ACTED/GIZ)

Mr. Anvar Kamolidinov

Non-governmental and other organisations

Fund for Support of Civil Initiatives

Ms. Muazama Burkhanova

Youth of the 21st Century

Mr. Umed Ulugov

Little Earth

Mr. Timur Idrisov
Ms. Mussavara Shukurova

Youth Ecological Centre

Mr. Yuri Skochilov

Kukhiston Foundation

Ms. Svetlana Blagoveshenskaya

International Centre for Not-for-Profit Law

Mr. Umed Kalandarov

Union of Consumers of Tajikistan

Mr. Bakhodur Habibov

Tajik Association of Road Carriers "ABBAT"

Mr. Boimurod Eshonov

National Association of Dehkan Farms

Mr. Azizbek Sharipov

Saodat

Ms. Mukharram Rasulova

Ecovakhsh

Ms. Rakhmoila Safarova

Academy of Mass Communication

Ms. Muhayo Orifova

Sadoi Kukhsor

Mr. Avazkhon Sirodjov

Khamkori Bakhri Tarakkiyot

Mr. Kurbonali Partoev

Noosphere

Ms. Tatiana Novikova

CESVI-Tajikistan

Mr. Giuseppe Bonati

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PHOTO CREDITS

Ms. Irina Gentsler (Photos 13.1, 13.2)
Ms. Natalia Idrisova (Photos 1, 5, 8, 11.2, 15.1, 15.2)
Ms. Anna Kuhmonen (Photos 1, 2, 3, 6, 9.1, 9.3, 9.4, 12.1, 14)
Mr. Zbigniew Niewiadomski (Photos 7, 11.1, 13.3)
Ms. Sarangoo Radnaaragchaa (Photo 9.2)
Ms. Emilia Wahlstrom (Photo 12.2)

Cover page photos:

Fann mountains, Peak Chimtarga in the background – Ms. Anna Kuhmonen;
Allium suworowii – Zoï Environment Network;
Big Alaudin Lake in Fann mountains – Ms. Anna Kuhmonen;
Savnob village, Bartang valley, GBAO – Mr. Alisher Primkulov;
Bukharan markhor – Zoï Environment Network.

KEY ABBREVIATIONS

ADB	Asian Development Bank
BAT	best available techniques
CACILM	Central Asian Countries Initiative for Land Management
CBD	Convention on Biological Diversity
CEIP	Centre on Emission Inventories and Projections (under CLRTAP)
CFC	chlorofluorocarbon
CHP	combined heat and power plant
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLRTAP	Convention on Long-range Transboundary Air Pollution
DRM	disaster risk management
DRR	disaster risk reduction
EBRD	European Bank for Reconstruction and Development
EIA	environmental impact assessment
ELV	emission limit values
EMEP	European Monitoring and Evaluation Programme (under CLRTAP)
ESD	Education for Sustainable Development
FAO	Food and Agriculture Organization of the United Nations
ForFITS	For Future Inland Transport Systems
GBAO	Gorno-Badakhshan Autonomous Oblast
GDP	gross domestic product
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMO	genetically modified organism
HCFC	Hydrochlorofluorocarbon
HOA	home owners association
HPP	hydropower plant
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
ILO	International Labour Organization
IMAC	Information Management and Analytical Centre
IWRM	integrated water resources management
KMK	Khojagii Manziliu Kommunalni (State Unitary Enterprise "Housing and communal services")
LDV	light duty vehicle
MAC	maximum allowable concentration
MDG	Millennium Development Goal
MSW	municipal solid waste
NBBC	State Institution "National Biodiversity and Biosafety Centre"
NBSAP	National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity
NGO	non-governmental organization
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
ODS	ozone-depleting substance(s)
OSCE	Organization for Security and Cooperation in Europe
PCB	polychlorinated biphenyls
PIP	Public Investment Programme
POP	persistent organic pollutant
PPCR	Pilot Programme for Climate Resilience
PPP	purchasing power parity
PPP	public-private partnership
PRTR	pollutant release and transfer register
RES	renewable energy sources
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goal

SEA	strategic environmental assessment
SEE	state ecological expertise
SSSES	Service of State Sanitary and Epidemiological Surveillance
SUE	state unitary enterprise
SVIS	State Veterinary Inspection Service
TALCO	State Unitary Enterprise Tajik Aluminium Company
TPP	thermal power plant
UNCCD	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
WUA	water user association
WWTP	wastewater treatment plant

SIGNS AND MEASURES

..	not available
-	nil or negligible
.	decimal point
€	euro
\$	dollar
cap	capita
eq.	equivalent
g	gram
Gcal	gigacalorie
Gg	gigagram
GWh	gigawatt-hour
ha	hectare
kg	kilogram
km	kilometre
km ²	square kilometre
km ³	cubic kilometre
kt	kiloton
ktoe	kiloton of oil equivalent
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	metre
m ²	square metre
m ³	cubic metre
Mg	megagram
MW	megawatt
PJ	petajoule
pkm	passenger kilometre
ppm	parts per million
t	ton (1,000 kg)
tkm	ton kilometre
toe	ton of oil equivalent
TWh	terawatt-hour

CURRENCY CONVERSION

Exchange rate (period average)
Monetary unit: 1 somoni = 100 diram

Year	Somoni/ US\$	Somoni /Euro
2010	4.38	5.81
2011	4.61	6.41
2012	4.74	6.09
2013	4.76	6.33
2014	4.94	6.56
2015	6.16	6.83

Source: ECE common database (accessed February 2016).

Executive summary

The second Environmental Performance Review (EPR) of Tajikistan was carried out in 2010. This third review intends to assess the progress made by Tajikistan in managing its environment since the second EPR and in addressing new environmental challenges.

Legal, policy and institutional framework

A number of new environmental laws have been adopted since 2010, with some of them tackling new issues for Tajikistan. These include, among others, the 2011 Law on Environmental Audit, which provides for mandatory and voluntary environmental audit to be performed by licensed environmental audit organizations. Significant amendments made to pre-2010 legislation included the introduction in 2012 of a new chapter on basin water management into the 2000 Water Code.

Progress has been achieved in integrating environmental considerations into sectoral legislation, although such integration is still at the initial stage. It can be observed at the level of laws and is almost absent at the level of subsidiary legislation.

The quality of environmental legislation has much room for improvement. There are a number of contradictions and inconsistencies in the environmental legislation. There are cases of no action having been taken for years to align existing legislation with newly adopted laws or governmental resolutions.

Progress has been made in improving the accessibility of legislation, including environmental legislation, to governmental officials. However, the population has free online access only to laws and not to subsidiary legislation.

Integration of environmental considerations into sectoral strategic planning is still at the initial stage. Steps are being made to introduce strategic environmental assessment (SEA) into the national legislation.

The 2016 National Development Strategy for the period until 2030 aims to align the national development agenda to the 2030 Agenda for Sustainable Development. The environment-related measures include increasing access to water supply systems, sanitation and hygiene; strengthening incentives on environmental protection for the population and economic entities; and development of a natural hazards risk management system.

The low status of the Committee on Environmental Protection is the core reason for insufficient progress with integration of environmental requirements into sectoral policies and legislation. The current status of the Committee is not sufficient to ensure the implementation of the ambitious development agenda, set in the 2016 National Development Strategy for the period until 2030 and other strategic documents on environment and socioeconomic development.

No clear separation of management function and state control function exists in forest management as both functions are vested with the Forestry Agency. Moreover, the transfer of the protected areas competences from the Committee on Environmental Protection towards the Forestry Agency in 2013 raises concerns with regard to the inherent conflict of responsibilities of the Forestry Agency, which is entrusted to manage forests and at the same time ensure the observance of the protected area regime.

Regulatory and compliance assurance mechanisms

Policy documents on compliance assurance are scarce. There are neither defined strategic priorities on environmental law enforcement nor targets on using different compliance assurance instruments to address those priorities at the national and subnational levels.

The regulated community is well identified, as there are multiple possibilities to receive relevant information about an enterprise. Sector-specific databases that contain relevant enterprise-level information exist in

different ministries and agencies. However, an information system ensuring the interconnection of databases and registers on permits and inspection activity and with external partners does not exist.

Some improvements occurred in developing product standards. Quality requirements for marketed fuel were established. On energy efficiency, a few technical standards and regulations were developed, including new norms on the insulation of buildings. Other recent technical regulations set labelling requirements for food products and safety requirements for fodder.

The 2012 Law on Ecological Expertise, together with subsequently adopted procedures for conducting the state ecological expertise (SEE) and environmental impact assessment (EIA) streamlined the mechanism of environmental assessment of projects. However, several aspects (e.g. screening and scoping, or the role of the competent authority in EIA) still remain unclear. The lack of guidance materials on EIA and the lack of a publicly accessible information system containing data on previous EIAs are the drawbacks of the current assessment system. Transboundary aspects receive only a brief mention in the legislation on EIA/SEE.

The system of inspection went through a decade-long process of reform, launched by the enactment in 2006 of the Law on Inspections of Business Entities, later replaced with the 2015 Law. Compliance monitoring activity is shown to be very intense, but its focus is mainly outside the environmental performance of the industrial sector. Inspection checklists are used but they are rather generic; there are no environmental checklists for different sectors. Other sector-specific guidance materials are not available. Available information on inspection activities is not analysed.

Tajikistan is starting to use environmental-risk-based approaches for better planning regulatory and enforcement activities. In 2013, the list of facilities and types of activity subject to EIA introduced risk-based categories for environmental assessment purposes. Earlier, the 2006 Law on Inspections of Economic Entities introduced risk-based requirements for determining the frequency of compliance monitoring actions. However, a list of high-risk facilities based on health and environmental criteria was never developed, so environmental inspections are not planned based on the clear and objective criteria of risk.

Self-monitoring by the regulated community is an important challenge. Only about 60 facilities have established self-monitoring. Many of them are municipal wastewater treatment plants (WWTPs) that check a few routine parameters in effluents. There is no legal obligation for operators to regularly report on the acquired data to the authorities.

Environmental compliance promotion activities remain sporadic. Only two companies, of which one industrial plant, are ISO 14001 certified. Steps to promote the private sector performance are taken mainly by non-state actors with support from international partners, sometimes outside environment-specific projects.

Corporate social responsibility and related reporting are at initial stage. Information disclosure by mining companies in Tajikistan is mainly oriented towards external audiences. Contribution to social issues is the most established form of corporate social responsibility.

The current environmental enforcement practices are biased towards petty offences. Monetary penalties are numerous but established and applied at low levels. The legally set level of fines is lacking proportionality in a number of cases. The court system exhibits low awareness about, and experience in, environmental cases.

Economic instruments and environmental expenditures and investments for greening the economy

The long-standing system of charges on emissions of air pollutants, discharges of water pollutants and generation of industrial waste has not undergone any significant changes since 2010. Charge rates, which have remained unchanged for some two decades in the presence of high cumulative inflation, are too low compared with the marginal abatement costs of any significant pollution reduction. The number of air and water pollutants subject to charge rates is high, which raises the issue of the resources required to administer this system relative to the environmental benefits.

The Government levies a tax on mobile sources of air pollution in the form of an excise duty on motor fuels. Although the tax rate was raised in 2014, it is still very low and unlikely to promote emission reductions from

road motor vehicles. Rates are also not differentiated based on fuel quality, notably as regards the sulphur content of diesel.

Tariffs for services provided by municipal utilities (water supply and sanitation, waste collection) have been raised significantly for all customer categories since 2010. The significant feature of the tariff regime is, however, for tariffs applied to legal entities, notably enterprises, to be significantly higher than household tariffs. This points to a continuing system of cross-subsidies in favour of the population. Total revenues collected by municipal utilities are far from sufficient for recovering operating costs.

Although progress with the installation of water meters has been made in urban areas, most households are not yet equipped with water meters. Water meters are central to reforming the water sector on the demand side and a necessary condition for the introduction of cost-reflective household tariffs.

There have been attempts to establish differentiated irrigation fee rates for the two irrigation systems (gravity irrigation and pump irrigation) in order to improve cost recovery. However as of late 2015, a unique tariff for irrigation water supply at the level of 1.5 dirams/m³, excluding VAT, was in place. The unique fee rate allows for broadly covering the costs of operation and maintenance for the gravity system but not the corresponding costs for the pump system. This has contributed to the progressive deterioration of the irrigation and drainage network.

State budget funds allocated to environmental protection have remained quite limited and were mainly used for financing recurrent expenditures. A more or less predictable source of financing for environmental expenditures is the earmarked revenues from the collection of pollution taxes and other earmarked charges. However, in general, these resources are too small to finance significant investments. There is a lack of information concerning the kinds of projects and measures financed from these funds.

Foreign financial assistance has become the mainstay of efforts to promote the economic and social development of Tajikistan. The Government's annual Public Investment Programme is entirely financed by foreign donor funds. Foreign financial funds were allocated predominantly to the energy and transport sectors, which accounted for some 51 per cent of total disbursements during the period 2011–2014. Water supply and sanitation, together with other communal services, had a share of 5.2 per cent, while environmental protection (in the narrow sense) accounted for 2.3 per cent of total foreign aid.

Environmental monitoring, information, public participation and education

The environmental monitoring networks are poorly equipped. In particular, this applies to the networks under the Committee on Environmental Protection, including Tajikhydromet, and the Ministry of Health and Social Protection of the Population. Due to poor equipment, and the lack of chemicals and fuel required to travel to monitoring points, monitoring covers limited monitoring points and monitored parameters on ambient air and water pollution. Forests and biodiversity are monitored using estimating methods.

Since 2010, the Agency of Statistics has suspended the collection of statistical reporting data on water. Comprehensive data on water use and water pollution are no longer available.

In general, the current environmental monitoring system is not indicator based. The report on the state of the environment was last published in 2010. In early 2016, the Agency of Statistics began to establish an online state of the environment report.

Environmental information is used mostly for reporting to higher levels. It is rarely used by public authorities as a tool for development and implementation of environmental policy, monitoring and evaluation of environmental performance.

Dissemination of environmental information has improved as compared with 2010; this applies in particular to the Committee on Environmental Protection. Other public authorities actively disseminate environmental information on a more limited basis.

Public requests for access to environmental information ("passive" access) are not common. The annual average number of public requests for environmental information submitted to the central office of the Committee on Environmental Protection is less than one hundred.

The Committee on Environmental Protection and the Forestry Agency cooperate actively with a number of environmental non-governmental organizations (NGOs). This includes undertaking joint public environmental awareness campaigns and joint actions such as planting trees and conducting training on environmental issues. Other public authorities are less used to cooperation with environmental NGOs and activists.

In the current EIA/SEE system, public participation as a mandatory element of the procedure is envisaged only at the EIA stage. At the SEE stage, the possibility of public participation is provided through the so-called public ecological expertise, which is rarely conducted in practice. Public participation in EIA continues to be limited and is mainly organized as part of the projects co-funded by international financial institutions.

The public seldom takes up opportunities for access to justice on environmental matters. NGOs have sometimes challenged in the courts the denial of requests for environmental information. More common is the practice of administrative review of complaints by representatives of the public on environmental matters.

Tajikistan has achieved progress on environmental education. It has not yet moved towards integration of the elements of Education for Sustainable Development (ESD) into its educational system. Some initiatives to promote ESD take place within the framework of international projects; however, there are no specific legal and policy frameworks to support ESD. Textbooks and guidance materials for teachers on ESD are almost non-existent.

Air protection

Data on total air pollution provided by the Agency of Statistics, which are mostly calculated by using emission factors, are of the same order of magnitude as the estimated data from the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), with the exception of emissions of sulphur dioxide, nitrogen dioxide and carbon monoxide, which are four times higher in the EMEP data. In contrast with the EMEP data, which show a gradual increase in air emissions in the last 5–10 years, data from the Agency of Statistics show a small reduction in emissions from both stationary and mobile sources.

With greenhouse gas (GHG) emissions of 0.4 ton of CO₂ per capita, Tajikistan ranks 160th out of 200 countries. Since 2005, GHG emissions have been stable but, due to the future growth of the population, increased traffic, a growing economy and industrial and agricultural production, GHG emissions are expected to increase in the near future.

From 1990 to 2010, there has been an enormous shift in the sources of GHG emissions. In 1990, the energy sector was by far the largest source of GHG emissions (70.46 per cent) and CO₂ by far the most emitted GHG. In 2010, GHG emissions from the energy sector reached 7.47 per cent of those in 1990. Industrial emissions of GHGs in 2010 were 41.49 per cent of the 1990 level. GHG emissions from the agricultural sector increased since 1990 by 17.25 per cent.

Emissions of NH₃ have increased in the last 10 years due to the growth of livestock husbandry. Tajikistan has not yet assessed the emission abatement potential. Technical measures based on the application of best available techniques in stables and manure management can reduce the emission of reactive nitrogen compounds. Uncertainties in emission inventory lead to the limited accuracy of emission modelling.

Heat and power plants, the chemicals industry and manufacturing industries make an important contribution to the SO₂ emissions by their combustion of fossil fuels. Although the use of fossil fuels in Tajikistan is relatively low, growing use is possible because of the rapid population growth and uncertainties surrounding the future use of hydropower, due to climate change risks.

Many central heating systems in residential areas have boiler houses heated with natural gas or fuel oil, which are no longer working, since gas imports decreased after 2010. Heating of houses in these areas is now mostly

achieved by electricity, bottled gas or coal-fired stoves. Such stoves contribute to a deterioration of the ambient air quality, as emissions are not abated and chimneys are relatively low.

Although at present the contribution of Tajikistan to global GHG emissions is very low, Tajikistan is highly vulnerable to the impacts of climate change. The rapid entry into force and effective implementation of the 2015 Paris Agreement is therefore beneficial to Tajikistan.

Tajikistan is not a Party to the Convention on Long-range Transboundary Air Pollution and its protocols. Participation by Tajikistan in the Convention would give the country better access to the necessary knowledge to develop a monitoring strategy on air pollution, a solid system of emission inventories and an air quality strategy.

Water management

Irrigation is the main water use, accounting on average for 77 per cent of total consumption during the period 2009–2014. In the same period, each of the other economic sectors accounted for between 3 and 4 per cent. In 2014, the consumption of water by households was 330 million m³, which represents 3.73 per cent.

Progress was achieved with regard to improving access to water and sanitation in line with the Millennium Development Goals. With regard to access to an improved drinking water source (Indicator 7.8), there was a 23.3 per cent improvement in the period 2000–2015, from 60 per cent of the population in 2000 to 74 per cent in 2015. Most of the increased access was in rural areas (an increase of 39.6 per cent). Similarly, the proportion of the population using an improved sanitation facility (Indicator 7.9) increased by 5.6 per cent in the same period, from 90 per cent in 2000 to 95 per cent in 2015, with a 2.2 per cent increase in urban areas and a 6.7 per cent increase in rural areas.

The control of drinking water safety parameters and water quality monitoring in centralized and non-centralized systems is conducted by the Service of State Sanitary and Epidemiological Surveillance. Of over 40,000 facilities under its supervision, only 60 per cent are inspected, mostly due to the lack of human and financial resources.

Almost the entire sewerage infrastructure is in a deteriorated state and requires rehabilitation, with over 70 per cent of existing systems having high wear and tear. About 80 per cent of wastewater treatment facilities do not meet technical requirements, so wastewater in urban areas undergoes only partial biological or mechanical treatment prior to being discharged directly to water bodies. Since 2010, no major sewerage systems or WWTPs have been constructed, planned or rehabilitated.

The irrigation and drainage network comprises 384 pumping stations of various types and capacities, irrigation channels with a total length of 29,200 km, 11,400 km of drainage networks and other infrastructure. Annually, the pumping stations use 1.3–1.5 billion kWh of electricity to deliver 5–6 billion m³ of water. Most installations have been in use for 50 years and are obsolete, due to the lack of adequate repair and maintenance. Around 30 per cent of pumps have deteriorated and suffer from power failure.

The real condition of the assets of water companies, irrigation and drainage network and intra-farm pipeline network is not well known. Water-related data, including on water quantity and water quality, are spread among various public authorities and organizations. There is no shared platform or system that would provide an overview of the situation in the entire country. The state water cadastre has not been maintained since 2005.

As of early 2016, 417 water user associations (WUAs) were in operation to distribute water among their members and other users, collect funds for water supply services, and maintain and use on-farm irrigation facilities and other water infrastructure at the farm level. However, WUAs are rather unstable due to the fact that they do not have fixed assets on their balance sheets.

The 2015 Programme of Water Sector Reform for the period 2016–2025 provides a roadmap for the transition from administrative-territorial water resources management to river basin management. It triggers major reforms in the institutional structure, the legislative framework and other areas. Its implementation is expected to be financed primarily through projects financed by development partners.

Climate change impacts on glaciers and water resources are already felt. The area covered by glaciers has declined by approximately one third since the 1930s. By the year 2050, the volume of glacial ice is expected to decrease by 25–30 per cent and river run-off to increase by 6–15 per cent. It is expected that the peak discharge in non-regulated rivers will shift to earlier months of the years, affecting economic sectors dependent on water supply. Climate change is also associated with siltation of the hydropower dams.

Waste management

Tajikistan does not have a national waste management strategy and action plan for waste management. Such strategy is under preparation. Also, the country lacks waste management plans for regions, municipalities and individual waste generators.

National data on collected municipal solid waste (MSW) are reported in m³, but individual operators prefer collecting waste data in tons. Partial data are available on MSW collection in Dushanbe and Khujand only. In 2013 and 2014, Dushanbe generated 220,880 tons and 257,000 tons of MSW, respectively. Khujand generates around 52,000 tons per year.

In 2016, collection was provided to 38.25 per cent of the country's population. This collection coverage is low; modernization of waste services must aim at increasing the share of the serviced population and developing adequate disposal capacity.

MSW is collected from designated places, which may be equipped with containers. In some cases, waste is dumped on the ground, and a front loader is used to transfer the waste to a collection truck. Another option is large containers (skips) located at the entrances to housing areas.

MSW is disposed of to allocated areas, which lack basic measures for avoiding the dispersion of pollution from waste. The Committee on Environmental Protection identified 69 disposal sites in 2016 that are used for municipal waste disposal. Existing disposal sites at regional centres are overfilled and there is an urgent need to start developing a national network of landfills.

Waste separation has not yet commenced, although some progress has been made as the collection of fluorescent lamps started. The country generally lacks recycling infrastructure, except for recycling of scrap metals and paper.

There is little information on industrial waste, because regular reporting is not carried out. Industrial enterprises and organizations, based on agreement with the road maintenance units, transport their waste to the municipal disposal sites, where it is disposed of together with municipal waste. The Committee on Environmental Protection has begun to make an inventory of disposal sites used for industrial waste.

Understanding of hazardous waste is limited to radioactive waste and pesticides. These types of waste are a priority at present and, once their situation has been improved, it is expected that progress will be achieved by defining an approach to waste with other hazardous properties.

Medical waste management is improving under the influence of donor funded projects. However old management practices continue. Experience gained in pilot projects is not evaluated and good practice is not extended to all hospitals. No healthcare waste management strategy has been developed to manage this type of waste.

Adoption of the National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 has been an important step towards improvement of the situation in radioactive waste management. The Concept defines priorities for rehabilitation works on individual tailing ponds. The highest priority is given to rehabilitation of Istiklol tailing pond, followed by Digmay tailing pond and Kujand ore heaps and mining water on the right riverbank of Syr Darya River. International donors have begun to implement programmes and projects aimed at reducing the harmful impacts of radioactive waste mismanagement.

Tajikistan has upgraded the two facilities for disposal and long-term storage of obsolete pesticides. This opens up the opportunity to accumulate pesticides from the country's small storage facilities within the central ones and to export pesticides for final disposal.

In 2016, Tajikistan acceded to the 1989 Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal. Participation in this treaty will increase the protection of the country from unregistered import of hazardous waste and will improve access to facilities for disposal of hazardous waste abroad. The country is not yet a party to the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the 2013 Minamata Convention on Mercury.

Biodiversity, biosafety, forestry and protected areas

The majority of available information on biological diversity, ecosystems and forests is outdated. Neither complex inventories nor systematic monitoring were conducted since 1991. Hence, the planning for nature conservation and forest management has been based on outdated inventories and rough estimates.

The forest cover is estimated at only 2.95 per cent of the total territory. The state forest fund accounts for 1.8 million ha, including 0.4 million ha of forests and 1.4 million ha of non-forested areas, e.g. pastures. The further decline of forests may result in accelerated desertification, landslides, mudflows and other natural disasters, limiting the profitability of agricultural practices and threatening human settlements.

The annual rate of deforestation caused by intensive livestock grazing and illegal firewood collection is higher than the natural forest biomass increment and regeneration ability. It is estimated that, due to logging and intensive cattle grazing, the area of juniper forests declines at the rate of some 2 to 3 per cent per year. Due to intensive livestock grazing in pistachio light forests, their natural regeneration is no longer possible. Mitigating the current pressures on existing forests and intensive reforestation are one of the most urgent challenges.

Some rare and endangered animal species, considered particularly attractive for trophy hunting, are subject to legalized "limited hunting", including inside protected areas. The determination of annual quota for hunting game species is based on rough estimates as reliable information on the actual size of species populations is limited.

No data on poaching and illegal trophy hunting are publicly available. The 2014 Fifth National Report to the Convention on Biological Diversity reports on the dynamics of hunting on wild species of animals and illegal hunting for 2012, and data on authorized and unauthorized hunting are presented by one aggregated number for each species.

The three million ha of protected areas accounts for about 21.58 per cent of the territory of Tajikistan. Improving the management effectiveness of the existing 20 protected areas is much more urgent than establishing any new protected areas. The only exception is the designation of small state nature reserves to protect rare or endangered flora species and communities.

The five-year management plans for several protected areas have been prepared. The area of the Tigrovaya Balka state nature reserve, previously encompassing 49,786 ha, was extended in 2011 by an additional 12,462 ha.

In 2013, the protective status of 12 out of 13 nature preserves (zakazniki) expired. It was extended only in late 2015. In 2013–2015, the unclear status of these areas resulted in growing pressures (e.g. for grazing areas) which, in some cases, led to their deterioration.

The Tajik national park was inscribed on the World Heritage List in 2013, becoming the first natural World Heritage site in the country. Five other natural areas are on the Tentative List.

The second edition of the Red Book was published in October 2015. It lists more species than the previous one; this is due to recent methodological corrections, e.g. the inclusion of lichens, and not to the growth in the number of endangered species.

The implementation of the 2005 Law on Biological Safety has been impeded by the absence of relevant by-laws establishing control and decision-making mechanisms, in addition to the lack of human and technical capacities, equipment and facilities. The country has no experience in conducting risk assessments nor in controlling intentional transboundary movements of GMOs.

In 2016, Tajikistan acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Some time and effort would still be required to provide necessary training and increase the operational capacities of agencies responsible for CITES enforcement.

Agriculture and environment

Agriculture remains a key sector of Tajikistan's economy. In 2014, 25 per cent of the total labour force worked in agriculture, and agriculture accounted for 23.5 per cent of GDP. An increasing population requires an increasing amount of agricultural production. In recent years, food crop yields and livestock numbers have increased; however, productivity and profitability remain low.

In 2014, agriculture consumed over 81.76 per cent of total water use, including for irrigation (77 per cent of the total water use). The agricultural sector is the largest source (accounting for around 80 per cent) of NH₃ emissions. But agricultural practices are not implemented in an environmentally friendly way; land and water management, especially, need to be improved.

According to official data, the overall consumption of fertilizers has decreased by 60 per cent, from 410,200 tons in 1999 to 245,300 tons in 2014. The amount of mineral fertilizers used annually in the period 2010–2014 was 141–182 kg/ha, but there is no strong trend of this decreasing. The manure of cattle that graze near villages is collected and dried, and used mainly (up to 90 per cent) as fuel; a very small share is used as fertilizer in agricultural production.

Pastures are a source of direct rural income as well as providing much of the country's meat and milk requirements. Pastures are not managed in a sustainable way that is economically viable, socially acceptable and environmentally responsible. Due to overgrazing, about 89 per cent of the summer pastures and 97 per cent of the winter pastures suffer from a medium to strong level of erosion.

In 2014, privately owned dehkan farms managed around 80 per cent of the arable land and produced 90 per cent of agricultural products. Half of dehkan farms are managed by unqualified people with no experience in agriculture. In general, farmers lack information on how to optimize the use of fertilizers, pesticides and water. Another issue has been the lack of freedom for dehkan farms to select agricultural crops to grow.

Some international projects provide for learning about the rational and sustainable use of agricultural practices. Extension services are not provided on a systematic basis by the Government.

The potential for organic farming is high. There have been pilot projects that have gained good results and have shown the availability of markets for organic production abroad. However, the accumulated best practices and knowledge are not communicated to farmers and there is no support provided to farmers to start organic farming.

The agricultural sector is vulnerable to the impacts of climate change, including increased and more severe floods, droughts, changing availability of water resources, increasing temperature and lowering and more erratic rainfall. The Pilot Programme for Climate Resilience has gained good experience in adaptation to climate change; however, this experience is not widely communicated and applied.

Industry and environment

The number of industrial enterprises increased from 1,320 in 2007 to 2,150 in 2014. However, not all registered enterprises are in operation due to a lack of raw materials and seasonal work.

Since 2007, more than 210 industrial enterprises have transferred to coal. However, for the reasons cited above, only 160 of those enterprises are now in operation.

Industrial air emissions of most pollutants did not show any specific trend during the period 2004–2011 for companies reporting to the Ministry of Industry and New Technologies, therefore excluding the State Unitary Enterprise Tajik Aluminium Company (TALCO). The only clear exception is carbon monoxide, emission of which decreased dramatically from 2004 to 2010. The decreasing trend reversed in 2011.

Average GHG emissions from the "Industrial processes" sector in 2005–2010 amounted to 9.25 per cent of total national emissions. In 2005–2010, the highest volume of emissions was observed in 2007. Metal production contributed 80 per cent of CO₂ emissions in 2010. Aluminium production contributes considerably to industrial GHG emissions.

As the mining industry has been developing over the last five years, waste generation by this industry has increased elevenfold, from 111,400 tons in 2010 to 1,267,646 tons in 2014. The amount of waste generated by light industry reportedly skyrocketed from 10,301 tons in 2010 to 1,107,549 tons in 2014. Such an increase can be partly explained by better data collection.

Tajikistan does not have policies for greening industry and promoting sustainable production, although some strategies were adopted by the Government. This important policy gap hampers the development and implementation of measures towards more efficient and green industry.

Little information is available on the pressures that industry places on the environment. Neither data nor estimates are available of industrial wastewater discharges and associated surface and groundwater pollution. There is no information on land uptake by industrial facilities and land degradation and soil contamination caused by industrial activities. Noise and vibration from industrial installations are not measured.

Energy and environment

The dissolution of the Central Asia Power System, limited gas supplies and an underdeveloped coal sector have left Tajikistan almost solely reliant on hydropower generation, which remains insufficient in the winter. An estimated one million people spend much of the winter without access to reliable electricity supplies.

The country's thermal power plants (TPPs) mainly use coal. Due to the fact that more coal-fired TPPs are currently in the pipeline, an increase in effects upon the environment might be expected to take place in the future.

Since 2005, investments in energy efficiency have increased more than threefold, reaching almost 3.5 per cent of GDP, with budget funding from all sources amounting to at least 30 per cent of investment costs. The GDP energy intensity has decreased by about 30 per cent compared with 1995.

The power sector is highly subsidized, and consequently tariffs for electricity are still low and do not reflect the costs of energy production. Energy subsidies and socially determined pricing mechanisms have failed to promote sound energy efficiency policies. Selling electricity at low prices stimulated excessive consumption.

The 2013 Law on Energy Saving and Energy Efficiency provides for the introduction of energy efficiency materials, appliances and technologies. However, energy efficiency has very low priority in practice, determined by the fact that a large proportion of the population does not have secure and reliable access to energy. There is no governmental department to govern, regulate, enforce and monitor energy efficiency reforms. Energy efficiency measures are still heavily focused on the supply side, with little improvement in demand-side management.

A Technical Committee "Energy saving, energy efficiency and energy management" was established in 2012 as part of the Agency on Standardization, Metrology, Certification and Trade Inspection under the Government. This Committee develops standards in the area of buildings, energy-consuming products and renewable energy. However, efforts to introduce standards are partly undermined by the 2010 Law on Standardization, which stipulates that standards are applied on a voluntary basis.

The Government introduced measures to restrict the manufacture, import and sale of incandescent lamps. All government, industrial and commercial organizations were requested to switch to the use of energy saving

lamps from 1 May 2009. About 241,000 poor households were provided with energy saving lamps, financed from the state budget. In the period 2009–2011, two new plants for production of energy-saving lamps have been built and put into operation.

With regard to renewable energy sources (RES), Tajikistan uses less than 1 per cent of the potential of RES other than hydropower. About 10 per cent of the country's population lives in remote, mountainous, off-grid areas where off-grid renewable energy solutions make more economic sense. To date, photovoltaic and wind energy systems are used only on a pilot basis. Overall, solar power is not yet considered as a priority supply option. The potential for using geothermal resources, the availability of thermal water and its characteristics are not well researched.

As approximately 98 per cent of the country's electricity is produced from hydropower sources in river basins fed by glacial meltwater and snowmelt, the energy sector is greatly exposed to climate change. The majority of the existing power plants, including the large Vakhsh cascade with a total capacity of over 4.5 GW, were designed in the 1950s, with no regard for climate change implications.

Transport and environment

Although vehicle ownership in Tajikistan is still rather low at 43–44 vehicles per 1,000 people, over the last decade, dramatic growth in the vehicle fleet has occurred. The rapid increase in the number of vehicles has already resulted in traffic congestion and increased air pollution.

The vehicle fleet is ageing, due to large-scale importation of outdated second-hand cars. The average age of the vehicle fleet is around 15–18 years, for both light duty vehicles (LDVs) and freight vehicles. As a result, motor transport is identified as the number one cause of environmental impacts on the quality of air in Dushanbe and other cities.

Over recent years, the impact of the transport sector on air pollution has stabilized in absolute terms. Compared with 2009, emissions of air pollutants from transport in 2014 have increased by only 14 per cent (from 249,000 to 284,000 tons), while the vehicle fleet has increased by 26 per cent (from 337,425 to 423,303) in the same period. This phenomenon is explained by the fact that more and more vehicles with petrol engines have been converted to use liquefied petroleum gas as fuel, because of its lower price and consumption rate.

In relative terms, however, road transport remains by far the main source of air pollution. In 2014, its contribution was more than 13 times higher than the total emissions from the industry and energy sectors.

The existing system of customs import duties and taxes provides almost no incentives for the importation of recent vehicles. New vehicles (produced within the last five years) are subject to a 5 per cent import duty, compared with 7 per cent for vehicles that are older than five years. This 2 per cent difference is not significant, taking into account that all imported vehicles are also subject to a 10 per cent excise tax and 18 per cent VAT. Customs duties and taxes provide no distinctions based on a vehicle's engine power, volume, powertrain or fuel (petrol, diesel, hybrid, etc.). When calculating the annual vehicle ownership tax, no distinction is made based on the powertrain or fuel consumption of a vehicle.

The Government has introduced mandatory periodic vehicle inspections and emission testing to determine the roadworthiness of LDVs and freight vehicles. However, the current system of vehicle emission tests and roadworthiness inspections is not stringent enough and mainly gears up for revenue collection, rather than for improving air quality and road safety.

The 2015 Law on Ensuring the Environmental Safety of Road Transport envisages a wide range of measures to mitigate the environmental impacts of the road transport. However, a coordination mechanism among various public authorities is not yet available. The available international standards for road vehicles, which are indispensable for the proper implementation of this Law, have not yet been adopted.

Several projects have been completed to improve the public transport system. Still, the current public transport system cannot cope with the increasing needs of the population. This is due to the outdated fleet, deteriorating infrastructure and inefficient structure of routes for various types of public transport. The growing demand for

public transport services, in particular in the capital, is partially met by unlicensed private companies (4,000 illegal carriers in Dushanbe alone) that operate without proper control by the authorities, cause traffic problems and impede road safety.

Housing and utilities sector and the environment

The Government adopted the Concept for Reform of the Housing and Utilities Sector for the period 2010–2025 and the Programme of Development of the Housing and Utilities Sector for the period 2014–2018. However, issues relating to modernization of the existing housing stock in apartment buildings, enhancement of its reliability and improvement of its energy efficiency and environmental safety are not addressed sufficiently. A governmental body responsible for development and implementation of state policy in the housing and utilities sector – envisaged by the Programme – has not yet been established.

Over the past decade, the total floor space of the housing stock has increased by 52.5 per cent. Rural housing stock grew by 75.58 per cent and urban housing stock by 21.4 per cent. This is a result of citizens' initiatives, mostly in rural areas, in the absence of any substantial governmental support. The increase falls short of satisfying people's housing needs: the average per capita floor space (10.9 m²) remains below the established social standard of per capita floor space (12 m²).

The revision of construction standards and norms is in process, with an aim to establish clear requirements for design and construction, which would facilitate the use of new and traditional safe construction materials and modern technologies designed to resist seismic and other unfavourable natural factors and to provide environmental safety. At the same time, the level of public awareness in respect of seismic protection regulations, energy efficiency and resilience to climate change is still low. New construction standards and norms are hardly ever applied in construction of self-build houses in rural areas.

The legal framework for establishing home owners associations has been put in place. However, only a few associations were established. In the majority of cases, they play a minor role in improving the management and maintenance of apartment buildings. For many years, apartment buildings have not had adequate technical maintenance and repairs. There is a huge need for capital repairs and enhancement of energy efficiency in such buildings.

There are no statistical data available on air pollution by the housing and utilities sector. About 88 per cent of rural households and 37 per cent of urban households with limited access to electricity use stoves for heating and cooking. These stoves run on solid fuels (coal, wood, agricultural waste) and contribute to air pollution. Most boiler houses of the remaining central heating systems are characterized by high emission of pollutants, partly due to their conversion from gas to coal without modern flue-gas cleaning systems.

Large green areas in parks, mini-parks, alleys and gardens in land pots adjacent to housing are typical of urban settlements in Tajikistan. Green areas account for about 30 per cent of the total area of cities. However green areas of common use are poorly developed in peripheral areas of towns and cities. Non-native tree species, which are vulnerable to the climate of Tajikistan, are used in place of native broad-leaved species in new green areas in urban communities, especially in Dushanbe.

The available data on the state of the housing sector are limited to the information received through the 2010 population census and published in 2013. There are no up-to-date reliable and comprehensive statistical data that would allow the Government to identify and comprehend the problems in respect of housing provision and the availability of communal services.

Health and environment

The notifiable gastrointestinal infections, which continue at high levels in the period 2005–2014, indicate a significant burden of ill health associated with unsafe water. The incidence of viral hepatitis, especially the most common Hepatitis A, tends to be on the rise. Though declining after 2009, the life-threatening disease typhoid fever is still present. The actual burden of water-related diseases is likely to be higher because of the limitations of the country's surveillance system.

The increasing incidence rates for selected parasitic diseases in the period 2005–2014, with infections sourced from contaminated food and/or water, is an alerting signal for environmental public health status. These infections are: giardiasis caused by contaminated food or water, ascariasis and enterobiasis, caused by contaminated hands due to poor personal hygiene and poor sanitation, as well as by contaminated food and, less commonly, water.

Morbidity from major notifiable zoonoses such as bovine tuberculosis, brucellosis and anthrax persisted in the period 2007–2011. Improper treatment of animal products (e.g. non-pasteurisation of milk), the illegal selling of farm products on the streets and overall weak control determine the burden of the population's ill health of epizootic origin. Monitoring and control of food contamination is not efficient and neither is there capacity for timely detection and prevention of human zoonoses.

Three centres for prevention and control of undernutrition have been set up across the country. However, undernutrition remains a priority issue severely affecting children and other vulnerable populations. Overall, only 20 per cent of children aged 6–23 months are fed appropriately according to the recommended infant and young child feeding practices.

There are no data on chemical incidents and number of cases of poisoning induced by chemicals. The poisoning of schoolchildren in May 2016 following a school disinsection in the Shamsiddin Shokhin district of the Khatlon Oblast showed the lack of capacity of the health sector in chemical incident preparedness and response.

Asbestos-related diseases have not been registered in the occupational diseases register of Tajikistan. Workers at the asbestos facilities undergo regular occupational medical check-ups. Asbestos-containing products are legally available, and the Dushanbe cement factory resumed production of corrugated asbestos-cement sheets in September 2013.

Although national legislation prohibits the employment of children below 15 years of age, child labour still remains a widespread problem. According to Child Labour Survey 2012–2013, 26.9 per cent of boys and 19.7 per cent of girls aged 5–17 years are working. In the 5–11 years age group, these figures are 13.3 per cent for boys and 8.1 per cent for girls. Among 12–14 years group, 34.7 per cent of boys and 25.1 per cent of girls are working and in the 15–17 years age group, these figures are 45.5 per cent and 38.4 per cent, respectively. Children are mostly engaged in elementary occupations and are unpaid family workers.

Tajikistan has ratified most of the health-relevant international conventions. However, it has not acceded to the ECE/WHO Protocol on Water and Health. The country has only partially benefited from the Strategic Approach to International Chemicals Management initial capacity-building activities. The participation of Tajikistan in the European Environment and Health process has been rather ad hoc.

Management of disaster risk associated with natural and man-made hazards

Over the past 10 years, a lot of effort has been put into strengthening the disaster risk management (DRM) system. Through the 2010 National DRM Strategy for the period 2010–2015 and the National Platform for Disaster Risk Reduction, disaster risk reduction has become a known concept in the country. However, the practical work of key institutions still centres on response.

The 2010 National DRM Strategy for the period 2010–2015 was based on the Hyogo Framework for Action 2005–2015 and complemented DRM measures that have been provided in previous programmes and action plans. The inclusion of DRM in local programmes of socioeconomic development was one of a number of achievements. However, the links between the National DRM Strategy and ongoing climate change adaptation work appear to be weak.

Existing disaster risk coordination platforms are limited in their scope. The National Platform for Disaster Risk Reduction does not include all relevant government authorities or partners.

The recently introduced Uniform State System for Emergency Prevention and Response is a good attempt to harmonize sectoral disaster management initiatives. According to the Uniform System, commissions on

emergency situations are set up at the national, regional, district and facility levels and are responsible for decision-making and coordination in the event of emergency. However, the Uniform System has yet to be put into concrete action through the clarification of duties and responsibilities and development of concrete mechanisms for collaboration.

Risk information is not systematically managed, with vertical silos hindering information sharing between authorities and across sectors. A lot of risk information is classified and not shared among government bodies, and much less with partners and the general public. Gender-disaggregated disaster data are not publicly available.

Many good efforts by donors and international and national NGOs have been implemented at the local level, where community awareness of risk has increased. Search and rescue teams, and volunteers, are responding to disasters and saving lives. At the national level, the lack of ownership, and technical and financial capacity is hindering the sustainability of the work of these partners.

Tajikistan has committed to the Sendai Framework for Disaster Risk Reduction 2015–2030. The country is part of the Shanghai Cooperation Organisation, through which capacities for disaster response are being strengthened. However, Tajikistan is not a member of the International Search and Rescue Advisory Group and is not represented in the United Nations Disaster Assessment and Coordination team.

In 2011, Tajikistan acceded to both the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. Tajikistan is not yet a Party to the ECE Convention on the Transboundary Effects of Industrial Accidents.

Introduction

I.1 Physical context

Tajikistan is a landlocked country in South-East Central Asia. The country has a land area of 143,100 km² and is bordered to the north by Kyrgyzstan (border length 630 km), to the east by China (430 km), to the south by Afghanistan (1,030 km) and to the north and west by Uzbekistan (910 km).

Three mountain systems, the Tien Shan, the Gissar-Alay and the Pamir mountains, cover about 93 per cent of Tajikistan's land area. Topography ranges from 300 to 7,495 m in elevation, and almost half of the land area lies above 3,000 m.

In addition to its highest mountain peak, Qullai Ismoili Somoni (7,495 m), which is located in the Pamir mountain range, Tajikistan has 72 mountain peaks over 6,000 m high. Earthquakes are frequent because Tajikistan is situated on an active seismic belt that extends throughout the entire south-eastern section of Central Asia.

The high mountains are permanently covered by snow and ice, and the glaciers, covering 8,476 km² or about 6 per cent of the country's land area, are estimated to hold 576 km³ of freshwater reserves. The melting snow and shrinking glaciers feed the rivers of the Aral Sea basin, contributing about 10 to 20 per cent of the total water flow and providing 6 to 13 km³ of fresh water annually.

A specific feature of Tajikistan is its high-altitude lakes, covering more than 680 km² and situated mostly in the eastern Pamir region. Of some 1,000 lakes, 80 per cent are situated higher than 3,000 m above sea level.

The western part of the country consists of foothills and steppes (semi-arid grassy plains), while the lowland areas are limited to river valleys in the south-west and in the extreme north, where a strip of the country's territory extends into the fertile Fergana Valley.

The distinct natural environments, ranging from hot deserts to cold alpine areas, feature very diverse fauna, including several rare species. The rich flora varies from drought-resistant grasses and low shrubs on the steppes to the dense forests of coniferous trees covering the mountain slopes.

The climate is continental, but the huge variations in elevation, combined with a very complicated relief structure, create unique regional and local climates, causing great temperature differences with considerable seasonal and daily weather fluctuations. The annual mean precipitation varies hugely from the minimum of less than 100 mm in the eastern Pamirs to 500 to 600 mm in the Vakhsh River valley in the south and reaching the maximum of over 2,000 mm at the Fedchenko Glacier.

I.2 Human context

Tajikistan has had very rapid population growth. From 2005 to 2014, the population increased by 22.07 per cent from 6.84 to 8.35 million. The average population density in 2015 was 58.6 persons per km². While the average population density is not very high, it varies significantly due to the mountainous geography, making the lowlands of northern and western Tajikistan the most densely populated areas of the country.

Along with the population growth, other demographic indicators have changed during the past ten years. The already high total fertility rate increased by 15.15 per cent from 2005 to 2013, while the mortality rate diminished by 13.04 per cent between 2005 and 2014. Life expectancy increased steadily. Average life expectancy at birth, which was 70.6 years in 2005, increased to 73.4 years in 2014 (75.4 for women and 71.6 for men). The biggest percentage change in the demographic figures was the 28.8 per cent decrease in the infant mortality rate, which fell from 54.1 deaths per 1,000 in 2005 to 38.5 deaths per 1,000 in 2012. The only figure staying almost constant was the birth rate, which was 27.8 per 1,000 in 2014 – almost the same as in 2005.

Most of the country's population lives in rural areas. In 2015, only 26.5 per cent of the population lived in urban areas and there has been practically no change in the urbanization rate since 2005. The largest city is the capital, Dushanbe, with 788,700 inhabitants. Other cities include Khujand (pop. 172,700), Kurgan-Tyube (pop. 102,900) and Kulob (pop. 101,200).

I.3 Economic context

Tajikistan joined the World Trade Organization (WTO) in March 2013, becoming the 159th member of the organization. This was in line with Tajikistan's foreign trade policy goal of developing the country's

export potential. Membership of the WTO will probably have an effect on Tajikistan's export and import markets.

Tajikistan's economy is based on aluminium, cotton and electricity. About three-quarters of total export earnings in 2013 was derived from aluminium (57 per cent), cotton (13 per cent) and electricity (5 per cent). During the past ten years, the shares of export-income-generating industries have been almost constant. Lack of diversification and reliance on a few export products make Tajikistan vulnerable to fluctuations in global commodity prices and terms of trade.

The industrial sector is dominated by aluminium production. The sole plant of the State Unitary Enterprise Tajik Aluminium Company (TALCO), located in Tursunzade, is one of the largest in the world and has a production capacity of 500,000 tons of aluminium per year. Almost all aluminium is exported and aluminium brought in 58.4 per cent of the export earnings in 2009. The three main export destinations for aluminium are Turkey, Iran and the Russian Federation. Aluminium production is an energy-intensive industry and, depending on the source of information, the aluminium industry is reported to consume some 40 to 50 per cent of the country's annual electricity production.

In 2009, the plant produced 348,000 tons of aluminium, which accounted for about 40 per cent of Tajikistan's total industrial output. The year 2014 was the seventh consecutive year with falling aluminium output. According to the official data, in 2014, output contracted by 42.2 per cent to 125,000 tons, below the Government's target production level of 150,000 tons per year. Since Tajikistan exports most of its aluminium, not only the production level but also the weak average annual global price of US\$1,864 per ton in 2014 affected the sector's performance. The Ministry of Economic Development and Trade indicated that aluminium exports were worth US\$234 million in 2014, a reduction of 37.2 per cent compared with 2013.

Before independence in 1991, Tajikistan's cotton production peaked at 800,000 tons/year. By 2005, cotton production had diminished to 448,000 tons, about half the level prior to independence. Although the production level has dropped, cotton still dominates the agricultural sector. In 2014, cotton production was 372,656 tons, and cotton alone, as the main agricultural export crop, contributed 90 per cent of agricultural export income.

The total power production capacity of the country is 5,190 MW, of which 93.9 per cent is produced by hydropower plants (HPPs) and 6.1 per cent by thermal power plants (TPPs). Currently there are 10 large or medium and about 265 small operational HPPs in the country. The world's highest such plant is the 300 m high Nurek dam, with installed hydropower capacity of 3,015 MW. It currently provides 70 per cent of the country's electricity but it is ageing, having been built in the 1970s. The estimated total annual hydropower potential is 527 billion kWh, of which 317 billion kWh could be used for power production.

The Rogun project, which envisages the construction of an even bigger 335 m high dam on the Vakhsh River with a capacity of 3,600 MW, began in the late 1970s and was revived in the early 2000s. The project is regarded as Tajikistan's way of attaining energy independence. Two assessment studies to evaluate the viability of the project according to international standards were supported by the World Bank and finalized in 2014 (box 11.1).

In general, Tajikistan's economy had a growing trend during the review period. The average annual gross domestic product (GDP) growth was 5.12 per cent between 2005 and 2013. In most years, there was respectable annual GDP growth, from 6.6 to 7.4 per cent. However, in 2009, growth was affected by the global economic crisis in 2008, which hit the economy and cut GDP growth to 4.0 per cent. In 2012 and 2013, GDP growth returned to the level prior to the 2008 crisis (7.5 and 7.4 per cent respectively). In 2014, economic growth slowed slightly, to 6.7 per cent; the main reasons for this were the weak global prices for key export commodities and the low expansion of services caused by the decline in remittances.

The exceptionally high level of migrant workers' remittances has played an important role as one of the drivers of economic growth during the past ten years. Massive remittances injected into the economy have increased the incomes of the population and have helped to reduce poverty significantly. The 2014 economic slowdown in the Russian Federation, from where over 90 per cent of remittances originate, had a major impact on Tajikistan's economy through the decline in remittances. Decreased remittances have lowered Tajikistan's domestic demand and slowed the growth in services, which have been the major contributors to economic growth in the past decade. In spite of the decline, the 2014 remittances still amounted to 41.7 per cent of GDP and Tajikistan still remained the most remittance-dependent country in the world.

Since 2005, the official registered unemployment rate has fluctuated between 2.0 and 2.4 per cent and the latest available figure, for 2013, was 2.3 per cent. The reason for this very low unemployment figure is that a large share of Tajikistan's labour force lives and works abroad. According to the International Organization for Migration, 589,748 Tajiks or 6.5 per cent of Tajikistan's total population resided in the Russian Federation in 2015.

Inflation, measured by the Consumer Price Index (CPI), was 7.2 per cent in 2005, then jumped to 20.9 per cent in 2008 but fell to a reasonable 6.1 per cent in 2014. Tajikistan has not been very successful in attracting foreign direct investment (FDI) and the cumulative FDI level is low. FDI net inflows as a percentage of GDP were 11.96 per cent in 2006, decreased to 7.28 per cent in 2008, but thereafter reduced to almost nothing. The latest available FDI figure, for 2014, was 2.82 per cent of GDP.

The ease of doing business in Tajikistan has improved markedly during the past few years. The country ranked 132nd out of 189 economies in the World Bank's report *Doing Business 2016* – a rise in rank of 45 positions in three years (it was 177th in 2014).

I.4 Social issues

The per capita GDP (US\$ purchasing power parity (PPP), 2005) of Tajikistan is lowest in the United Nations Economic Commission for Europe (ECE) region, but the continuous GDP growth since 2005 has markedly improved the living standards of the population. The increase in per capita GDP (measured in 2005 PPP somoni) by 34.16 per cent between 2005 and 2013 has reduced the number of people living below the national poverty line. In 2007, over half (53.1 per cent) the population lived below the national poverty line. This decreased to 47.2 per cent in 2009 and, while the published target for 2015 in the National Development Strategy for the period until 2015 was 32 per cent, the latest available poverty level figure from the Asian Development Bank (ADB), for 2015, was slightly higher than the target – 35.6 per cent.

In 2005, Tajikistan's composite human development index (HDI), as measured by the United Nations Development Programme (UNDP), was 0.673 (on a scale of 0.0 to 1.0), and the country ranked 122nd out of 177 countries assessed. The 2014 HDI figure was a bit lower, at 0.624, and Tajikistan's relative position weakened, dropping the country to 129th position out of 188 countries.

Health care

Tajikistan has challenges in providing health care to its citizens. The ease of access to health care is a particular problem. For people living in mountainous areas or poor regions without decent roads, getting to a healthcare clinic can be an arduous struggle. Many pregnant women do not go in for pre-natal check-ups or to learn about family planning.

Education

While the school enrolment level is high, certain specific groups encounter barriers in access to education. Girls face problems with access to education, particularly at higher levels of basic education, as well as with access to vocational and higher education. Poor families have difficulties with access to schooling for their children because of the direct and indirect costs, which may include the costs of buying expensive school books or transport expenses if the school is located far from home. Children with a physical disability struggle with the lack of appropriate infrastructure in schools and the absence of adapted teaching material, combined with the limited ability of teachers to deliver inclusive education.

Gender

The UNDP Gender Inequality Index for 2014 placed Tajikistan, with a score of 0.357, in 69th place out of 155 countries. The World Economic Forum's *Global Gender Gap Report 2014* ranked Tajikistan in 102nd position out of 142 countries, with a score of 0.665.

Tajikistan acceded to the 1979 Convention on the Elimination of all Forms of Discrimination Against Women in 1993. In 2014, Tajikistan ratified the 1999 Optional Protocol to this Convention but without recognizing the competence of the United Nations Committee on the Elimination of Discrimination against Women to initiate inquiries into situations of grave or systematic violations of women's rights. In 1999, the country acceded to the 1953 Convention on the Political Rights of Women. At the national level, the 2005 Law on State Guarantees of Equal Rights and Equal Opportunities for Men and Women aims to prevent any discrimination based on gender. Key policy documents include the National Strategy to Promote the Active Role of Women in the Republic of Tajikistan for the period 2011–2020 (2010 Resolution of the Government No. 269) and its Action Plan for the period 2015–2020 (2015 Resolution of the Government No. 548).

Photo I: Women harvesting, Hisor District

The officially declared goal of having 30 per cent representation of women in governing bodies of the legislative, judicial and executive bodies has not been achieved. Female participation declines the higher the state level. In 2012, only one of the 18 government ministers was a woman, but this increased to two of 18 in 2015.

The number of female legislators in the lower chamber of the parliament, the *Majlisi namoyandagon* (Assembly of Representatives), increased slightly over the review period. The proportion of female legislators was 12.7 per cent in 2005, increasing to 19.05 per cent after the March 2015 elections. However, the representation of women in the upper chamber, the *Majlisi milli* (National Assembly), decreased from 23.53 per cent in 2005 to 6.25 per cent after the 2015 elections.

There is practically no gender imbalance at the primary level of education, where the enrolment ratio in 2014 was 1 female to 0.99 male. At the secondary level of education, there was a slight imbalance in the enrolment ratio of 0.9 female to 1 male in 2012. However, the tertiary education level has a much higher enrolment differential: in 2014, the ratio was 0.61 female to 1 male.

According to the 2013 World Bank *Tajikistan Country Gender Assessment*, other factors limiting gender equality include women's limited access to land and finance, the effects of external labour

migration and patriarchal systems of decision-making that limit women's ability to make effective choices.

I.5 Institutions

Tajikistan is a presidential republic. The head of state is the directly elected President. The length of the presidential term is seven years and the President may serve no more than two consecutive terms. The President appoints the Prime Minister and other members of the Government. The latest presidential elections were held in 2013.

The legislature has two chambers. The lower chamber, the *Majlisi namoyandagon* (Assembly of Representatives), which convenes on a permanent basis, has 63 members, who are chosen by direct popular election for a five-year term. Twenty-two of the members are elected by proportional representation (in which representatives are elected from party lists in proportion to the number of votes each party receives), and 41 are elected from single-member constituencies (geographical areas that each have one representative). The latest parliamentary elections, in which the People's Democratic Party won 51 of the 63 available seats, were held in March 2015.

The upper chamber, the *Majlisi milli* (National Assembly) convenes at least twice per year and has 33 members, who are indirectly elected for a five-year term. Three-quarters of them, 25 members, are

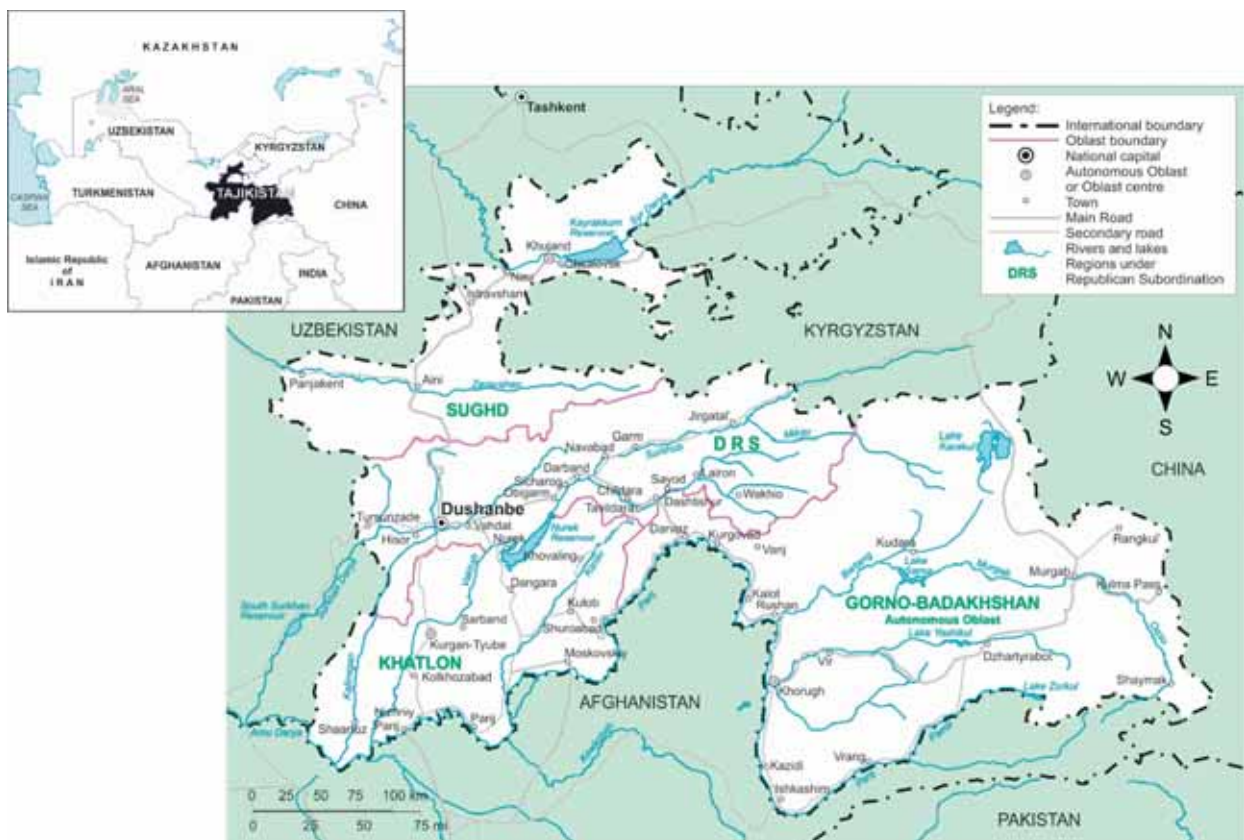
chosen by the deputies of the local assemblies (majlisi). The remaining eight members are appointed directly by the President. The latest elections for the National Assembly were held in March 2015.

The Constitution provides for an independent judiciary. The court system has local, district, regional and national levels, with each higher court serving as an appellate court for the level below. The Supreme Court is the highest court. Other high courts include the Supreme Economic Court and the Constitutional Court. The president appoints the

judges of these three courts, with the approval of the legislature.

The administrative-territorial structure of Tajikistan includes the Gorno-Badakhshan Autonomous Oblast (GBAO), the Sughd Oblast, the Khatlon Oblast, 62 districts, 18 cities and towns, 57 settlements and 370 rural administrations (djamoats dechot). Thirteen districts in central Tajikistan are under republican subordination. The capital, Dushanbe, is administratively independent and divided into four districts.

Map I.1: Administrative map



Source: United Nations Cartographic Section, 2010.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

**PART I: ENVIRONMENTAL GOVERNANCE AND
FINANCING**

Chapter 1

LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

1.1 Legal framework

The system of legal acts in Tajikistan includes, from the top downward, the Constitution; laws adopted by national referendum; international agreements to which Tajikistan is party; constitutional laws; codes and laws; joint resolutions of the two chambers of the parliament, Majlisi milli (National Assembly) and Majlisi namoyandagon (Assembly of Representatives); resolutions of Majlisi milli and resolutions of Majlisi namoyandagon; decrees of the President; resolutions of the Government; resolutions of ministries, state committees and other state bodies; and acts of the local representative and executive authorities.

Environmental laws

New laws

A number of new environmental laws have been adopted since 2010, with some of them tackling new issues for Tajikistan. In 2011, the Law on Environmental Protection was adopted in place of the 1993 Law on Nature Protection. The new Law expands some provisions of its predecessor and adds several new concepts and elements. The novelties of the Law include provisions on strategic planning in environmental protection, provisions on rights of public associations in the area of environmental protection, concepts of environmental certification and environmental audit, provisions on the protection of green areas and a chapter on compensation for environmental damage. The Law is more detailed on the delineation of responsibilities of the environmental and sanitary authorities in setting ambient quality and emissions standards, and on the environmental requirements for sectoral activities. Remarkably, the Law introduces consideration of environmental requirements in cases of privatization, bankruptcy and closure/reorganization of a legal entity. The 2014 amendment to the Law allows environmental inspectors to use firearms and special devices.

The 2011 Law on Specially Protected Natural Areas replaced the 1996 Law on Specially Protected Natural Areas and Objects. The 2011 Law adds one new category – state zoological parks – to the categories of specially protected natural areas and

describes in more detail the regime of all categories of protected areas, which include state nature reserves; state nature parks; nature preserves; state zoological parks; state monuments of nature; ecological-ethnographic zones; dendroparks and botanical gardens; and natural zones of health resorts, therapeutic and recreational zones. The Law describes strategic planning on specially protected natural areas which is to be done as part of concepts, strategies and plans of socioeconomic development and on the basis of the state environmental programme. The Law includes the notions of protection (buffer) zones and ecological corridors but is silent on the national ecological network. The Law includes a chapter on specially protected natural areas of international importance, such as those included in the World Network of Biosphere Reserves, wetlands of international importance and interstate natural parks and reserves.

The 2012 Law on the Protection of Atmospheric Air replaced its 1996 predecessor. The new Law introduces the classification of sources of emissions of air pollutants and provisions regulating the requirements on air protection for stationary and mobile sources, for combustion of fuels and incineration of waste, and for harmful physical effects (noise, vibration, electromagnetic fields, etc.), as well as provisions on air protection during unfavourable meteorological conditions. The 2012 Law does not go further than its predecessor in regulating ozone layer protection.

The 2011 Law on Environmental Audit is a novelty for Tajikistan. The Law provides for mandatory and voluntary environmental audit to be performed by licensed environmental audit organizations. The mandatory audit takes place upon the decision of governmental authorities. In 2015, amendments were introduced in the 2004 Law on the Licensing of Certain Types of Activities to include environmental audit in the types of activities regulated by this Law. The licences to conduct environmental audit are to be issued by the Committee on Environmental Protection under the Government, which is the specially authorized state body in charge of regulating environmental audit. The Government has approved the procedures for requesting the mandatory environmental audit (2014 Resolution of the Government No. 789) and for maintenance of the

register of environmental auditors and environmental audit organizations (2015 Resolution of the Government No. 550). However, subsidiary legislation is still needed to define rules for conducting environmental audit, forms for conclusions of environmental audit and other aspects.

The 2010 Law on Drinking Water and Drinking Water Supply was adopted for the first time. The Law covers public and private centralized and non-centralized drinking water supply systems and provides for state support for the development and functioning of drinking water supply systems through tax incentives, credits and other incentives. Local authorities and owners of water supply systems are obliged to take measures in the event of interrupted functioning of drinking water supply systems to ensure the provision of drinking water through the use of standby sources and systems or delivery of water in tanks. The Law includes the requirements for sanitary protection zones for all sources and systems of drinking water supply.

The 2011 Law on Environmental Monitoring, adopted for the first time, describes the organization of the Consolidated State System of Environmental Monitoring and establishes the state register of environmental monitoring objects. The Law provides for obligations of enterprises to organize local environmental monitoring, i.e. monitoring at facility level. It also requires that governmental authorities at various levels use the data of environmental monitoring in decision-making. The provisions of the Law are further detailed in the 2014 Resolution of the Government No. 791 "On the Procedure of organization of the unified state environmental monitoring system and on the state register of environmental monitoring objects in the Republic of Tajikistan" (chapter 4).

The 2011 Law on Environmental Information is a new law for Tajikistan. It describes the notion and categories of environmental information and regulates terms and conditions of access to such information. The Law divides environmental information into general (to be actively disseminated by the authorities and provided free on request) and specialized (which requires additional preparation and is provided on the basis of a contract). The Law includes a non-exhaustive list of limitations to access to environmental information. While, formally, the 2011 Law on Environmental Information prevails over the 2002 Law on Information as an act adopted later in time and as a specific act on the issue, there could be issues with access to environmental information that are not precisely regulated in the Law on Environmental Information and would

therefore fall under the Law on Information, e.g. the Law on Environmental Information is silent on the "information of restricted access" and several other limitations included in the Law on Information.

The 2012 Law on Ecological Expertise replaced its 2003 predecessor, streamlining the procedures of the state ecological expertise (SEE) (chapter 2).

The 2010 Law on Environmental Education of the Population aims to ensure that all citizens receive minimum ecological knowledge and declares the mandatory character of ecological education at all levels of the educational system. The system of environmental education is part of the overall educational system and should be implemented through state educational standards. The Law does not entrust any central government body with competences on environmental education, but provides for the establishment of inter-agency commissions at national and local levels in order to coordinate environmental education-related activities of various executive authorities. As of late 2015, the commissions have not yet been established.

The 2011 Forest Code replaced the 1993 one. The Code regulates the organization of forestry, monitoring and inventory of the state forest fund, afforestation and reforestation and permitting of forest use, and establishes the State Inspectorate on Forest Protection. Compared with the 1993 Code, which allowed timber harvesting only through sanitary and similar cuts, the 2011 Code introduced provisions for the harvesting of timber and fuelwood. The 1993 Code applied the division of forests into groups but allocated all forests of the country to the first group only. The 2011 Code does not apply the division of forests into groups. Instead, it provides for five protection categories depending on the functions of forests (water protection forests; protective forests; sanitary, hygienic and recreational forests; forests of specially protected natural areas; forests with nut and fruit plantations); however, it does not describe the regimes of all these categories. The Code provides that economic activity and use is restricted in forests of specially protected natural areas, such as nature reserves and nature preserves, forests of natural and historic monuments and forests subject to scientific and research activities and seed production; however, the restrictions are not described in detail.

The 2013 Law on Fishery, Fishing and Protection of Fish Resources replaced the 2006 Law on Fishery. The new Law introduces the system of quotas for extraction of fish approved by the state body in charge of fisheries upon consultation with the Scientific Council on Fishery, Fishing and Protection

of Fish Resources. Quotas apply not only to commercial fishery but also to scientific and research fishing and other fishing. Quotas are approved through the conclusion of yearly contracts with users of fish resources. The new Law allows fishing of Red Book species "depending on the purpose of their extraction (fishing) provided that it does not harm fish resources and their habitats". The 2007 Rules on Fishing in Water Bodies of the Republic of Tajikistan (2007 Order of the Minister of Agriculture and Nature Protection), which are still in force, prohibit the extraction of rare species included in the Red Book, e.g. Bastard sturgeon, pike asp and Aral barbell, throughout the whole year in all water bodies.

The 2014 Law on Hunting and the Hunting Sector regulates the hunting sector in detail and was adopted to facilitate trophy hunting. Game species are divided into limited and unlimited game species. The limited species include endangered Red Book species. Several subsidiary legal acts, including the new regulation on hunting, are still to be adopted in furtherance of the Law. The 2011 Law on Environmental Protection and the currently valid Regulation on Hunting and Hunting Sector (1997 Resolution of the Government No. 324) explicitly prohibit the hunting of all Red Book species. In 2012, the amendments to the 1999 Law on Tourism added a notion of international hunting (interokhota), or hunting with the participation of foreign citizens, to the types of tourism in Tajikistan.

The 2013 Law on Radioactive Waste Management, adopted in Tajikistan for the first time, envisages monitoring of radioactive waste through establishment of a state register of radioactive waste and state cadastre of radioactive waste disposal sites. It regulates the design and construction of radioactive waste management facilities, which shall be done on the basis of the SEE and state nuclear and radiation safety expertise. The Law provides for the social protection of personnel working with radioactive waste and for compensation for damage to citizens living or working in the neighbourhood of radioactive waste disposal sites or radioactive waste management facilities.

The 2010 Law on the Safety of Hydrotechnical Infrastructure was adopted for the first time. It applies to infrastructure for hydropower and flow regulation, and flood protection, as well as to dikes embanking the deposits of liquid wastes. The Law places the responsibility for the safety of hydrotechnical infrastructure on the owners and users of such facilities, who shall ensure compliance with safety rules during construction and exploitation,

perform regular inspection and safety assessment, take measures to ensure safe operation, ensure development and updating of safety criteria, and keep local warning systems operational. The Law introduces such instruments as a declaration of safety that has to be completed by the owners or users at the various stages of life of a hydrotechnical installation. In 2015, the Government enacted subsidiary legislation, i.e. Procedures for development and operation of state expertise for declaring the safety of hydrotechnical infrastructure, Procedures for establishment and maintenance of the State Register of Hydrotechnical Facilities, and Procedures for defining the financial limits of civil liability for damage caused as a result of an accident at a hydrotechnical facility (2015 Resolution of the Government No. 436).

Amendments to existing laws

Since 2010, few amendments have been introduced into pre-2010 environmental laws. In 2011, the 2002 Law on Waste from Production and Consumption was amended to include the concept of waste ownership, to introduce the notion of abandoned waste and the responsibility of local executive authorities for handling abandoned waste, and to clarify the competences of various governmental bodies in waste management. In 2013, amendments were introduced in the 1994 Law on Subsoil Resources to regulate extraction of placer resource deposits.

Since 2010, the 2000 Water Code has been amended, in 2011 and 2012. In 2011, users of hydroenergy sources that produce less than 30,000 kWh of electrical energy were exempt from paying for water use. In 2012, a new chapter on basin water management was included in the Code. It provides for the establishment of a National Water Council to coordinate activities of various bodies on basin management and to develop basin plans of use and protection of water resources, as well as the creation of basin councils. The amendment also requires the development and approval by the Government of a national water strategy.

Draft environmental code

In Tajikistan, codes have the same legal value as other laws (except constitutional laws and laws adopted by national referendum, which have a higher status). Therefore, codification of environmental legislation would not raise the status of environmental norms as such. The primary value of codification efforts in Tajikistan could therefore be the improvement of the quality of environmental

legislation. The enforcement authorities also advocate for codification from the point of view of convenience for users.

In the period 2011–2013, the draft environmental code was developed upon request of the parliament and the Government by a working group of experts with the support of the Organization for Security and Cooperation in Europe (OSCE). The draft went through several public hearings. The legal basis for codification was provided by the Concept of Forecast Development of Legislation approved by the 2011 Decree of the President No. 1021, which explicitly mentioned the need for systematization of environmental legislation and adoption of an environmental code. The development of the code is also envisaged in the State Programme to Implement the Concept of Forecast Development of Legislation in Agriculture and Environmental Protection for 2012–2015 (2012 Resolution of the Government No. 94).

The draft was developed with an aim to ensure a comprehensive approach to legal regulation of environmental issues, and address gaps and conflicts within environmental legislation and between environmental and sectoral legislation. The draft brings together several existing laws and, if adopted, would substitute four existing laws. It attempts to regulate a few new issues (e.g. integrated permitting). However, the draft leaves a number of pending issues untouched (e.g. it reconfirms the powers of local executive authorities to do environmental inspection but does not delineate such powers vis-à-vis the powers of environmental inspectors of the Committee on Environmental Protection). As of late 2015, the Parliamentary Commission on Agriculture and Environment intended to organize further process to work on the draft.

Environmentally related provisions in sectoral laws

There has been progress achieved in integrating environmental considerations into sectoral legislation (chapters 9–13), although such integration is still at the initial stage: it can be observed at the level of laws and is almost absent at the level of subsidiary legislation.

In the energy sector, in 2011, amendments were introduced in the 2000 Law on Energy to add the use of renewable energy sources (RES) to the goals of governmental policy in the energy sector, and the competences of the state body in charge of energy were enlarged to include development of programmes and other measures to promote RES. In

2015, an addition to the 2010 Law on Renewable Energy Sources stated that prices and tariffs for energy produced from RES to support the development of RES (feed-in tariffs) are to be approved by the Government. In 2013, a new Law on Energy Saving and Energy Efficiency replacing the 2002 Law on Energy Saving enlarged the scope of regulation to energy efficiency and enhanced state support measures to energy efficiency and energy saving. The 2015 Law on Oil and Gas declares the need to observe environmental protection requirements during exploration and use of oil and gas reserves and requires SEE for mining facilities and for oil and gas pipelines.

Another positive development can be found in the transport sector. The 2015 Law on Ensuring the Environmental Safety of Road Transport provides for the introduction of ecological classification of imported vehicles, inspections of the ecological status of vehicles, introduction of fuel standards, production and sale of ecologically clean fuel, systematic control of fuel quality, introduction of technologies for secondary treatment or decontamination of car batteries, and ecologically safe disposal of end-of-life vehicles, used tyres and car batteries and used oil (chapter 12).

The 2012 Code on Urban Planning declares the observance of environmental protection and ecological safety requirements and sanitary rules and standards among key requirements of urban planning. It explicitly requires that planning documents, such as the General Settlement Scheme of the Republic of Tajikistan and Consolidated Urban Planning Schemes, include measures for improvement of the state of the environment.

In the health sector, the 2011 amendments to the 2003 Law on Ensuring the Sanitary-Epidemiological Safety of the Population introduced the notion of sanitary and epidemiological expertise, which checks the compliance of project documentation and economic facilities to state sanitary and epidemiological rules and standards, and also enhanced the provisions on sanitary-hygienic, anti-epidemic and information measures. The 2012 Law on Safety of Food Products replaced its 2002 predecessor and provided for more detailed requirements for the production, packaging, labelling, storage, transportation, sale and import of foodstuffs.

In the agricultural sector, the new laws adopted since 2010 include the 2012 Law on Plant Protection, which regulates, among other matters, the use and disposal of pesticides; the 2013 Law on Pastures, aimed to ensure optimal use of pastures through their

monitoring, registration and state expertise; and the 2013 Law on Biological Farming and Production, which introduces criteria for biological production and requirements for the processing, storage, transportation, packaging, labelling and certification of biological products, therefore constituting a step towards organic farming (chapter 9).

Other laws

Several other laws adopted since 2010 play an important role for environmental policy implementation and enforcement while not being environmental laws per se. The 2011 Law on Permitting defined general rules for issuance of various permits and permitting competences of various authorities (chapter 2). According to this Law, the state body on environmental protection issues the permits for emissions of air pollutants, special water use, use of fauna and flora, forest use, import and export of waste for reuse, and the regulation of waste generation, use, destruction and disposal. It also issues the conclusions of the SEE and the certificate of competence to perform environmental audit. The 2011 Law on Conformity Assessment regulates accreditation and certification issues and includes the notion of an environmental management system (chapter 2). The 2015 Law on Inspections of Economic Entities lays down the requirements and mandates of various authorities on organization of inspections (chapter 2). The 2013 Law on Mountainous Regions of the Republic of Tajikistan provides for preferential conditions and state support for development of such regions and aims to ensure protection of their natural resources. The 2012 Law on Public–Private Partnership (chapter 3) – a new law for Tajikistan – defines the legal framework for initiation and operation of public–private partnerships (PPPs) in the area of infrastructure and social services.

Trends and progress achieved

The quality of environmental legislation has much room for improvement. There are many contradictions and inconsistencies in the legislation. For example, in accordance with the 2011 Law on Environmental Protection (arts. 9 and 62), the management of specially protected natural areas is entrusted to the state body on environmental protection, which currently is the Committee on Environmental Protection. The 2011 Law on Specially Protected Natural Areas entrusts the management of specially protected natural areas to the state body on environmental protection. Transferring the management of specially protected natural areas in late 2013 to the newly created

Forestry Agency under the Government (2014 Resolution of the Government No. 132) and declaring the Forestry Agency to be the specially authorized state body for specially protected natural areas (2014 Resolution of the Government No. 435) clearly contradict the 2011 Law on Environmental Protection and the 2011 Law on Specially Protected Natural Areas. In another example, the 2011 Law on Permitting, which describes the permitting competences of various governmental agencies, does not provide for any permitting by the state body responsible for forestry, whereas the 2011 Forest Code provides for some permitting competences of such a body and the Forestry Agency does issue the woodcutting permits. Another example is the 2014 Law on Hunting and the Hunting Sector which allows the hunting of Red Book species despite the explicit prohibition contained in the 2011 Law on Environmental Protection. There are also different approaches to regulating the same issues taken by different laws adopted in the same time period.

There are numerous cases where no action is taken for years to align existing legislation with newly adopted laws or governmental resolutions.

Unlike the practice in other countries, laws in Tajikistan do not clearly define the time frames and responsibilities for development of subsidiary legislation. The development and adoption of subsidiary legislation often takes years. For example, although the Law on Biological Safety dates back to 2005, the rules for genetically modified organism (GMO) labelling of foodstuffs and fodder were included in two technical regulations adopted in 2014 (2014 Resolution of the Government No. 811 "On Technical Regulation of the safety of fodder and fodder additives" and 2014 Resolution of the Government No. 29 "On Technical Regulation 'Labelling of foodstuffs'") and, as of early 2016, no other subsidiary legislation is in place.

The 2009 Law on Normative Legal Acts does not make the legal expertise (review) of draft legal acts mandatory (art. 49). Legal expertise of draft laws and other legal acts is pursued by the Ministry of Justice, which provides its legal opinion of their compatibility with the legislation in force. In addition, the Ministry of Justice has to control the quality of legal acts adopted by ministries, state committees and local public administration bodies (arts. 73, 74) and can refuse to register such legal acts. However, the legal expertise does not seem to function properly.

The integration of environmental considerations into sectoral legislation has seen some progress but still

remains limited and insufficient in forestry, agriculture, industry, energy, transport, and housing and utilities. The procedure for mandatory review by concerned agencies (and, therefore, the Committee on Environmental Protection) of draft legal acts is in place. The Executive Office of the President oversees which governmental institutions are on the review list for a particular draft legal act. However, it is not clear to what extent the Committee on Environmental Protection can actually use this procedure in order to include environmental aspects in sectoral legislation.

The development of laws and strategic documents is often supported by donors. In general, the assistance by donors and international organizations is appreciated. However, sometimes this results in bringing in advanced concepts without them being properly integrated into the legislation and reality of Tajikistan. For example, according to national experts, the 2006 Law on Inspections of Economic Entities (replaced in 2015), which applied the same rules to all types of inspections, complicated the verification of compliance with environmental and sanitary and epidemiological legislation due to its tight requirements on inspection frequency. Another example is the 2014 Law on Hunting and the Hunting Sector, which allows hunting of Red Book species but does not regulate such hunting in sufficient detail so that it would concern only old animals or those beyond reproduction capability.

Progress has been made with the accessibility of legislation, including environmental legislation, to governmental officials. In conformity with the Concept of Development of Electronic Government, approved by 2011 Resolution of the Government No. 643, the legal database "Adlia" (www.adlia.tj), created with the support of USAID, has been installed in ministries and other governmental bodies. The database includes primary legislation but only a very limited number of legal acts issued by ministries, state committees and other governmental institutions. "Adlia" is accessible to businesses and the public only by subscription. The population has free access to laws through the website of the National Legislation Centre under the President (<http://www.mmk.tj/>) but not to any subsidiary legislation.

Environmental lawyers in Tajikistan can be counted on the fingers. Environmental law is being taught at faculties of law in the Tajik National University and the Russian-Tajik Slavic University.

1.2 Policy framework

Strategic planning

Types of strategic planning documents

The 2003 Law on the State Forecasts, Concepts, Strategies and Programmes of Socioeconomic Development of the Republic of Tajikistan describes the system of socioeconomic development planning. The system includes:

- Long-, medium- and short-term forecasts of socioeconomic development;
- The Concept of socioeconomic development developed by the Government for 15 years and adjusted every five years; the Law does not make it clear who approves the Concept;
- The Strategy of socioeconomic development developed by the Government for ten years and adjusted after five years to be approved by the Majlisi namoyandagon (National Assembly);
- The Programme of socioeconomic development developed by the Government for five or three years and approved by the Majlisi namoyandagon;
- State targeted programmes approved by the Government;
- Regional programmes of socioeconomic development.

According to the 2003 Law, the regional programmes of socioeconomic development are to be developed by local executive authorities and approved by local representative authorities. However, in reality, these programmes are approved by the Government.

Although the 2003 Law speaks only about socioeconomic development planning, its rules apply, by analogy of law, to other areas of planning. Therefore, the strategic planning system of Tajikistan includes concepts adopted as planning documents to cover a 15-year perspective, strategies adopted as planning documents to cover a ten-year perspective, and programmes covering five- or three-year periods

The 2003 Law requires that the Programme of socioeconomic development include measures on nature protection and environmental efficiency and that the regional programmes of socioeconomic development take into account the Millennium Development Goals (MDGs).

Photo 1: A view of Roshorv village, Bartang valley, GBAO

Financing and reporting

Strategies and programmes usually describe financing needs, of which a very minor part is secured at the moment of adoption of a strategic document. Grants from foreign donors and other non-budgetary funds are considered as co-financing sources for implementation and are included as such in the texts of strategic documents, often as major funding sources. For example, the Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) envisages that 99 per cent of financing for the reform of the water sector will be covered by projects supported by the development partners. Many strategies and programmes in the environmental area remain significantly underfunded.

The 2003 Law requires annual reporting by the Government to the Majlisi namoyandagon on implementation of programmes of socioeconomic development and requests local executive authorities to monitor the implementation of regional programmes of socioeconomic development; it is silent on the monitoring of implementation of other documents. Some rules on reporting are provided in the Rules for Monitoring and Assessment of Implementation of the Poverty Reduction Strategies (2008 Resolution of the Government No. 216).

For state programmes, the governmental resolution that approves a programme usually includes provisions on monitoring and reporting, in particular requesting a governmental authority in charge of coordination of implementation to collect information on implementation from all authorities involved and submit annual reports to the Government. The reports on implementation of programmes are regularly submitted and in some cases, the Government adopts follow-up resolutions, including measures aimed at streamlining implementation. The follow-up governmental resolutions are publicly available, while the reports themselves are not directly available in the national legal database ("Adlia"). Few strategic documents include indicators of implementation, and few strategic documents include information on implementation of earlier strategic documents on the same subject matter.

Very few strategic documents (e.g. the Programme of Development of the Housing and Utilities Sector of the Republic of Tajikistan for the period 2014–2018 (2014 Resolution of the Government No. 506)) provide for public awareness of their implementation as a means to achieve stronger implementation. Information on implementation of strategic documents is not regularly reflected on the public authorities' websites and in the media.

Strategic documents on sustainable development

The sustainable development policy framework includes:

- The Concept of Transition to Sustainable Development (2007 Resolution of the Government No. 500);
- The National Development Strategy for the period until 2015 (2007 Resolution of Majlisi namoyandagon of the Majlisi Oli No. 704) and the National Development Strategy for the period until 2030 (2016 Resolution of Majlisi namoyandagon of the Majlisi Oli No. 636);
- The Poverty Reduction Strategy for the period 2010–2012 (2010 Resolution of the Majlisi namoyandagon of the Majlisi Oli No. 1557), followed by the Living Standards Improvement Strategy for the period 2013–2015 (2012 Resolution of the Majlisi namoyandagon of the Majlisi Oli No. 1030).

The Government regularly assesses implementation of documents on socioeconomic development and issues annual (or sometimes half-yearly) resolutions on the outcomes of such assessment (e.g. 2015 Resolution of the Government No. 21 on the Outcomes of Socioeconomic Development of the Republic of Tajikistan in 2014 and Tasks for 2015).

Such resolutions include concrete measures and gaps to be addressed by specific governmental bodies, including measures related to the environment and sustainable development. For example, the 2015 Resolution of the Government No. 21 requested the Ministry of Agriculture to ensure planting of crops tailored to low water conditions, and the Committee on Environmental Protection to prioritize air pollution control and control over waste from construction and mining enterprises in 2015. At the same time, these resolutions address socioeconomic development in general and do not allow document-specific conclusions.

The State Committee on Investments and Management of State Property, in its annual foreign aid report (e.g. Foreign Aid Report for 2014) provides information on the amounts of foreign aid by sector allocated for implementation of the two Poverty Reduction and Strategies and the Living Standards Improvement Strategy, including measures realized through such assistance.

National Development Strategy for the period until 2030

The National Development Strategy for the period until 2030 adopted in late 2016 refers to the outcomes of post-2015 national consultations and aims to take into account the Sustainable Development Goals (SDGs) adopted by the United Nations General Assembly in September 2015. It discusses three development scenarios: inert development (continuation of the agro-industrial model), industrial development (implementation of ongoing and other energy and infrastructure projects, rational use of land, water, energy and other resources, increased production capacities in industry and agriculture), and industrial and innovative development (economic development based on innovation). The Strategy suggests the transition from one type of development to the next one following the implementation of envisaged actions. The Strategy includes indicators for the last two scenarios, against which monitoring of implementation is to be made.

The Strategy addresses three major activity clusters: i) Development of institutional capacity of the country (effective public administration system, development of the regions); ii) Human capital development (education and science, health, social protection, culture, living environment, addressing social inequality); and iii) Quality of economic growth (real economy, efficient employment, financial sector, investment climate). The environment-related activities include increasing access to housing; developing the utilities sector; increasing access to water supply systems, sanitation and hygiene; strengthening incentives on environmental protection for the population and economic entities; and development of a natural hazards risk management system.

Strategic documents on environment

National Environmental Action Plan

The National Environmental Action Plan (NEAP) (2006 Resolution of the Government No. 191) covered measures for the period 2007–2011. No overall assessment of implementation has been prepared.

Concept on Environmental Protection

The Concept on Environmental Protection in the Republic of Tajikistan (2008 Resolution of the Government No. 645) described problems in the environmental sector and formulated eight priority

areas, albeit rather generally, e.g. improvement of protection and management of water resources. The Concept was followed by the Mid-Term Plan for the Implementation of the Concept on Environmental Protection for the period 2010–2012 (2010 Resolution of the Government No. 94), which included measures for implementation of priority areas. No further plans of implementation of the Concept were adopted. The Concept is not referred to in any other strategic document.

State Environmental Programme for the period 2009–2019

The State Environmental Programme for the period 2009–2019 (2009 Resolution of the Government No. 123), accompanied by an Action Plan (2009 Resolution of the Government No. 602), is the key strategic document on environmental protection. The Committee on Environmental Protection submits annual reports on implementation of the Programme to the Government; the reports cover only some of the measures from the Action Plan.

Strategic documents on environmental issues

There are several strategic documents covering specific environmental issues, such as the National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity (2003 Resolution of the Government No. 392), State Programme on Development of Specially Protected Natural Areas for the period 2005–2015 (2005 Resolution of the Government No. 79), Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 (2006 Resolution of the Government No. 514) and National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 (2014 Resolution of the Government No. 505).

There are a number of strategic documents covering cross-cutting or horizontal environmental issues, e.g. Environmental Monitoring Programme for the period 2013–2017 (2012 Resolution of the Government No. 685), Programme of Recovery of Hydrometeorological Stations and Hydrological Posts for the period 2007–2016 (2006 Resolution of the Government No. 408), National Action Plan on Climate Change Adaptation (2003 Resolution of the Government No. 259), State Programme for Research and Conservation of Glaciers in Tajikistan for the period 2010–2030 (2010 Resolution of the Government No. 209), State Comprehensive Programme of Development of the Environmental Awareness and Education of the Population until 2020 (2015 Resolution of the Government No. 178)

and Programme of Emergency Preparedness and Radiation Safety for the period 2013–2017 (2012 Resolution of the Government No. 770). The Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) addresses mostly institutional issues in the sector, to enable implementation of integrated water resources management (IWRM) and the basin approach.

There are some strategic documents adopted specifically to facilitate implementation of commitments taken by Tajikistan under international environmental agreements, such as the National Implementation Plan of the Republic of Tajikistan on Realization of the Stockholm Convention on Persistent Organic Pollutants (2007 Resolution of the Government No. 502) and National Strategy on the Reduction of Consumption of Ozone Depleting Substances in the period 2015–2020 (2015 Resolution of the Government No. 643).

Strategic documents at local level

The local programmes of socioeconomic development are the most common strategic documents that cover environmental issues at the local level. They usually cover issues of water supply, waste management and environmental protection. Programmes of socioeconomic development for all districts and towns are approved by the Government, i.e. not by the oblast, district or town authorities. Annual reports on implementation of local programmes on socioeconomic development are also submitted to the Government.

The Law on Environmental Protection entrusts local executive authorities to develop the programmes and action plans on environmental protection for their respective territories for approval by local representative authorities. However, strategic documents on environmental protection at the local level are scarce. The non-governmental organization (NGO) Fund for Support of Civil Initiatives, with support of the Regional Environmental Centre for Central Asia, facilitated the development of environmental management programmes (in fact, local environmental action plans (LEAPs)) in the City of Dushanbe (2005) and in Varzob District (2011). The City of Dushanbe has adopted a Comprehensive State Programme for the Development of Education and Environmental Awareness of the Population until 2020 (2015 Decision of the Chair of the City of Dushanbe No. 286). As of late 2015, the Concept of greening the City of Dushanbe is under development.

Sectoral development with a possible impact on environment

There has been some progress achieved in integrating environmental considerations into sectoral planning (chapters 9–13), although such integration is still at the initial stage. For example, the Concept for Reform of the Housing and Utilities Sector for the period 2010–2025 (2010 Resolution of the Government No. 321) provides for gradual transition from governmental subsidies towards full cost recovery tariffs for municipal services and the increase of competition in the sector, which are good steps, but is silent on the strengthening of the energy and water efficiency of buildings.

The Programme for Reforming the Agricultural Sector for the period 2012–2020 (2012 Resolution of the Government No. 383) places an emphasis on support to local agricultural production using environmentally sound technologies, through various types of support to dehqan farms. The Concept of Innovative Development in the Agro-industrial Sector (2014 Resolution of the Government No. 144) names ecologization of agriculture among major directions of the state innovation policy in the sector. The Programme for Development of Pastures for the period 2016–2020 (2015 Resolution of the Government No. 724) provides for targeted measures to improve the productivity of pasture lands and for the planting of natural herbs; however, it also envisages the purchase of significant quantities of mineral fertilizers. The Programme on Fighting Pests and Diseases in Gardens and Vineyards for the period 2011–2015 (2010 Resolution of the Government No. 625) provides for agrotechnical, chemical (pesticides) and biological (microbiological products and pheromone traps) methods.

The Programme for the Development of Forestry for the period 2006–2015 (2005 Resolution of the Government No. 396) (chapter 8) recognizes that (as of 2005) forests occupy only 3 per cent of the country's territory and declares as its first goal the improvement of the state of the environment. The Programme provides for measures on afforestation but does not include any quantitative target to increase the forest cover.

The Programme of Adaptation of the Economy of the Republic of Tajikistan to Membership of the World Trade Organization (2014 Resolution of the Government No. 691) includes such measure as accession to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The Programme for Development of Tourism for the period 2015–2017 (2014 Resolution of the Government No. 738) includes a section on ecotourism.

The State Quality Programme for 2013–2015 (2012 Resolution of the Government No. 512) envisages support for the use of resource- and energy-efficient ecologically sound technologies and materials and the introduction of environmental management systems.

There is a body of strategic documents and legislation regulating "ecological migration", i.e. migration as a result of landslides, avalanches, mudflows, etc. The Programme on Internal Migration of the Population for the period 2012–2014 (2012 Resolution of the Government No. 91) provides for annual resettlement of 300 households of ecological migrants.

However, many strategic documents aim at facilitation of economic development without any reference to environmental protection requirements or criteria, e.g. the Programme of State Support for Entrepreneurship for the period 2012–2020 (2012 Resolution of the Government No. 201), Programme of Privatization of State Property for the period 2014–2016 (2013 Resolution of the Government No. 557) and State Programme for Reclamation of New Irrigated Lands and Restoration of Lands No Longer in Agricultural Use for the period 2012–2020 (2012 Resolution of the Government No. 450).

Towards strategic environmental assessment

The country is not a Party to the 2003 Protocol on Strategic Environmental Assessment to the ECE Convention on Environmental Impact Assessment in a Transboundary Context. Strategic environmental assessment (SEA), as provided for in the Protocol or in Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, does not exist in Tajikistan. Currently, the 2012 Law on Ecological Expertise provides that sectoral concepts, forecasts, programmes and schemes whose implementation may have an impact on the environment are subject to SEE. The 2012 Procedures for conducting state ecological expertise (2012 Resolution of the Government No. 697) further clarify that draft territorial comprehensive schemes for use of natural resources and environmental protection are subject to SEE. A draft law on SEA has been prepared within a UNDP project in 2013–2014.

Millennium Development Goals

In general, the Government has been aligning its strategic documents with the MDGs. Official reports on MDG implementation were prepared in 2003 and 2010. Statistical information on MDG indicators is available at <http://www.tojkinfo.tj>. Information on MDG indicators is found in annex IV to this report.

A brief self-assessment of MDG implementation can be found in the 2016 National Development Strategy for the period until 2030. It recognizes that the MDG implementation process strengthened the country's cooperation with the international community, which enabled progress on MDG indicators. It also acknowledges that most MDGs were mainly achieved only in the capital. It identifies the significant problems remaining, including:

- The high level of maternal and child mortality and high burden of tuberculosis prevalence in the regions;
- The increase in HIV and non-infectious diseases;
- Poor access to education services, manifested in the low number of kindergarten facilities, low professional level of teachers and inadequate school infrastructure in the regions;
- Lack of access to improved water supply and sanitation in rural schools and medical institutions;
- Deterioration in nutrition;
- Unequal access of women and men to material (land, finances, etc.) and non-material (education, health, etc.) resources;
- Environmental problems and vulnerability;
- Regional differences in access to social infrastructure and rural–urban differences in access to safe water for domestic uses.

Post-2015 development agenda

In 2013–2014, Tajikistan had an extensive process of national consultations on the post-2015 development agenda, facilitated by the United Nations system. These consultations involved various groups, such as the Government, youth, minorities, the private sector, women, parliamentarians, persons with disabilities and the elderly. Based on the outcomes of national consultations, Tajikistan's *Report of Post-2015 National Consultations* (2013) identifies the priorities for the country: education, health, employment, inequalities, food security, good governance, social protection, conflict prevention, energy and environment, and population dynamics. Additionally, the National Stakeholder Consultations on Water:

Supporting the Post-2015 Development Agenda, organized in May 2013 by the Global Water Partnership – Central Asia and Caucasus, addressed the priorities for water management at the national level and for Central Asian cooperation on water.

The National Development Strategy for the period until 2030 includes references to the 2030 Agenda for Sustainable Development and the SDGs. It mentions that the Government expects that priority activities of the Strategy will be supported by development partners in the framework of new SDGs-related initiatives.

Green economy policy framework

As of late 2015, the green economy concept is not referred to in the country's key policy documents, although some elements of the green economy approach are present in selected legal acts and strategic documents.

In 2012, as part of preparation for the Rio+20 Conference, the Government prepared a National Review, "Towards a Green Economy in Tajikistan". The key message of the Review is that Tajikistan's opportunities for transition to a green economy are linked to its natural resources, in particular water. The Review proposes the development of a roadmap to a green economy to be approved by the Government and suggests a number of steps to be taken in the improvement of governance systems; power engineering; industry; agriculture; education, science and technologies; and environmental protection.

In 2014, recommendations for promoting a green economy in Tajikistan were developed by a group of experts with the support of OSCE. The recommendations describe short-, medium- and long-term measures. Short-term measures include popularization of green economy ideas through ecological education, implementation of green statistics and environmental monitoring, strengthening legislation and establishing a coordinating body. Medium-term measures refer to developing hydropower and other RES, the greening of agriculture and implementation of IWRM, implementing the principles of green construction and improving the housing and utilities sector, developing ecological tourism, developing clean transport, improving waste management, and certification and eco-labelling. Long-term measures envisage investments in conservation of natural capital and energy- and resource-sound technologies.

Trends and progress achieved

Tajikistan relies on a system of socioeconomic strategic planning. Environmental issues are integrated into programmes on socioeconomic development. The 2006 NEAP, which included measures for the period 2007–2011, was not followed by a similar overarching strategic planning document in the environmental field. The 2008 Concept on Environmental Protection is not referred to in other strategic documents. The State Environmental Programme for the period 2009–2019 is regarded as a main strategic document on the environment. However, it was not developed as a visionary policy document and is already somewhat outdated if it is to serve as the main strategic document on the environment. Strategic documents on environmental protection are poorly funded and not fully implemented. There has been some progress achieved in integrating environmental considerations into sectoral planning; however, such integration is at the initial stage. Steps are being made to introduce the SEA instrument into the national legislation.

1.3 Institutional framework

Since 2010, major changes in the institutional set-up on environmental protection were brought about by the 2013 Decree of the President No. 12 which, inter alia established:

- The Ministry of Energy and Water Resources on the basis of the former Ministry of Energy and Industry and the former Ministry of Land Reclamation and Water Resources;
- The Agency of Land Reclamation and Irrigation under the Government, entrusted with the management functions related to land reclamation and irrigation of the former Ministry of Land Reclamation and Water Resources;
- The Forestry Agency under the Government and withdrew the State Institution of Forestry and Hunting from the system of the Committee on Environmental Protection under the Government, towards the new agency.

Committee on Environmental Protection under the Government

The Committee on Environmental Protection under the Government is the national environmental authority in charge of development and implementation of governmental policy on environmental protection, biological diversity, persistent organic pollutants (POPs), climate change,

control over the rational use of natural resources, hydrometeorology and prevention of the causes of emergencies with negative environmental impacts. The Regulations of the Committee were approved by the 2008 Resolution of the Government No. 189 and amended several times, most recently by the 2015 Resolution of the Government No. 344. Since 2010, no attempts were made to raise the status of the Committee on Environmental Protection under the Government, so its status remained rather low – lower than that of a state committee or of a ministry.

Since 2010, major changes in the structure and competences of the Committee have included:

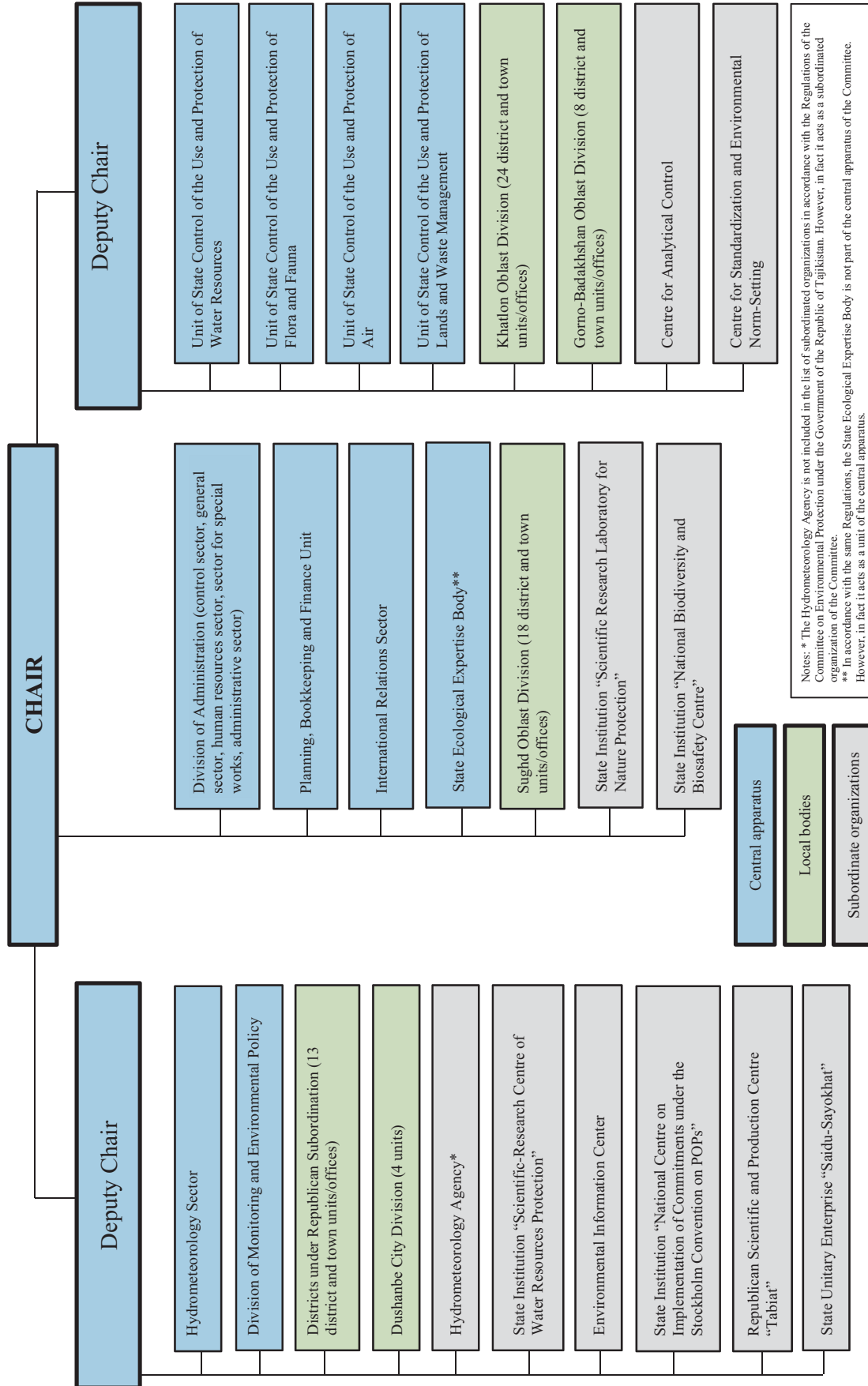
- Removal of competences on forestry and specially protected natural areas (reserves and national parks) from the Committee towards the new Forestry Agency in late 2013–early 2014;
- Removal of the Environmental Police from the Committee towards the Ministry of Interior, as of 2014;
- Raising the status of a hydrometeorological authority through transformation of the State Institution on Hydrometeorology into a Hydrometeorology Agency, still under the authority of the Committee, in 2015.

Other than the above, the organizational structure of the Committee (figure 1.1) has seen few changes since 2010. The position of First Deputy Chair of the Committee was abandoned in 2014. An internal decision taken in 2015 resulted in separating permitting from inspection (chapter 2), with the former mostly vested to the central apparatus and the latter to the territorial bodies of the Committee. This decision had an impact on the distribution of work between national and local level rather than on the organizational set-up. There have not been substantial reductions in staff, in the central apparatus (from 54 staff in 2010 to 41 staff in 2015), or the territorial bodies (from 390 staff in 2010 to 361 staff in 2015) of the Committee and its subordinated organizations (from 1,101 in 2010 to 924 in 2015) (figure 1.2).

Among other matters, the Committee is in charge of:

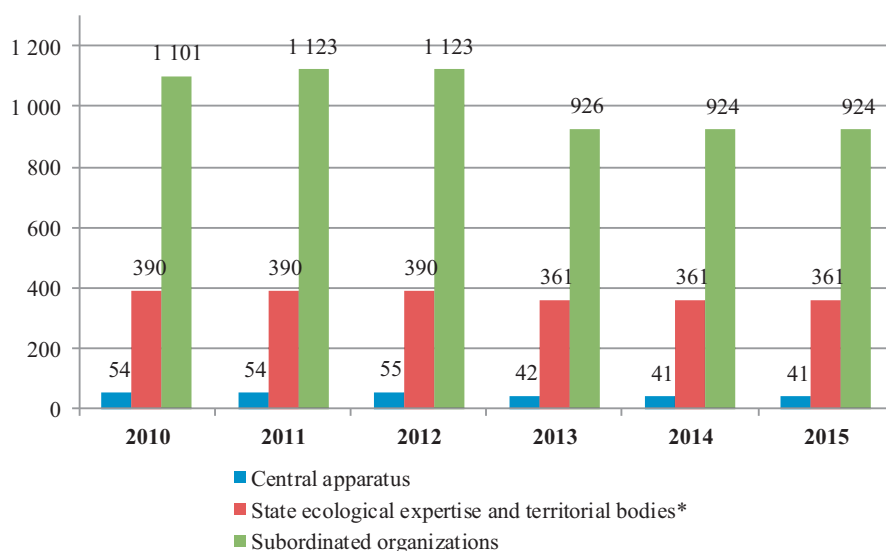
- State control (inspections) of the use of natural resources and environmental protection (chapter 2);
- Development of draft laws and other legal acts on the environment, as well as draft programmes, concepts, strategies and national and regional action plans on environmental protection and participation in their implementation;

Figure 1.1: Organizational structure of the Committee on Environmental Protection under the Government



Source: Committee on Environmental Protection, 2015.

Figure 1.2: Staff of the Committee on Environmental Protection under the Government, 2010–2015, number



Source: Committee on Environmental Protection, 2015.

Note: * Figures include inspectors and exclude support personnel, such as bookkeepers and human resource officers.

- Development and approval of rules and standards on environmental protection and use of natural resources;
- Development and publication of national reports on the state of the environment;
- Organization and implementation of SEE;
- Organization and implementation of environmental monitoring (chapter 4);
- Issuance of some licences and permits (chapter 2);
- Determination of limits and quotas for the use of natural resources;
- Determination of the size of payments for use of natural resources, environmental pollution and waste disposal;
- Creation of the register of polluters;
- Management of environmental funds;
- Environmental awareness and education;
- International cooperation on environmental protection.

There are several resolutions of the Government defining the Committee on Environmental Protection as the "specially authorized state body" for, inter alia: environmental protection (2012 Resolution of the Government No. 545); protection of fish resources (except in the ponds of fish farms where this is the prerogative of the Ministry of Agriculture) (2014 Resolution of the Government No. 486); protection of air quality (2013 Resolution of the Government No. 463); environmental monitoring (2013

Resolution of the Government No. 571); waste management (2012 Resolution of the Government No. 205); and environmental audit (2012 Resolution of the Government No. 452).

Territorial bodies

Territorial bodies of the Committee have a two-layer structure (figure 1.1). The first layer is made up of the Dushanbe City Division, Sughd Oblast Division, Khatlon Oblast Division and Gorno-Badakhshan Autonomous Oblast Division. The second layer is made up of 67 units and offices on environmental protection at district or town level, with offices being smaller than units. The Committee's units and offices on environmental protection in the districts under republican subordination are directly subordinated to one of the Deputy Chairs of the Committee.

Although both first- and second-layer territorial bodies are legal entities, in practice, the units and offices on environmental protection at district and town levels have no autonomy from the first-layer bodies. They do not have financial independence and are financially and substantively accountable to the first-layer bodies.

The regulations of all territorial bodies are approved by the Chair of the Committee. The supervision of territorial bodies is divided between the Chair and two Deputy Chairs of the Committee.

All territorial bodies of the Committee are formally subordinated to the Committee only. However, in fact, they work very closely with the local executive authorities – both at oblast level and at district and town levels. Heads of territorial bodies are appointed by the Chair of the Committee upon the consent of local executive authorities. According to the 2013 amendments to the 2004 Constitutional Law on Local Public Administration Bodies, the decision on appointment also has to be approved by the local representative authorities. In some districts, territorial bodies of the Committee occupy premises in the buildings of local administrations. The activity reports are formally submitted to the Committee on a monthly, quarterly and annual basis by territorial bodies of the Committee. However, some territorial bodies submit reports to heads of local executive authorities. In general, territorial bodies regularly inform local executive authorities of their activities and participate in coordination meetings organized by local executive authorities. There are cases where territorial bodies of the Committee receive instructions (poruchenia) from local executive authorities.

According to the Dushanbe City Division, its core activities include inspection, monitoring of waste generation volumes, air emission volumes and logging volumes, greening the territory, environmental awareness activities and issuance of permits for small vegetation cutting.

Subordinated organizations

Since 2010, major changes in the system of subordinated organizations have included the removal in 2013 of the State Institution for Forestry and Hunting, State Institution "Scientific-Research Institute for Forestry" and State Institution of Specially Protected Natural Areas from the structure of the Committee, as well as the transformation in 2015 of the State Institution on Hydrometeorology into a Hydrometeorology Agency (2015 Resolution of the Government No. 360). The transformation into an agency has entailed a change in the status of management and key technical staff to that of civil servants, and an increase of 7 per cent in the annual operation and maintenance budget.

The Director of the Hydrometeorology Agency (Tajikhydromet) is appointed by the Government upon the proposal of the Chair of the Committee. The Agency's system includes the Hydrometeorological Centre, Centre for Studies on Climate Change and the Ozone Layer, Centre for Automatic Network, Centre for Measurement Tools and Centre for Glacier Studies, meteorological stations, hydrological

stations and points (posty), and environmental monitoring points. The Agency is responsible for cooperation with the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat.

Non-commercial subordinated organizations include the State Institution "Scientific Research Centre for Water Resources Protection", Environmental Information Centre, State Institution "National Centre on Implementation of Commitments under the Stockholm Convention on Persistent Organic Pollutants", State Institution "Scientific Research Laboratory for Nature Protection", State Institution "National Biodiversity and Biosafety Centre", Centre for Analytical Control and Centre for Standardization and Environmental Norm-Setting. Commercial subordinated organizations include the Republican Scientific and Production Centre "Tabiat" and the State Unitary Enterprise "Saidu-Sayokhat"; the latter is currently not operational.

The 2014 Resolution of the Government No. 791 provides for establishment of a republican state centre of environmental monitoring under the Committee on Environmental Protection and of local state centres of environmental monitoring under the territorial bodies of the Committee. As of late 2015, these centres are not yet established.

Executive Office of the President

The Executive Office of the President performs analysis of major policy issues, ensures coordination and proposes mechanisms for monitoring of national strategies and programmes, ensures systematic control of implementation by governmental authorities of legal acts adopted by the President and the Government, and performs expertise and finalization of draft legal acts submitted by ministries and agencies. The 2014 Decree of the President No. 116 created a Division on Agriculture and Environment in place of the former Department of Ecology and Emergency Situations within the Executive Office of the President.

Sectoral ministries

The establishment, in 2013, of the Ministry of Energy and Water Resources (Regulation approved by the 2014 Resolution of the Government No. 149) was meant to strengthen an integrated approach to the water and energy sectors in Tajikistan. The Ministry is in charge of governmental policy and regulation in both the energy sector and water resources sector and coordination of activities in these sectors at both internal and international policy levels. The tasks of

the Ministry include technical surveillance over water and fuel-energy facilities under construction, development of incentives and activities on RES, organization of activities on prevention of and response to emergency situations in the fuel-energy and water sectors, and participation in defining methodologies for the calculation of tariffs for electricity, heat, natural gas, oil, oil products and water. The Ministry is a specially authorized state authority on the issues of energy saving and energy efficiency (2015 Resolution of the Government No. 15).

The Service for State Surveillance over the Safety of Hydrotechnical Facilities (Regulation approved by 2014 Resolution of the Government No. 511) is a new institution created in 2014 under the Ministry of Energy and Water Resources. It is entrusted with state control of hydrotechnical infrastructures once they commence operation. The Service performs state surveillance over the safety of both state-owned and private infrastructure and organizes warnings in the event of accident threat.

The Ministry of Industry and New Technologies (Regulation approved by 2014 Resolution of the Government No. 147) is in charge of governmental policy and regulation in the industry and fuel sector and development of new technologies, including in the defence, mechanical engineering, metal processing, chemicals, mining, construction materials, coal, food processing and manufacturing industries. Among other tasks, the Ministry is entrusted with: technical surveillance over industrial facilities under construction; development and approval of technical norms and requirements for industrial production, equipment and materials; prevention and response to emergencies in the industrial sector; rational use of materials and energy in industrial production; increased use of local raw materials; and radioactive waste management (2014 Resolution of the Government No. 524).

The Ministry of Transport (Regulation approved by 2011 Resolution of the Government No. 250) is in charge of governmental policy and regulation in the area of transport, including the civil aviation, rail, motor and road sectors. Among other tasks, the Ministry of Transport is to develop and monitor programmes facilitating competitive and efficient use of resources and increased efficiency of transport systems, set norms and technical requirements for consumer safety and the protection of the environment and natural resources, develop and implement measures to increase road and aviation safety, decrease harmful impacts of transport on the

environment, transfer road transport to alternative fuel sources and organize control of the technical status of vehicles.

The Ministry of Health and Social Protection of the Population (Regulation approved by 2014 Resolution of the Government No. 148) is the central executive authority in charge of the governmental policy on public health and social protection. Among other issues, the Ministry approves sanitary standards, rules and hygiene standards.

The Service of State Sanitary and Epidemiological Surveillance (Regulation approved by the 2007 Resolution of the Government No. 186), subordinated to the Ministry, is in charge of the sanitary and epidemiological safety of the population, including surveillance. The Service also implements sanitary and epidemiological monitoring, participates in response action in the event of epidemics, accidents and natural disasters, oversees the use of ionizing and non-ionizing radiation sources and accredits laboratories for sanitary, hygiene and microbiological research.

The Ministry of Agriculture (Regulation approved by 2008 Resolution of the Government No. 191) is responsible for development and implementation of governmental policy on agriculture, including crop husbandry, cattle breeding, cotton farming, fishery and apiculture. It is also responsible for plant protection, the use of pesticides and other chemicals in agricultural production and development of agricultural infrastructure. Its competences cover control over import and export of agricultural products, support to agricultural producers, and coordination of scientific research on agriculture and rational use of land, chemicals and mineral fertilizers.

Ensuring ecological safety is among the tasks of the Ministry of Interior (Regulation approved by 2006 Resolution of the Government No. 592). As of 2014, the Environmental Police is part of the Ministry of Interior's Department of Public Order, and is financed from the Ministry's budget. Previously, the Environmental Police operated on the basis of an agreement between the Ministry of the Interior and the Committee on Environmental Protection. It was then financed from the special funds of the Committee although its staff was part of the Ministry of Interior's staff. The tasks of the Environmental Police include control of air pollution emissions from transport vehicles, and combating illegal import, export and transit of environmentally dangerous goods, Red Book flora and fauna species, toxic chemicals and illegal waste.

The Ministry of Economic Development and Trade (Regulation approved by 2006 Resolution of the Government No. 589) is the central executive authority responsible for governmental policy in all socioeconomic sectors and for coordination of monitoring of implementation of national development strategies, poverty reduction strategies and public investment programmes.

The Ministry of Finance (Regulation approved by 2015 Resolution of the Government No. 187) is the central executive authority responsible for governmental policy and regulation of financial, budgetary and tax issues.

The competences of the Ministry of Education and Science (Regulation approved by 2014 Resolution of the Government No. 145) include development and approval of standards for educational institutions, approval of plans and model educational programmes, development of priority directions for science and technology development, and implementation of programmes and projects in the area of science. No specific environmental-education-related structural unit exists in the Ministry.

The relevant competencies of the Ministry of Justice (Regulation approved by 2006 Resolution of the Government No. 587) include development of draft laws, decrees of the President and resolutions of the Government and the legal expertise of draft laws and other legal acts, including issuance of legal opinion on their correspondence to the Constitution, laws, other legal acts and international treaties to which Tajikistan is a Party. There are no environmental lawyers engaged in the legal expertise of draft laws and other legal acts in the Ministry of Justice.

Forestry Agency under the Government

The Forestry Agency under the Government, established in 2013 (Regulation approved by 2014 Resolution of the Government No. 132), is responsible for governmental policy on forests, forestry, forest resources, hunting and the hunting sector, flora and fauna, and specially protected natural areas, as well as for management and state control in these areas. No clear separation of management functions and state control exists in forest management.

The Forestry Agency includes the State Forest and Hunting Inspectorate, State Institution "Scientific-Research Institute for Forestry", 41 state forestry institutions (*leskhoz*) that manage forestry on the territories of the state forest fund, five nurseries in the

form of unitary enterprises and the State Institution of Specially Protected Natural Areas.

According to the Regulation of the Forestry Agency, the State Forest and Hunting Inspectorate is vested with both state control, i.e. inspection, with regard to forest and hunting resources, and issuance of permits for the use of forest and hunting resources. As of late 2015, the State Forest and Hunting Inspectorate is not yet operational; its Regulation is still to be approved.

Thirteen preserves (*zakazniki*) are managed by state forestry institutions (*leskhoz*es), as was the case prior to the creation of the Forestry Agency, when the state forestry institutions were subordinated to the State Institution of Forestry and Hunting under the Committee on Environmental Protection. National parks and reserves that until 2013 were managed by the State Institution of Specially Protected Natural Areas under the Committee on Environmental Protection are now managed by the State Institution of Specially Protected Natural Areas under the Forestry Agency.

The 2014 Resolution of the Government No. 435 defines the Forestry Agency to be the authorized state body for forestry, hunting and specially protected natural areas. The 2014 Resolution of the Government No. 523 defines the Committee on Environmental Protection to be the specially authorized state body for protection, use and reproduction of flora. The 2015 Resolution of the Government No. 65 defines the Committee on Environmental Protection to be the specially authorized state body for protection and use of flora and fauna species belonging to the Red Book. Lack of clarity exists with regard to delineation of the competences of these two bodies in respect of protection of non-Red Book flora and fauna species on the territories of the forest fund.

Other actors

The Agency of Statistics under the President (Regulation approved by 2010 Decree of the President No. 862) is the state body responsible for statistical policy and economic analysis. It produces biannual statistical books entitled *Environmental Protection in the Republic of Tajikistan*. A national Interagency Coordination Commission on Environmental Statistics was created under the Agency (2002 Resolution of the Government No. 41).

The State Committee on Land Management and Geodesy (Regulation approved by 2010 Resolution of the Government No. 225) is responsible for,

among other matters, governmental policy on land use, land cadastre, land mapping, state registration of real estate and state control of the use and protection of land.

The State Committee on Investments and Management of State Property (Regulation approved by the 2006 Resolution of the Government No. 590) is the central executive authority, which implements the governmental policy on investments, attracting investment, management of state property and privatization, as well as programmes to support entrepreneurship. It is also the authorized state body on public-private partnerships (2013 Resolution of the Government No. 250). The Committee facilitates and coordinates foreign assistance and cooperation of other governmental bodies with donors (chapter 3).

The Committee on Architecture and Construction under the Government (2014 Resolution of the Government No. 150) (until 2013, the Agency on Architecture and Construction under the Government) is the central executive authority responsible for governmental policy, regulation and control in the area of architecture and construction. The Committee's tasks include, among others, the development of the general scheme of population settlement in Tajikistan and of draft territorial plans for oblasts, districts and cities, as well as the development and approval of republican standards and building norms in architecture, urban construction, building materials, construction and engineering equipment. Among other bodies, the Committee has within its structure the Service of Licensing of Urban Planning Activities (2014 Resolution of the Government No. 587) and the Service for State Surveillance over Architecture and Construction (2014 Resolution of the Government No. 586). The latter performs, among other tasks, the surveillance over building materials and construction activities.

The Committee on Emergency Situations and Civil Defence under the Government (Regulation approved by 2006 Resolution of the Government No. 611) is in charge of policy on preparedness and protection of the population and economic facilities from the consequences of emergency situations of both natural and man-made character, as well as in the event of military activities.

The Anti-Monopoly Service under the Government (Regulation approved by 2010 Resolution of the Government No. 227), created in 2010, is the body in charge of protection of competition, prevention and restriction of monopoly activities, and consumer protection.

The Service of State Surveillance over Safety in Industry and Mining under the Government (Gosgortekhnadzor) (until 2013, the Main Administration) oversees accident prevention by legal and natural persons to ensure industrial and mining safety, and conducts the geological research on subsoils (Regulation approved by 2014 Resolution of the Government No. 152). Control of hazardous chemicals and explosive materials is also within the scope of its activities. The Service determines the organization of the expertise of industrial safety and sets standards and regulations for the use of subsoils. The State Inspectorate on Mining Surveillance, State Inspectorate on Surveillance over Use and Protection of Subsoils, State Inspectorate on Surveillance over Explosive Materials, State Inspectorate on Surveillance over Chemical and Metallurgic Industries and State Inspectorate on Surveillance over Hazardous Industrial Facilities are part of the Service of State Surveillance.

The Agency of Land Reclamation and Irrigation under the Government (Regulation approved by 2014 Resolution of the Government No. 125), established in 2013, is in charge of land reclamation and irrigation, maintenance and repair of irrigation, drainage and other water infrastructure entrusted to the Agency, development of the cadastre of the status of reclaimed lands and monitoring of bank protection in nullahs and rivers. The Agency acts to ensure delivery of water through irrigation networks and rational use of water. The Agency is an authorized state authority to support water user associations (2014 Resolution of the Government No. 755). The Agency has some 20 subordinated organizations including the Design Institute "Tadjikhyprovokhoz" and State Unitary Enterprises "Tadjikvodavtomatika" (installation and start-up water works) and "Selezaschita" (mudflow protection).

The Agency for Standardization, Metrology, Certification and Trade Inspection under the Government (Regulation approved by 2006 Resolution of the Government No. 615) is responsible for governmental policy on certification of products and services, state supervision over implementation of standards and technical regulations and improvement of the State System of Certification.

The Main Administration on Geology under the Government (Tajikgeology) (Regulation approved by 2006 Resolution of the Government No. 617) is responsible for coordination of works on geological exploration of subsoils and rational use of mineral resources and raw materials. Exploration of

groundwater reserves and permitting on the use of groundwater is also vested with this body.

The National Legislation Centre under the President, established in 2009 (2009 Decree of the President No. 637), is responsible for legal expertise of draft laws upon request of the President or the Government, and for development of draft laws and other legal acts upon request of these bodies or upon its own initiative (Regulation approved by 2014 Decree of the President No. 288). The Centre has a Department of Agrarian, Natural Resources and Environmental Legislation.

The Academy of Sciences provides scientific support to the development of policies on environmental protection and use of natural resources and sectoral policies. With the 2013 Decree of the President No. 12, the functions of implementing scientific policy were removed from the competences of the Academy of Sciences and vested with the Ministry of Education and Science.

The Agency for Nuclear and Radiation Safety under the Academy of Sciences (2004 Resolution of the Government No. 482) is responsible for development of standards on radiation safety; licensing of activities connected with use of nuclear energy; permitting of import, export, transit and transportation of radioactive materials; inspections of facilities that use nuclear and radioactive materials; defining procedures for use of ionizing radiation sources; preparedness for radiation accidents and participation in response; and radiation monitoring of the environment.

Vertical coordination

Tajikistan is divided for administrative purposes into the following territories: the capital, Gorno-Badakhshan Autonomous Oblast, Sughd and Khatlon oblasts, towns and districts under republican subordination, and lower level territorial units.

The local representative authorities have the powers to define main directions of environmental protection and use of natural resources and approve ecological programmes in their respective territories; approve expenditures on environmental protection as part of local budgets; and review the reports of local executive authorities, territorial bodies of central executive authorities and enterprises on environmental protection and use of natural resources.

The local executive authorities have powers to implement state control of environmental protection,

develop and implement programmes and action plans on environmental protection and use of natural resources, make proposals to the national environmental authority on environmental issues, raise environmental awareness, etc. One of the deputy heads of a local executive authority is usually responsible for overseeing environmental issues, i.e. acts as a curator for such issues. While the competence of local executive authorities to implement state control of environmental protection formally overlaps with the same competence of territorial bodies of the Committee on Environmental Protection, this does not seem to be a problem, as territorial bodies of the Committee work hand in hand with the local executive authorities and regularly inform and consult them on their work.

As for vertical coordination, there is almost no involvement of territorial bodies of the Committee on Environmental Protection in policymaking on environmental issues. The first-layer territorial bodies, i.e. the Committee's divisions in oblasts and the City of Dushanbe, are not consulted by the central level on drafts of strategic documents, laws and regulations developed at national level, not to speak of the units and offices on environmental protection in districts and towns. The Committee's decision of 2015 to take permitting out of the scope of activities of territorial bodies (except permits for small vegetation cutting), although positively resulting in the separation of permitting from inspection, was taken without consultation with even first-layer territorial bodies.

Horizontal coordination

According to the 2001 Law on the Government of the Republic of Tajikistan, the Government includes ministries and state committees. The personal composition of the Government includes the Prime Minister, first and other deputies, ministers and chairs of state committees. The Committee on Environmental Protection is not part of the Government but a body subordinated to the Government. The status of the Committee is rather too low to enable it to effectively pursue strong environmental policy and promote the integration of environmental considerations into sectoral policies, and does not allow the Committee to act on an equal footing with sectoral ministries.

The weak integration of environmental aspects into sectoral legislation and strategic documents shows that, despite formal procedures for review of draft legislation and strategic documents by all interested public authorities, the Committee's influence on such documents is limited.

Coordination mechanisms

In general, horizontal coordination mechanisms are quite developed in Tajikistan. However, few directly refer to the environmental area.

Moreover, some mechanisms relevant to environmental issues do not involve the Committee on Environmental Protection. For example, the composition of the National Council on Development of Education under the Government, approved through the 2014 Resolution of the Government No. 601, does not include the representative of a national environmental authority. The composition of the National Coordination Council on Public Health and Social Protection of the Population under the Government, approved through the 2014 Resolution of the Government No. 834, does not include the representative of a national environmental authority. The composition of the Coordination Council on Safety of Food Products, approved through the 2013 Resolution of the Government No. 495, does not include the representative of a national environmental authority.

In order to enhance the regulatory framework through dialogue with the private sector, the Consultative Council on Improvement of the Investment Climate was established under the President (2007 Decree of the President No. 356). Discussion of draft laws is among the key activities of the Council. However, the Committee on Environmental Protection is not involved in the activities of this Council and environmental issues and regulations have so far attracted little attention from the Council.

In addition, coordination mechanisms tend to be mostly interministerial, with some participation of international organizations and little participation, if any, of the private sector and NGOs, although representatives of NGOs, including environmental NGOs, are part of the Public Council of the Republic of Tajikistan established in 1996 and functioning under the President of Tajikistan.

An example of a recently created coordination mechanism is the National Commission on Irrigation and Drainage, established under the Agency of Land Reclamation and Irrigation through the 2015 Resolution of the Government No. 620. The Commission is to help the new Agency deal with a number of tasks, such as the improvement of irrigation systems and application of economic instruments to improve the cost efficiency of land

reclamation and irrigation where it requires the involvement of a multitude of governmental bodies. Membership of the Commission includes representatives of the Ministries of Agriculture, of Energy and Water Resources, and of Education and Science, State Committee on Land Management and Geodesy, Committee on Environmental Protection, Committee on Emergency Situations and Civil Defence, Service of State Surveillance over Safety in Industry and Mining, Forestry Agency, Main Administration on Geology and several scientific institutions.

Another example of a coordination mechanism is the National Platform for Disaster Risk Reduction created in accordance with the Law on Protection of the Population and Territories from Natural and Man-made Emergencies through the 2012 Resolution of the Government No. 98, which brings together not only various ministries and agencies but also international organizations as observers (chapter 15). There is also a Republican Commission on Flood Prevention, created through the 2010 Resolution of the Government No. 281 and comprising representatives of ministries, agencies and a few enterprises.

Training and in-service training

There are provisions stating the need for training and in-service training of specialists on environmental protection in the 2011 Law on Environmental Protection, 2010 Law on Environmental Education of the Population and 2008 Resolution of the Government No. 189. According to the 2007 Law on Civil Service, training and in-service training of civil servants is done in accordance with state-guaranteed order (*goszakaz*).

In practice, training and in-service training of employees of the Committee on Environmental Protection on general (non-environmental) issues takes place in the Institute of Public Administration under the President, and on environmental protection issues through participation in various seminars and via training provided by senior staff to junior staff. Occasionally, brief seminars are conducted on new legislation. In general, the Committee on Environmental Protection faces challenges in attracting highly qualified staff.

No schemes of regular training and in-service training of civil servants on environmental issues are in place for the employees of sectoral ministries and agencies.

Trends and progress achieved

Since 2010, the status of the Committee on Environmental Protection under the Government has remained rather low. The low status does not allow the Committee to effectively coordinate the activities of all governmental authorities on environmental protection and does not contribute to the integration of environmental considerations into sectoral policies and legislation. Some horizontal coordination mechanisms relevant for environmental issues do not include the Committee. The transmission of the protected areas competences to the Forestry Agency in 2013 raises concerns with regard to the inherent conflict of responsibilities of the Forestry Agency, entrusted to manage forests and at the same time ensure the observance of the protected area regime.

1.4 Conclusions and recommendations

There are a number of contradictions and inconsistencies in the environmental legislation. There are cases of no action having been taken for years to align existing legislation with newly adopted laws or governmental resolutions. The development and adoption of subsidiary legislation often takes years. The mechanism of the legal expertise (review) of draft laws and other legal acts is in place but does not seem to function properly. Progress has been made in improving the accessibility of legislation, including environmental legislation, to governmental officials. However, the population has free online access only to laws and not to subsidiary legislation.

Recommendation 1.1:

The Government should:

- (a) *Strengthen the quality of environmental legislation by eliminating contradictions and inconsistencies, ensuring timely development and adoption of subsidiary legislation, and aligning existing legislation with newly adopted legislation;*
- (b) *Ensure free online access to all environmental legislation.*

Strategies and programmes usually describe financing needs, of which a very minor part is secured at the moment of adoption of a strategic document. Grants from foreign donors and other non-budgetary funds often constitute an important co-funding source. Many strategies and programmes in the environmental area remain significantly underfunded.

Governmental resolutions, which approve state programmes include provisions on annual reporting. The Committee on Environmental Protection submits annual reports on implementation of the State Environmental Programme to the Government. However, the reports on implementation of state programmes are not publicly available.

Besides local programmes of socioeconomic development, strategic documents on environmental protection, which would address specific environmental issues at local level are scarce.

Strategic environmental assessment, as provided for in the ECE Protocol on Strategic Environmental Assessment or in Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, does not exist in Tajikistan.

Recommendation 1.2:

The Government should:

- (a) *Ensure allocation of adequate governmental funding for implementation of strategic documents on sustainable development and environmental protection on the basis of a reasonable number of priorities;*
- (b) *Provide free online access to the reports on implementation of strategic documents on sustainable development and environmental protection;*
- (c) *Support local authorities in the development and adoption of local strategic documents on environmental protection;*
- (d) *Progressively introduce strategic environmental assessment.*

The Government has been aligning its strategic documents with the Millennium Development Goals (MDGs). Official reports on MDG implementation were prepared in 2003 and 2010. Statistical information on MDG indicators is available at <http://www.tojikinfo.tj>. In 2013–2014, Tajikistan had an extensive process of national consultations on the national priorities and vision for the post-2015 development agenda. The 2016 National Development Strategy for the period until 2030 aims to align the national development agenda to the 2030 Agenda for Sustainable Development. Implementation of the National Development Strategy for the period until 2030 can be enhanced on the basis of thorough analysis of MDG implementation and close coordination with the efforts to implement the Sustainable Development Goals.

Recommendation 1.3:

The Government should:

- (a) *Prepare and publish the final report on implementation of the Millennium Development Goals;*
- (b) *Implement the National Development Strategy until 2030 on the basis of the globally agreed Sustainable Development Goals.*

The low status of the Committee on Environmental Protection does not allow the Committee to effectively coordinate the activities of all governmental authorities on environmental issues and ensure environmental protection and promotion of sustainable development in various sectors. Its current status is the core reason for insufficient progress with integration of environmental requirements into sectoral policies and legislation. The current status of the Committee is not sufficient to ensure the implementation of the ambitious development agenda, set in the 2016 National Development Strategy for the period until 2030 and other strategic documents on environment and socioeconomic development.

Recommendation 1.4:

The Government should raise the status of the national environmental authority to a ministry, taking into account the strategic economic development plans.

No clear separation of management function and state control function exists in forest management as both functions are vested with the Forestry Agency. Moreover, the transfer of the protected areas competences from the Committee on Environmental Protection towards the Forestry Agency in 2013 raises concerns with regard to the inherent conflict of responsibilities of the Forestry Agency, which is entrusted to manage forests and at the same time ensure the observance of the protected area regime.

Recommendation 1.5:

The Government should:

- (a) *Entrust the competency on all specially protected natural areas to the Committee on Environmental Protection;*
- (b) *Ensure clear separation of the state control over the management of natural resources and the management functions in forest management.*

Training and in-service training of employees of the Committee on Environmental Protection on general (non-environmental) issues takes place in the Institute of Public Administration under the President, and on environmental protection issues through participation in various seminars. Occasionally, brief seminars are conducted on new legislation. However, the system lacks regularity and a systematic approach to ensure comprehensive coverage of environmental and sustainable development issues, including emerging problems and new concepts.

Recommendation 1.6:

The Committee on Environmental Protection should improve the system of training and in-service training of its staff by ensuring regularity and comprehensive coverage of environmental and sustainable development issues.

No schemes of regular training and in-service training for civil servants on environmental issues are available for the employees of sectoral ministries and agencies.

Recommendation 1.7:

The Government should establish schemes of training and in-service training on environmental issues for civil servants in sectoral ministries and agencies.

Chapter 2

REGULATORY AND COMPLIANCE ASSURANCE MECHANISMS

2.1 Institutional framework

Since 2008, the compliance assurance system has seen a few changes in the distribution of functions, with a clear trend towards a higher degree of centralization.

The main actor in environmental regulation and compliance assurance is the Committee on Environmental Protection under the Government of the Republic of Tajikistan, with its territorial bodies and subordinated organizations. The Committee's central apparatus is responsible for policy design and law-making, and environmental standard setting. The Committee includes four units of state control (air, water resources, flora and fauna, and soil and waste management), which have regulatory functions and provide methodological guidance and oversight of the Committee's territorial bodies. The Committee's Division of Monitoring and Environmental Policy aggregates and summarizes data, including data on inspection activity. Besides, the State Ecological Expertise Body deals with environmental assessments and authorization of project and facility-level activities (except the least dangerous projects, which are addressed at the oblast level), as well as environmental audit.

Since mid-2015, the Committee's units of state control were made responsible for issuing permits for air emissions, water use and wastewater discharge, and waste management; in such a way, the issuing of permits became centralized. The oblast divisions have retained the right to issue tree-felling permits for fewer than ten trees in urban areas, and to carry out – together with district and town offices/units – compliance monitoring activities, including analytical control. The district and town offices/units monitor compliance and provide administrative non-compliance response. A significant element in local-level activities is quarterly verification of pollution charge payment.

The vertical reallocation of permitting tasks of mid-2015 resulted in a system that puts considerable administrative burden on the central level where human resources are scarce. Another issue is that

now the environmental authorities at the regional and district/town levels are assigned similar tasks. The centralization of permitting is, in fact, a return to the allocation of mandates that existed in the 1990s, when specialized inspectorates working at the central level were dealing with permitting and the supervision of the territorial subdivisions' compliance monitoring activity. At the beginning of the 2000s, permitting was partly delegated to territorial subdivisions, which reportedly caused many situations of abuse at the local level, as well as lack of delimitation between permitting and inspection at the individual level. This also resulted in a system that was not transparent and accountable, in particular because of gaps in reporting on issued permits from territorial bodies to central level. Thus, the 2015 change was made in order to prevent the conflict of interests and make permitting more transparent and accountable.

Four units of the Committee on Environmental Protection dealing with state control of the observance of environmental legislation (air, water, flora and fauna, and soil and waste) have 17 full-time staff plus a few persons employed on the basis of short-term contracts. The State Ecological Expertise Body employs 20 people. In terms of organization, the Body is not part of the Committee's central apparatus; this allowed the by-passing of severe restrictions on the number of civil servants allowed at the national level but did not change its de facto role within the Committee.

Most of the human resources available at the subnational level are dedicated to inspection activities. Some of the territorial bodies of the Committee on Environmental Protection were beefed up in the last five years: for example, the Dushanbe City Department of Environmental Protection has seen its number of inspectors increase from 22 to 33. Four additional district offices were established. There are two to three persons in every oblast division who conduct the environmental expertise procedure for category IV (low hazard) projects. The district and town offices/units have four to five staff members on average, and sometimes only two to three staff members.

Photo 2: Mountain view on the way to Anzob pass, Ayni District, Sughd Oblast

There are several organizations subordinated to the Committee on Environmental Protection (chapter 1) that have relatively narrow functions, such as ambient quality monitoring, site-specific sampling and laboratory analysis, information management, standards setting, and applied research. Among them, the Centre for Analytical Control acts as the analytical arm supporting compliance monitoring. While financed by the Committee, the Centre is institutionally separated; its staff members do not have civil servant status. Four analytical laboratories are attached to the oblast divisions. The Centre for Standardization and Environmental Norm-Setting runs a library of environmental standards and norms in electronic format.

In late 2013, the mandate of the Committee on Environmental Protection for nature protection and conservation was weakened when forest management and protected areas management tasks were transferred to a newly established Forestry Agency under the Government (2013 Decree of the President No. 12). For about a decade prior to this transfer, forests and protected areas were managed separately by legal entities under the Committee. The state forestry institutions (*leskhoz*) employed a corpus of some 800 forest guards who enforced forest management and hunting regulations and ensured fire protection on the territory of the forest fund. The protection of state nature reserves and nature parks was ensured by state inspectors for protected areas

with jurisdiction limited to their territory. Besides, there were state environmental inspectors who had wider control prerogatives, including flora and fauna protection and the observance of hunting and fishing rules, and whose jurisdiction spread over the entire territory of the country. The 2013 reorganization is likely to create confusion and potential duplications of inspection activity at the territory of state forest fund between the State Forest and Hunting Inspectorate, to be created under the Forestry Agency, and the Committee's state environmental inspectors. The latter still keep the mandate of state supervision over the protected areas, the animal species introduced in the Red Book, and the fish resources of the hunting areas. As of late 2015, the State Forest and Hunting Inspectorate was still being established.

Neither continuous training nor special capacity-building programmes on mechanisms of compliance assurance, e.g. risk-based inspections, are provided by the Committee on Environmental Protection. Occasionally, seminars are conducted on new legislation. At the same time, there are important capacity-development needs.

The competences of the Ministry of Health and Social Protection of the Population include: the state sanitary and epidemiological supervision, assessment of the quality of drinking water and food products, and enforcement of sanitary rules. The Ministry

approves the air quality standards for residential areas and sets sanitary standards for surface waters used for drinking and recreation purposes. The Service of State Sanitary and Epidemiological Surveillance (Sanepidemnadzor) oversees compliance with sanitary regulations. The Service is also empowered to oversee the sources of ionizing and non-ionizing radiation. The Service has a regulated community of over 40,000 entities subject to control and employs some 950 people with supervision prerogatives.

The Environmental Police within the Ministry of Interior has some 65 staff members organized at oblast level who often support the environmental inspectors in their actions, notably during campaigns of mobile sources emissions control and combating illegal fishing and hunting. The Environmental Police conducts quarterly environmental checks of vehicles followed by issuance of the so-called "ecological vouchers" (chapter 12). The Environmental Police was long part of the Ministry of the Interior on the payroll of the Committee on Environmental Protection; since 2014, it has been fully integrated into the former.

The Agency for Nuclear and Radiation Safety under the Academy of Sciences (2004 Resolution of the Government No. 482) is the state regulatory authority responsible for, inter alia, licensing the activities related to ionizing radiation sources and use of radioactive substances. It also has control functions over the compliance with regulations on radiation safety and licence conditions. The Agency carries out inspection of all users dealing with ionizing radiation sources, including industrial sites. Currently, there is a duplication of function with Sanepidemnadzor.

The Service of State Surveillance over Safety in Industry and Mining under the Government (Gosgortekhnadzor) has competences on environmental regulation related to industrial and mining safety. The Service employs 50 staff, most of them industrial and mining safety inspectors distributed over eight control areas. It also issues licences for the operation of dangerous facilities and licences for performing industrial safety assessments. Gosgortekhnadzor maintains the state register of dangerous production facilities. It also has a role in issuing and enforcing permits for the use of mineral and thermal groundwater.

The competences of several other institutions include some elements related to environmental compliance assurance. For example, the Main Administration on Geology under the Government (for underground sources) and the Agency of Land Reclamation and

Irrigation under the Government (for water abstracted from the irrigation canals) are consulted when permits for special water use are granted by the Committee on Environmental Protection. The State Committee on Investments and Management of State Property maintains the unified state electronic register of permitting documents, including environmental permits. Tajikstandard has the roles of the national accreditation authority and the national certification authority.

Joint actions of different state bodies mandated to oversee regulatory compliance and carry out monitoring functions (e.g. environmental and sanitary authorities and the Environmental Police) are a routine practice, especially at the local level. This is mainly done on an ad hoc basis and under the guidance of local executive authorities. A particular issue making coordination difficult is the lack of connection between information systems of various agencies and, quite often, even within the same state authority, as well as insufficient capacity for data processing, storage and exchange.

As far as the local executive authorities in environmental compliance assurance are concerned, the 2011 Law on Environmental Protection gives them rights to "state control on environment", along with the Committee on Environmental Protection. They also have control powers on waste handling (under the 2002 Law on Waste from Production and Consumption) and water protection zones regime (under the 2011 Norms for Water Protection Zones for Water Bodies in the Republic of Tajikistan). On the other hand, they have no structural units dedicated to environmental protection. In practice, their main function is delivery of environment-related services, such as municipal solid waste management (e.g. deciding on the location of landfills) and natural assets management (e.g. granting mining allotments for common mineral resources such as clay, sand or gravel). Local executive authorities have a central role in land-use and urban planning.

The cooperation of the local executive authorities with the Committee on Environmental Protection territorial bodies is strong. According to the 2004 Constitutional Law on Local Public Administration Bodies, the heads of the Committee's territorial subdivisions are to be appointed and dismissed by the Committee's Chair upon written consent of the head of the local (oblast, district or town) executive authority and the decision is to be approved by the local council of deputies. This is at the root of what is in fact double subordination of the Committee's territorial bodies (chapter 1), especially at the district and town level.

In practice, semi-annual work plans of the Committee's territorial bodies are coordinated with local executive authorities. Joint actions of sanitary, environmental and other enforcement agencies are often undertaken under the aegis of the local administration. Since the local executive authorities lack resources for their day-to-day activity, there is a tendency to use the Committee's district and town offices/units for local issues more or less related to the environment.

2.2 Legal and policy framework

Legal framework

Several new laws were enacted in the period 2010–2015, while other primary legal acts were amended. The secondary legislation, however, did not always follow; thus, several laws remain "lettre morte" without implementation mechanisms.

The 2011 Law on Environmental Protection introduced some modern principles and tools related to compliance assurance and regulatory mechanisms, notably the concept of environmental audit, the environmental status review of legal entities during their privatization, bankruptcy or liquidation, and the notion of environmental certification. The Law introduced the presumption of environmental danger from all planned activities and stated that decisions on siting the potentially dangerous projects are to be taken after considering the opinion of people living in the area.

This Law also established the public's right for environmental oversight through involvement in EIA procedures and in other ways, as well as the public's access to justice on environmental matters. In addition to the citizens who can claim in court compensation for environmental damage to their health and property, NGOs can now initiate lawsuits for environmental damage in defence of the interests of citizens and can appeal to the authorized state bodies and courts on restriction, suspension and termination of economic and other activities having a negative impact. The Law clearly stated that the decisions of environmental inspectors can be appealed in court. Besides organizing a public ecological expertise, civil society organizations now have the right to recommend their representatives for participation in the SEE.

The 2012 Law on the Protection of Atmospheric Air sets air protection requirements for the design, construction and operation of stationary pollution sources and for mobile pollution sources. It introduces a classification of pollution sources and

pollutants and establishes permitting, monitoring and pollution control requirements. The Law introduced the concept of best available techniques (BAT) and requested the national technological standards being established and design documentation being developed be based on BAT.

Tajikistan undertook a complete revision of its Forest Code in 2011 and adopted the Law on Fishery, Fishing and Protection of Fish Resources in 2013 and Law on Hunting and the Hunting Sector in 2014. The new legislation updated the mechanisms of biological resources use and protection by incorporating forms of regulation such as the allocation of hunting grounds on the basis of auctions. The new laws were not always followed by secondary legislation so the new legislation is not entirely put into practice.

The 2012 Law on Ecological Expertise, together with subsequently adopted Procedures for conducting state ecological expertise (2012 Resolution of the Government No. 697) and Procedures for the organization and conduct of environmental impact assessment (2014 Resolution of the Government No. 509), streamlined the mechanism of environmental assessment of projects. These acts brought several procedural adjustments such as introducing more flexibility into the duration of the SEE, which is now linked to the complexity of projects. The Law introduced the right for the public to participate in the development (and not only the discussion) of EIA materials, but did not provide details to enable implementation of this right. It increased the rights in relation to the public ecological expertise, such as the obligation of the proponent to provide to the public project documentation of the same completeness and complexity as to the SEE. A new list of facilities and types of activity subject to EIA was adopted by the 2013 Resolution of the Government No. 253. This four-category list is risk based and is quite comprehensive as compared with the previous one, which contained only 14 types of facilities. The EIA procedures have been differentiated in relation to the project risk. Public participation is described in the new EIA Procedures in more detail, as is the content of the EIA report. However, several aspects (e.g. screening and scoping, or the role of the competent authority in EIA) still remain unclear.

Following the 2011 Law on Environmental Audit, the Committee on Environmental Protection was nominated the competent authority and given the right to issue licences for this kind of activity and qualification certificates for auditors (2012 Resolution of the Government No. 452). Environmental audit is to be done at the expense of the business entity. Mandatory audits of

facilities/activities posing environmental risks are to be undertaken based on annual plans set by the competent authority. The Procedures for requesting the mandatory environmental audit (2014 Resolution of the Government No. 789) defined the conditions for the competent authority to prescribe a mandatory environmental audit.

The 2004 Law on Industrial Safety of Dangerous Production Facilities provides a regulatory framework focused on accident prevention at dangerous industrial installations. It defines dangerous facilities, introduces the state register of such facilities and sets requirements for their operation, such as obtaining a licence, developing a declaration on industrial safety, mandatory self-monitoring and reporting, mandatory insurance, and control measures.

Since 2010, Tajikistan has further developed legislation that specifically addresses permitting and inspection procedures. The 2011 Law on Permitting set the legal, organizational and economic basis for the permits system: the list of activities that require a permit, the permitting procedure, and the types of permits and the competent state bodies authorized to issue them. The Law was one of the elements of the country's permit system reform that reduced the total number of types of permits (more than 600) to only 88. Eight types are issued by the Committee on Environmental Protection.

The 2006 Law on Inspections of Economic Entities described in detail how inspection should be planned and executed, and imposed stricter procedural requirements on various compliance assurance authorities. It restrained the right of control bodies to inspect business entities by limiting the frequency of control checks. Two more specific laws were enacted that further restricted the activity of enforcement agencies: the 2009 Law on the Moratorium on Inspection of Small and Medium Business Entities and the 2012 Law on the Moratorium on Inspection of Business Entities Engaged in Production. These laws limited the capacity of enforcement authorities to assure compliance with environmental law and went against good international practices that require certain flexibility in control activities in order to be able to undertake unscheduled inspections when necessary.

A new Law on Inspections of Economic Entities has been enacted in late 2015, replacing the 2006 Law. The new Law provides a more detailed description of several procedural aspects and strengthens the risk-based approach to inspections, by setting the general risk-assessment criteria and requiring inspection

authorities to elaborate specific risk-assessment criteria. It introduces the Council for Coordination of Activity of Inspection Authorities as a mechanism to improve coordination. The Law also introduces a Code of Ethics for inspectors to be approved by the Government and establishes new inspectors' performance assessment indicators, such as compliance promotion and advisory activity at the enterprise level.

The 2011 Law on Conformity Assessment sets the system of assessing compliance with requirements of technical regulations and standard-setting documents such as GOSTs and GOST-based methodologies.

The 2004 Law on the Licensing of Certain Types of Activities defines the conditions and requirements for obtaining a licence, suspension and termination of licences, and a list of activities requiring a licence. Such activities include handling hazardous waste; handling ozone-depleting substances (ODS); environmental audit; hydrometeorological activity; handling ionizing radiation sources; radioactive waste management; import, export, transportation, production, use and disposal of radioactive material; collection and processing of ferrous and non-ferrous scrap metals; collection and harvesting of medicinal plants; and use of plants and animals included in the Red Book of Tajikistan.

Policy framework

Policy documents on compliance assurance are scarce. The 2011 Concept of Forecast Development of Legislation of the Republic of Tajikistan (2011 Decree of the President No. 1021) foresees the improvement of regulation on environmental information, public environmental expertise, environmental audit and environmental damage compensation, as well as harmonization of Tajikistan's environmental standards with international environmental standards.

The State Quality Programme for 2013–2015 (2012 Resolution of the Government No. 512) provides for, inter alia, activities on the development and implementation of environmental management systems in Tajik industry based on the ISO 14000 series. It foresees the establishment of a mechanism for certification of environmental management systems in compliance with the ISO standard. The Programme envisages the development of technical regulations and product standards harmonized with international standards.

There are neither defined strategic priorities on environmental law enforcement nor targets on using

different compliance assurance instruments to address those priorities at the national and subnational levels.

2.3 Environmental standards

Ambient quality standards

Tajikistan conserved the system of ambient quality standards inherited from the Soviet period. Those standards, expressed in terms of maximum allowable concentrations (MACs), have traditionally been set based on the "zero risk" concept. It is clear that the number and stringency of standards do not match the current capacity of the country to monitor and ensure their compliance.

The current system of ambient quality standards contains a substantially larger number of parameters that are expected to be regulated (including monitoring and assessment) than, for example, the equivalent standards included in relevant European Union (EU) directives. For air, almost 600 MAC standards are set for residential areas. For water, there are 1,345 sanitary MACs applied for water bodies used for drinking water supply and recreation purposes, and 1,072 fishery MACs. These numbers refer to MACs adopted from the late 1980s to the early 1990s. No significant revision of ambient quality standards was undertaken during the last two decades.

Besides extending the use of the former Soviet standards, the Procedures on the application of norms and standards of other countries, approved by the 2005 Order No. 64 of the Agency for Standardization, Metrology, Certification and Trade Inspection, clarified the procedures for authorizing the use in Tajikistan of the standards base of other countries (mainly the Russian Federation and other CIS countries). Sometimes the stakeholders are not very aware about what are the standards to be used.

Two main governmental authorities mandated to enact ambient quality standards are the Committee on Environmental Protection and the Ministry of Health and Social Protection of the Population. The Service of State Sanitary and Epidemiological Surveillance is setting, inter alia, sanitary norms and standards for ambient air and soil quality in residential areas and on industrial sites, as well as drinking water standards. The Committee on Environmental Protection approves, in coordination with the Ministry of Health and Social Protection of the Population, environmental standards in atmospheric air for specially protected natural areas.

Emission standards and norms

MACs are translated into enterprise-specific emission and effluent limit values, which are part of permits authorizing a certain level of environmental impact. These limit values are complemented by technological standards, which can be both individual and sectoral. The latter are Soviet emission standards, partly modified and adapted by the Russian Federation in the 1990s. Sectoral emission limit values (ELVs) exist for refineries, the cement and building industries, energy generation, and metal and wood processing.

The Committee on Environmental Protection establishes the pollutants that are subject to ELV setting. In total, 121 air pollutants and 197 water pollutants are subject to mandatory emissions limitation and pollution charges. This list makes the existence of a large number of MACs somewhat symbolic, as they have little practical value for substances outside the ELV list.

The ELVs are developed by the industrial operators and are approved by the environmental authority (Committee on Environmental Protection) as part of permitting. The operators often lack guidance materials for developing ELVs while the authorities lack trained people for assessing them.

A special regulation regime of pollutant emissions is applied during unfavourable meteorological conditions. Industrial facilities have a list of prescribed actions to be taken during such conditions, built into the air emissions permits.

Norms of pollutants emissions from mobile sources are established in technical regulations and have not been updated recently. The 2015 Law on Ensuring the Environmental Safety of Road Transport introduced for imported vehicles the concept of environmental classes depending on the technological standards of their emissions. The Government still has to develop the vehicles environmental classification procedure.

In accordance with the 2000 Water Code, discharge of wastewater into water bodies is permitted only if it does not cause an exceedance of MACs in the water body and (or) if wastewaters are treated by the water user to comply with the norms established by the state administrative body on the use of natural resources and protection of the environment. Overall, this is similar to water quality regulation used before the 1990s.

No new elements of discharge regulation have been introduced recently. For users discharging wastewater directly into receiving water bodies, ELVs in wastewater are set according to the Regulation for Setting Norms for Pollutant Discharge into Water Bodies (replacing a 1990 Instruction) approved by the then State Committee on Environmental Protection and Forestry in 2005. The pollutants are regulated based on calculated individual limit values while taking account of MACs, background level of the substance in the water body and the assimilation capacity of the receiving waters. The facility-specific ELVs form a constitutive part of the permit for special water use. They are developed by the water user and approved by the Committee on Environmental Protection upon the agreement of the Service of State Sanitary and Epidemiological Surveillance. For significant polluters they are normally accompanied by self-monitoring requirements.

The general requirements for disposing of industrial effluents into municipal sewerage systems are contained in the regulations for their operation adopted by the 2011 Resolution of the Government No. 234.

In 2011 the Committee on Environmental Protection introduced the Norms for Water Protection Zones for Water Bodies in the Republic of Tajikistan, which set a minimum width for water protection zones and strips around/along water bodies. Economic or other activities on these areas are strictly limited.

Sectoral industrial waste generation norms are developed by line ministries and approved by the environmental, sanitary and epidemiological, and industrial safety authorities, according to their competences. Those norms form the basis for setting waste generation and waste disposal limit values, which are specified in waste production, use and disposal regulation permits issued by the environmental authorities. The norms are based on the waste hazard class.

Although the State Programme to Implement the Concept of Forecast Development of Legislation in Agriculture and Environmental Protection for the period 2012–2015 specifically addressed the issue of industrial and household waste, proposing the setting of hazardous waste production norms and limits, no such norms have been set to date.

Norms and procedures on handling end-of-life vehicles, tyres, batteries and used motor lubricants are not yet in place, but are expected to be developed by the Government following the requirements of the

2015 Law on Ensuring the Environmental Safety of Road Transport.

Product standards

Drinking water quality standards is one of the sectors that have seen some development since independence. Specifically, drinking water quality is regulated by Sanitary Rules and Norms 2.1.4.004-07 "Drinking Water. Hygiene requirements for the quality of water in centralized water supply systems. Quality control". This standard sets safety requirements for drinking water on bacteriologic, radiation and chemical criteria based on World Health Organization (WHO) recommendations and EU Directive 98/83/EC on the quality of water intended for human consumption.

Few improvements occurred on the quality of automobile fuels imported to and marketed in Tajikistan (there is no in-country production). Most imported fuel meets the Euro 2 standard (sulphur level 500 ppm in both petrol and diesel). Leaded petrol has been banned since 2010. The quality of the fuel is checked during import and storage and at gas stations. Lately, fuel quality standards along the whole chain of petroleum products have been enforced by Tajikstandard, which has a national fuel testing laboratory. Currently, the Committee on Environmental Protection is in charge of the control of motor fuel quality at gas stations. Quality requirements for marketed fuel as well as provisions for its certification are established in the Technical Regulation "Safety requirements for petrol, diesel, fuel oil and jet fuel" (2014 Resolution of the Government No. 30). Recently, this was supplemented by the Technical Regulation "Safety requirements for liquefied petroleum gas" (2015 Resolution of the Government No. 136).

On energy efficiency, a few technical standards and regulations were developed, including new norms on the insulation of buildings (SNiP MKS-ChT 23-02-2009 "Thermal protection of buildings"). General (including environmental) requirements during the entire materials life cycle are established by "Technical Regulation of the Safety of Construction Materials" (2014 Resolution of the Government No. 338).

Other recent technical regulations set labelling requirements for food products (2014 Resolution of the Government No. 29) and safety requirements for fodder and fodder additives (2014 Government Resolution No. 811). Both documents contain provisions related to the regulation of GMO content in food and fodder, respectively.

2.4 Regulated community

The regulated community is well identified, as there are multiple possibilities to receive relevant information about an enterprise. Environmental enforcement agencies have access to the state register of legal persons and individual entrepreneurs (maintained by the Tax Committee under the Government) and to the lists of economic entities maintained by the local executive authorities. Enterprise information is also collected and shared by the oblast and district subdivisions of the Agency of Statistics and the Agency for Social Insurance and Pensions.

Besides the economic/business activity databases, the enforcement agencies have more specialized sources of information for identifying and profiling the regulated community. Environmental authorities collect such information mainly during the process of land allotment and as part of ecological expertise and permitting/ licensing procedure. The holders of a permit or licence for activities related to some form of environmental impact implicitly become subject to control by environmental inspectors. Information from other agencies (e.g. the Service of State Sanitary and Epidemiological Surveillance) is also used to identify the subjects of control.

At the beginning of 2014, the Agency of Statistics reported 1,640 enterprises in manufacturing industry, 136 in mining, 28 in the energy, gas and water distribution sector (i.e. a total of 1,804 enterprises in the industrial sector) and over 2,300 in the building sector. The classification of industrial enterprises by type of economic activity shows few groups that are particularly relevant for environmental protection: chemical industry (30 entities), processing of petroleum products (14), metal production (147), cement and asphalt (245) and machinery (60). The distribution of business entities by size reveals a very limited number of large enterprises (over 200 employees) that are potentially posing pollution problems by the very scale of their activity. Their number in the mentioned sectors does not exceed a few dozen facilities.

Tajikistan is starting to use environmental-risk-based approaches for better planning regulatory and enforcement activities. For example, the list of facilities and types of activity subject to EIA (2013 Resolution of the Government No. 253) introduced risk-based categories for environmental assessment purposes. Earlier, the 2006 Law on Inspections of Economic Entities (replaced by the 2015 Law on Inspections of Economic Entities) introduced risk-based requirements for determining the frequency of

compliance monitoring actions. It asked the Government to set a list of high-risk facilities based on health and environmental criteria. Such a list was never developed, however, so environmental inspections are not planned based on the clear and objective criteria of risk.

Sector-specific databases that contain relevant enterprise-level information exist in different ministries and agencies. For example, a register of dangerous production facilities is maintained by the Service of State Surveillance over Safety in Industry and Mining under the Government. However, an information system ensuring the interconnection of databases and registers on permits and inspection activity among them and with external partners (e.g. Ministry of Interior, tax authorities, statistics authorities) does not exist.

2.5 Environmental assessment

Domestic context

Having its roots in the Soviet approaches to environmental approvals, the existing system of project-level environmental assessment comprises two distinct but interlinked elements: EIA and SEE. An EIA report is developed by the project proponent in the pre-design phase when feasibility of the project is assessed; further, the EIA report becomes part of the design documentation. Public consultations are part of this process. The SEE is performed by competent environmental authorities and aims to review the full project design documentation (including EIA report) in order to check whether proposed technical solutions comply with environmental laws and regulations. If positive, the outcome of this process – the SEE conclusion – is formal recognition of compliance of the design documentation with environmental laws, but may also contain additional conditions of project implementation. Following the receipt of a positive SEE conclusion, a building permit may be granted by the urban planning and construction authorities upon agreement of the local executive authorities. Land allotment for projects receives temporary endorsement at the early stages and is then reconfirmed by the local executive authorities (or central authorities, upon their competences) after the EIA and SEE procedures. Environmental assessments are thus articulated within the urban planning procedures.

Primary and secondary legislation governing environmental assessments has recently been modified in order to elaborate the scope of such assessments and make clearer the juncture between

EIA and SEE. In this context, a new Law on Ecological Expertise was adopted in 2012. Its implementation was facilitated by the follow-up enactment by the Government of two procedural regulations (on SEE in 2012 and on EIA in 2014), as well as the List of facilities and types of activity subject to mandatory EIA, in 2013.

The 2013 list is quite comprehensive: it contains 180 types of facilities grouped under four hazard categories (from (I) "high risk" to (IV) "local impact"). If a project is not on the list, neither EIA nor SEE is required and the project goes directly to the state building expertise under the Committee on Architecture and Construction. This Committee deals with all building projects, regardless of their size, financing sources or ownership. It has to be noted that the SEE procedure is applied more broadly than for specific projects; in particular, it also applies to the assessment of draft forest management plans, technical regulations and some strategic documents (chapter 1). Before 2012, most projects were going to SEE without EIA reports. The 2006 list of activities requiring a mandatory EIA report comprised only 14 categories of facilities with significant impact on the environment.

The 2013 list of facilities for which EIA is required reflects the structure of the economy in Tajikistan. Some category assignments are questionable (e.g. tobacco production and textile factories under category I or livestock farms under category IV) and the capacity thresholds are often not indicated. Overall, the list is far from international practice and may leave scope for interpretation, given that project screening is the sole responsibility of the proponent.

Although the recent legal changes conferred continuity and consistency on the EIA and SEE tools, the scope of environmental assessments in Tajikistan

is not yet clearly outlined. There are inconsistencies between the text of the 2012 Law and its implementing regulations, e.g. as concerns the sectors and types of documents subject to EIA and SEE.

The number of dossiers submitted to SEE was increasing in the period 2010–2014 (table 2.1). Along with growing economic activity leading to more development projects, this is the result of better identification of the regulated community, including through inspection activities. Even so, environmental authorities find that the practice of working without undertaking a due environmental assessment procedure remains widespread among enterprises. For example, an inspection campaign conducted in 2015 in Khatlon Oblast revealed that about 40 per cent of enterprises were working without a positive SEE conclusion (in all, 4,378 enterprises subject to SEE were checked, including industrial enterprises, agricultural enterprises, greenhouses, market places, social buildings, etc.).

In practice, a fairly limited number of new development projects in Tajikistan carry large potential environmental risks. In 2014, only 14 of the 1,179 projects reviewed were in category I (high risk). The bulk of projects were classified as medium or low risk: 251 projects were in category II and 384 in category III. These projects were reviewed at the central level by the State Ecological Expertise Body. Up to half the projects submitted to the SEE procedure ("local impact projects", or category IV) undergo a reduced EIA procedure at the oblast level, while the assessment itself results in a "declaration on the environmental impact" including, inter alia, a list of general environmental requirements/conditions to be followed during operation. In 2014, this applied to 530 project dossiers or 45 per cent of the total submitted for review.

Table 2.1: Projects reviewed by SEE, 2010–2015

	Project dossiers received, number	Positive conclusions, number	Negative conclusions, number	Negative conclusions, per cent
2010	384	347	25	6.51
2011	721	688	34	4.72
2012	789	733	41	5.20
2013	1 064	1 008	16	1.50
2014	1 179	1 108	66	5.60
2015*	869	780	59	6.79

Source: State Ecological Expertise Body of the Committee on Environmental Protection, 2015.

Note: * January–September.

One characteristic of environmental assessment in Tajikistan is the relatively small number of rejected project dossiers. The State Ecological Expertise Body rarely rejects project dossiers, preferring to provide opportunities for applicants to correct the identified problems. SEE negative statements can contain two types of conclusions: either on the need to improve/complete/revise the project documentation submitted, or on the inadmissibility of project implementation due to a failure to comply with environmental safety requirements. No more than 1–2 per cent of project dossiers receive the latter negative conclusion.

The Law on Ecological Expertise foresees the possibility of the competent authorities establishing ad hoc expert committees for particularly complex projects or projects with transboundary impacts; such committees would involve professionals from the Committee on Environmental Protection and external experts with specific knowledge and experience. In practice, this procedure is used for category I (high risk) projects.

The latest legal changes introduced more flexibility in the SEE deadlines. The statutory duration of the SEE administrative procedure is limited to one month, but this term can be doubled by the competent authority for "complex" projects. Moreover, according to the Law on Ecological Expertise, for projects having transboundary impact, this term is to be established by governmental decision. There is an inconsistency between the Law and the 2012 Procedures on SEE: the latter simply state that "in case of necessity related to project complexity or transboundary impact the SEE duration can be extended until 90 days".

A unified administrative fee for SEE procedure and other permits, to be paid to the state budget, was introduced in 2011 (120 somoni or less than US\$20). Prior to this, the SEE fee was differentiated depending on the project complexity (from 15 to 3,000 somoni). The unified fee can be questioned, as examination of large and environmentally risky projects requires more time, effort and technical skills.

The current environmental assessment system does not envisage either deciding on the need for EIA (screening) or determining the scope and content of environmental assessment (scoping) as specific procedural steps of EIA. The 2013 List of facilities and types of activity that require a mandatory EIA is comprehensive and considered by the authorities to leave no room for case-by-case examination. The Procedures on EIA (2014 Resolution of the

Government No. 509) provide general requirements as to the content of the EIA documentation. There is no formal requirement for dialogue between the proponent and the public authorities on these matters. Thus, screening and scoping are now totally within the responsibility of the project proponent. Also, preparation of an EIA study is no longer a licensed activity – no legal requirement exists for EIA developers to have a qualification and/or experience in a particular field.

The positive SEE conclusion contains decisions: (i) on compliance of planned activity with environmental requirements; (ii) on the acceptability of anticipated environmental impacts; and (iii) on the possibility of implementing the project. The SEE conclusion contains a list of environmental requirements to be met during the project life, including the compliance monitoring (inspection) requirements. During the construction phase, unscheduled site visits by environmental authorities are undertaken to check compliance with requirements indicated in the SEE conclusion. Environmental authorities are also part of the state commission for acceptance of the constructed building/facility.

Lack of guidance materials on EIA and a publicly accessible information system (database) containing data on previous EIAs are often quoted by the expert community as among the drawbacks of the current EIA system. This hampers the exchange of experience and best practices on environmental assessments.

Public participation

In the current EIA/SEE system, public participation as a mandatory element of the procedure is envisaged only at the EIA stage. At the SEE stage, the possibility of public participation is provided through the so-called public ecological expertise. This is not a mandatory element of the assessment procedure and is rarely conducted in practice.

The public participation element of EIA has been described in detail in the 2014 EIA Procedures. Public participation procedures exist for all categories of projects, although in practice they are mostly used for category I projects. The EIA reports for category I projects must contain a non-technical summary. The EIA reports are available for review by the local population who may be affected by the project. The minimum duration of public consultation was set at 30 days since its announcement by the local executive authorities. Concerned citizens can request public hearings of a specific EIA report.

Public hearings are organized by the project proponent and the EIA developer in cooperation with the local executive authorities. Environmental authorities are not necessarily involved at the stage of public consultation (despite provision for their representatives to be invited). A record of public hearing containing the responses of the project proponent and the EIA developer to questions raised by the public is attached to the EIA report presented to the SEE. Information on the issued SEE conclusion concerning planned activity is to be published by the environmental authority in local mass media within 10 days.

The EIA Procedures do not state clearly who should receive the public's questions and comments in the event that request for public hearings is not received by local executive authorities. They only state that "the environmental authority within 3 working days sends the record of received comments to the project proponent and to the EIA developer"; apart from this, the document does not foresee any role for the environmental authorities in the EIA process. The public has 10 days since the announcement of public consultations in local mass media to request public hearings.

The 2014 EIA Procedures changed the focus and the timing of public consultations. The previous, 2006, EIA Procedures stated that the early involvement of the public in the process (i.e. after the submission to the competent environmental authority of the declaration of the project's intent) and public opinions served to structure the terms of reference for the EIA, to be endorsed by the competent authority. In fact, that ensured public involvement in the EIA scoping phase. Under the 2014 EIA Procedures, public consultations are planned to take place only after the EIA report has been prepared by the project proponent. The efficiency of this late involvement of the public in EIA is to be questioned. Moreover, the EIA Procedures are unclear on the modalities and capacity of the public to influence the final decision on the project development.

The current legal arrangement ("no SEE without EIA") has the advantage of providing the public with the possibility of being consulted on all considered projects, since this possibility is related only to the EIA stage. The 2012 Law on Ecological Expertise states the right of the public not only to be consulted on, but also "to participate in the development of the EIA materials"; however, no details are provided on the practical implementation of this right.

The 2012 Law strengthened another element of public participation: public ecological expertise,

undertaken at the SEE stage. The proponent now has to provide, at the request of a person or the public association in charge of the public ecological expertise, the project documentation with the same content and same degree of detail as is provided to the SEE. A request to undertake public ecological expertise cannot now be dismissed by invoking a state or commercial secret. Not a single public ecological expertise has so far been undertaken.

The Law introduces the right of the public associations to recommend their representatives for participation in the SEE; however, no mechanisms of such involvement are developed and no such request has so far been put forward.

The practical implementation of public participation requirements is weak. Public participation is mainly limited to large projects co-financed by international actors. This situation is a consequence of the low levels of environmental awareness among both the general public and the public authorities, and the lack of relevant mechanisms for participation in public ecological expertise and for proposals from members of the public for their representatives to participate in SEE.

Transboundary context

The decree on accession to the Convention on Environmental Impact Assessment in a Transboundary Context (2004 Decree of the President No. 1287) was never followed by deposition of the instrument of accession, so the country is not a Party to the Espoo Convention. It has no practical experience in applying the EIA instrument in the transboundary context in the meaning and terms of the Espoo Convention.

Transboundary aspects have been reduced to the very minimum in the new legislation enacted in the period 2012–2014. The Law on Ecological Expertise mentions transboundary aspects only in relation to the duration of the SEE administrative process: for projects having transboundary impact the duration is to be established by governmental decision. The SEE Procedures only mention that international proceedings are to be undertaken in the case of significant potential transboundary impact of the planned activity. The project documentation submitted to SEE must include the EIA materials on transboundary impact projects, coordinated with the affected Party. However, neither the EIA Procedures nor the SEE Procedures provide, for example, details on the notification procedure, requirements regarding consultations between the parties on the EIA report, requirements regarding public participation or

requirements regarding the final decision concerning the project.

Environmental audit

Practical implementation of environmental audit has not yet commenced.

2.6 Environmental permitting and licensing

The Committee on Environmental Protection issues permits for air emissions, special water use, waste management, waste import/export for the purpose of reuse, and natural resources use and protection, and licences for handling of ODS, handling of hazardous waste, and use of strictly protected plants and animals. It is also entrusted with issuing licences for environmental audit activities but, as of late 2015, has not yet issued any. Several types of environment-related permits and licences are issued by other authorities, notably for regulating dangerous industrial facilities or the transport and storage of industrial explosives.

Permits

The 2011 Law on Permitting set a common permitting procedure for all activities requiring a permit and delineated the list of activities that require a permit, the types of permits and the competent state bodies authorized to issue them. Permitting authorities can renew, suspend and revoke permits; they are also entitled to monitor compliance with permit requirements and conditions. A unified permit fee was introduced.

The Law introduced the "approval by default" procedure: the permit is deemed granted if the permitting authority did not provide a written answer within the legal term (10 working days). A new element of the permitting legislation is the introduction of regulatory impact assessment for any legal act establishing a new permitting document, as a measure to prevent unreasonable introduction by state authorities of new types of permits.

A register of issued permits is to be maintained by every permitting authority. All data on permitting procedures are centralized in the unified state electronic register of permitting documents maintained by the State Committee on Investments and Management of State Property. The electronic register is publicly available via the Internet (www.ijozat.tj). Besides procedural matters, the register contains limited data on enterprises that have received permits.

Pollution control permits

Permits are issued for air emissions, special water use, waste management and waste import/export for the purpose of reuse.

Special water use permits cover both abstraction and wastewater discharge, which concerns only those entities that are not connected to a municipal sewerage system. Where the enterprises are connected to municipal wastewater treatment plants (WWTPs), the quality of their effluent is stipulated on a contractual basis. The permits for special water use are granted by the environmental authority upon coordination with the Service of State Sanitary and Epidemiological Surveillance, the Main Administration on Geology under the Government (for underground sources), the Agency of Land Reclamation and Irrigation under the Government (for water abstracted from the irrigation canals) and/or the Service of State Surveillance over Safety in Industry and Mining under the Government (for curative/thermal waters). The water permit is issued after the acceptance of the construction by the state commission for acceptance of the constructed building/facility.

All industrial facilities must prepare draft limit values (ELVs) for air and water emissions, as well as for waste generation, based on technological process norms. The ELVs become part of the permits. The enterprises undertake periodical inventories of all pollution sources, which serve for updating the ELVs and applying for new permits. Hazard classes are used to set charges for generated waste.

No thresholds are established for units that require emission/discharge and waste permits: almost all economic and social entities (except the public schools) are required to have these permits and to pay pollution charges. Thus, the number of issued permits remains high, especially on waste (table 2.2).

Since mid-2015, almost all competences for environmental permitting were transferred to the central apparatus of the Committee on Environmental Protection; prior to that, most of the waste management permits and some air emission permits were granted by the Committee's oblast and district divisions. This formally separated the permitting and inspection activities that were often previously combined at the oblast and district level. The oblast divisions and district and town offices/units are still involved in preparing the permit dossiers (e.g. checking the draft limit values) but the formal decisions are taken and the permits themselves are granted by the central apparatus of the Committee.

Territorial bodies are informed about the permits issued so that they can monitor and enforce them.

According to the Law on Permitting, the permitting document is issued for an unlimited duration. In practice, pollution control permits are granted for a period of three to five years.

Current legislation does not foresee any participation of the public in the permitting process.

A breach of permit requirements is considered an environmental offence. Notably, exceeding the ELVs for air or water and the amount of waste disposed of, established in permits, is considered environmental damage and is subject to damage compensation claim by the environmental enforcement authority. However, instrumental checks of emissions are often not possible due to the lack of technical, logistical and financial capacity of the laboratories. The same goes for activity without a due permit and/or unauthorized pollution release. Permits can be temporarily suspended or withdrawn by decision of the issuing authority or by the court. The decisions (rejection of a permit claim, suspension or revocation of a permit) of the permitting authorities can be appealed to a higher administrative authority or in court.

Natural resources protection and use permits

The Committee on Environmental Protection's Unit of State Control of the Use and Protection of Flora and Fauna issues permits for the removal of rare wild animals and plants from their habitats, mostly for scientific purposes. Since 2015, it issues CITES permits. The Unit also grants permits for tree felling when more than ten trees in urban areas are concerned (smaller cuts are still dealt with at the oblast level).

Natural resources use is also subject to authorization by environmental or/and other authorities. Limits on the extraction of natural resources must be approved and special permits issued. Since the institutional changes of late 2013, the Forestry Agency sets quotas (upon the decision of a special commission that includes representatives of the Academy of Sciences

and the Hunting Society) and issues permits for regulated game species. Hunting areas are allocated to legal persons for 10–20 years, on the basis of auctions.

The Committee on Environmental Protection is the competent authority for granting permits for fishing in natural water bodies. The Forestry Agency issues woodcutting permits. Mining allotment and the granting of mining leases for common minerals are dealt with by the local executive authorities.

Licences

The system of licences for environment-related activities has seen little procedural change since the enactment of the Law on the Licensing of Certain Types of Activities in 2004. Four types of licences are issued by the Committee on Environmental Protection: for the handling of hazardous waste, handling of ODS, use of plants and animals included in the Red Book, and for environmental audit.

The procedural aspects of licensing were set out in the 2007 Resolution of the Government No. 172 "On approval of the Regulations on the specifics of the licensing of selected types of activities, revised version". The period of licence validity is three to five years. Temporary suspension of licences by the licensing authority can only be applied in exceptional situations when there is a direct risk to public health or of irreversible environmental damage. Licences can be annulled only by court decision. Suspension and revocation of licences are rarely used as an enforcement tool (e.g. no such cases were recorded in 2014).

During recent years, about 70–80 licences have been issued every year for the hunting and export of rare species (mostly ibex and Marco Polo sheep), on the basis of annual quotas enacted by governmental decisions.

In 2014–2015, between 15 and 20 hazardous waste handling licences were granted annually to specialized municipal services and recycling companies.

Table 2.2: Pollution control permits issued, 2011–2015, number

	2011	2012	2013	2014	2015
Air emission	146	312	377	358	325
Water use and discharge	36	166	164	176	201*
Waste management	..	..	..	572	448*

Source: Committee on Environmental Protection, 2015.

Note: * January–September.

Industrial safety regulation

Tajikistan has developed special regulation of facilities that carry the threat of industrial accident. These include production units handling hazardous chemicals, those that have dangerous machinery and equipment, mining activities and hydrotechnical works. The Service of State Surveillance over Safety in Industry and Mining under the Government (Gosgortekhnadzor) is the competent authority in this field. The Service issues licences for the operation of dangerous facilities and for performing industrial safety expertise. It also keeps the state register of dangerous production facilities. The 2004 Law on Industrial Safety of Dangerous Production Facilities does not provide for quantity thresholds for hazardous chemicals, so all facilities dealing with chemicals responding to specified toxicological criteria are to be included in the register. As of November 2015, the register reportedly included 675 facilities.

The project design documentation for construction, renovation, modernization or decommissioning of a dangerous facility is subject to industrial safety expertise undertaken by a licensed entity and approved by Gosgortekhnadzor. The operation of such facilities is subject to meeting several mandatory conditions: operators should acquire a dangerous facility operation licence, have qualified and adequately trained staff, have a self-monitoring system, regularly report on accidents to the competent authority and have in place channels for immediate notification of authorities and the population in the event of an industrial accident.

Industrial facilities handling dangerous chemicals develop a "declaration of industrial safety", containing an assessment of chemical accident risks and measures for the prevention of accidents and for containing and limiting the consequences of an accident. The "declaration" is a precondition for obtaining a dangerous facility operation licence from Gosgortekhnadzor. The declaration of industrial safety is subject to industrial safety expertise.

2.7 Compliance promotion and voluntary schemes

Environmental compliance promotion activities remain sporadic. Only two companies are ISO 14001 certified: the TALCO aluminium plant and Sangtuda-1 HPP.

Steps to promote the private sector performance in the environmental sphere include making access to

finance easier for sustainability-related projects or providing training on environmental management systems. Such steps are taken mainly by non-state actors with support from international partners, sometimes outside environment-specific projects. For example, the role of the European Bank for Reconstruction and Development (EBRD) in providing affordable finance to small and medium-sized enterprises (SMEs) in Tajikistan is notable. The Bank channels such financing via several mechanisms, e.g. a new climate resilience credit line disbursed as of 2015 through a local bank. The loan is supplemented with technical assistance for SMEs (and also households) willing to adopt technologies and practices that would reduce negative pressure on natural resources, e.g. water and land. In August 2015, the International Trade Centre conducted the first training on ISO 14001, funded by the Government of Switzerland within its Trade Cooperation Programme in Tajikistan. This week-long event took place in Sughd Oblast and brought together representatives of governmental authorities, textile and clothing companies, consulting companies and universities.

Corporate social responsibility (CSR) and related reporting remain at initial stage. Information disclosure by mining companies in Tajikistan is mainly oriented towards external audiences. Furthermore, CSR activities emerge not so much from local pressure, e.g. public activism, but from the Government's expectation of such activities. Contribution to social issues is the most established form of CSR in Tajikistan. This includes, for example, developing local infrastructure, participation in charity activities or providing employment to local inhabitants.

No CSR reports of Tajik companies are available from the database of the Global Reporting Initiative. Furthermore, no Tajik organization takes part in the United Nations Global Compact. Overall, voluntary environmental initiatives are very scarce in Tajikistan.

Eco-labelling is at its starting point. The 2013 Law on Biological Farming and Production set the general legal and organizational framework for organic farming and established its main elements, including production, processing and storage requirements, as well as packaging, labelling and certification of organic products (chapter 9). Organic certificates were issued in a pilot project on organic agriculture supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

2.8 Identification of non-compliance: Inspection and self-monitoring

Inspection

The system of inspection went through a decade-long process of reform, launched by the enactment in 2006 of the Law on Inspections of Business Entities. The Law clarified the rights and obligations of inspectors and of inspected entities, as well as establishing a standard procedure of inspection for all the competent authorities. Inspection frequencies were strictly regulated by the Law, being limited to biennial inspections, except for the high-risk facilities that could be checked every six months. Moreover, in July 2012, a moratorium on inspection of business entities engaged in production was instituted through a special law.

The results of the 2006 Law were assessed and a new Law on Inspections of Business Entities was developed by a working group composed of representatives of government authorities and businesses and adopted in late 2015.

Frequency and number of inspections

The 2012 moratorium did not translate into marked decreases in the annual number of facilities inspected by environmental authorities and the number of inspections (table 2.3). The numbers indicated in the table are most likely a reflection of the fact that some types of regulatory requirements were not subject to the 2006 Law on Inspections of Business Entities and their verification was left to the discretion of environmental inspectors. Many types of site visits were not considered to be "inspections" in the sense of those subject to the frequency restrictions established by the Law. There was no regulation at all of the frequency of certain types of site visits, such as follow-up verification of compliance, verification of pollution charges payments and sampling. Furthermore, site visits related to ambient pollution could be conducted on the basis of complaints from citizens. Such visits were also not subject to frequency restriction. It is not clear, however, how "non-inspections" were reflected in the inspection statistics.

The analysis of inspection statistics is further complicated by the fact that reported categories of inspections (table 2.3) do not match those foreseen

by the 2006 Law on Inspections of Business Entities (arts. 10, 15). Also, problems with the consistency of undertaking and reporting on inspections by oblast divisions on environmental protection are visible when comparing data at the oblast level.

Data on the activity of other enforcement agencies support the idea that the 2006 Law on Inspections of Business Entities was not applied in a uniform way. The Service of State Surveillance over Safety in Industry and Mining under the Government in 2013 performed 1,049 checks on a regulated community of 1,752 facilities, including industrial accident risk facilities. The total number of inspections conducted in 2014 by the Service of State Sanitary and Epidemiological Surveillance exceeded 63,000, on a regulated community of over 40,000 entities. However, the Service works under the same restrictions on the inspections' frequency. Different approaches are used for checking economic entities and public organizations, e.g. the Regulation on the Service of State Sanitary and Epidemiological Surveillance (approved by 2007 Resolution of the Government No. 186) allows "control checks of any local executive authorities at any time", which contradicts the principle of equality in treating the subjects of inspection.

Operational modalities

Environmental inspection activities are based on biannual plans. These plans are coordinated with relevant local executive authorities and approved by the Committee on Environmental Protection. Typically, they contain the list of enterprises that need to be inspected. Planning is not really based on risk because of the lack of criteria and methodologies of risk assessment. No list of high-risk facilities was developed by the Government as required by the 2006 Law on Inspections of Business Entities. Separate plans are developed for analytical control, based on requests from inspectors. Unplanned site visits are rare, constituting some 2–3 per cent of total visits in Dushanbe City, for example. Resolution of citizens' complaints is reportedly an important part of the inspection tasks. Registers of complaints are available in the territorial bodies and central apparatus of the Committee on Environmental Protection. In some cities, citizens can file complaints electronically, e.g. several authorities in the capital city offer this possibility through their websites.

Table 2.3: Inspections on environmental protection, 2010–2015, number

	2010	2011	2012	2013	2014	2015*
Total	16 784	22 643	24 309	21 798	22 244	16 148
Multi-media	1 913	2 051	..
Sectoral (single medium)	15 733	15 791	..
Thematic/operative	2 414	2 871	..
Follow-up	1 148	866	..

Source: Committee on Environmental Protection, 2015.

Note: * January – September.

Compliance monitoring work is almost entirely done at regional and district/town levels. Periodically, local-level inspectors are accompanied by colleagues from the central apparatus of the Committee on Environmental Protection during multi-media inspections of large facilities. Inspectors from the central apparatus almost never undertake site visits without the local-level inspectors. There is also the practice of joint inspection with inspectors of the Service of State Sanitary and Epidemiological Surveillance (Sanepidemnadzor), commonly at the request of local authorities. Occasionally, NGO representatives also join inspections. Registers of inspections are maintained by the Committee's territorial bodies.

Inspection checklists are used to guide on-site activities, but also as a measure for strictly framing the inspection. According to the 2006 Law on Inspections of Business Entities, the checklists had to be shared with the inspected entity in advance, if the entity requested it; if there was no such request, the checklist should have been handed in together with the decision that inspection would take place. According to the 2015 Law, the checklist is to be handed in together with the written notification of inspection. As of late 2015, checklists are rather generic and there are no environmental checklists for different sectors. Neither are other sector-specific guidance materials available.

According to the 2006 Law on Inspections of Business Entities, the inspections had to be announced in writing 72 hours in advance and the inspected entity had, in principle, the right to decline it within 24 hours of receiving the announcement. According to the 2015 Law on Inspections of Business Entities, inspections have to be announced in writing five working days in advance and can be declined within two working days of that announcement.

An appeal procedure exists for contesting the outcomes and decision of inspection taken by the competent authorities, but it is scarcely used by the regulated community.

Any inspection is finalized by an act of inspection and, based on that, an inspection decision is taken by the enforcement agency, including the prescription of corrective measures, sanctions and details of the appeal procedure. A decision is to be taken even if the inspected facility was in full compliance, but in practice this is not done. The document is subject to administrative appeal to a higher authority (within 30 days), with a possible subsequent judicial recourse. The appeal prevents the execution of the enforcement agency's decision on inspection until a resolution on appeal is taken. An eventual administrative sanction can also be appealed, within 10 days. The number of appeals is very low.

Laboratories

Environmental enforcement authorities are supported by a network of five dedicated laboratories, including the Committee's Centre for Analytical Control in Dushanbe. Annual plans and a mandatory list of facilities to be checked are prepared and regularly updated, taking account of the requests from the environmental authorities. The analytical capacity of most laboratories is limited; they use old methods and face a lack of qualified staff, modern equipment and consumables. Oblast laboratories are accredited for analyses of a few parameters only.

Each year, the Centre for Analytical Control checks compliance with permit requirements on air by 60–70 facilities and with permit requirements on water by 60–80 facilities. Normally, this involves the analysis of 13 air pollution parameters and some 35 indicators of water pollution. The laboratory within the Khatlon Oblast Division of Environmental Protection has a much narrower scope of work and regularly checks 15 facilities; the laboratory is accredited only for sampling and analysis of water. The lack of laboratory capacity is, inter alia, weakening the capacity of the enforcement agency to impose environmental damage compensation on polluters and to provide the necessary evidence base in court.

Inspection reports

Monthly inspection reports are prepared for the Committee on Environmental Protection and for local authorities. Every quarter, inspection results are discussed during the Committee's Board meetings.

Inspection reports are not publicly disclosed. The general outcomes of inspection work are published annually in environmental bulletins issued by the Committee on Environmental Protection in a limited number of copies. The same format of information disclosure is used by the Khatlon Oblast Division of Environmental Protection, which issues annually an environmental bulletin in 80 copies. The structure of inspection statistics is not well aligned with types of inspection mentioned in the Law on Inspections of Business Entities.

Self-monitoring and reporting

Self-monitoring by the regulated community is an important challenge for the system of environmental compliance monitoring in Tajikistan. Lack of self-monitoring is not only an equipment issue; it is also a legal problem (lack of concise regulation). Reportedly, only about 60 facilities have established self-monitoring. Many of them are municipal WWTPs that check a few routine parameters in effluents. In Dushanbe, only a modernized TPP and a new cement factory have working self-monitoring systems. There is no legal obligation for operators to regularly report on the acquired data to the authorities. The quality of self-monitoring data is periodically checked by environmental inspectors through sampling and laboratory analysis.

No systems of continuous automated monitoring at enterprises were reported.

Reporting of emissions and effluent discharges suffered negative changes: since 2010, no statistical

reporting on water effluents is required. Thus, only the system of statistical reporting on air emissions is working, while statistical reporting on waste generation and disposal is under development. The operators of dangerous production facilities must regularly report on accidents to the competent authority.

2.9 Non-compliance response

Since 2010, no major changes have occurred in the design of the environmental enforcement system in Tajikistan. One notable exception is an amendment of 2011 to the 2008 Code on Misdemeanours, which requires that poaching, illegal fishing and logging be addressed exclusively through the courts. The suspension of a facility's activity is now possible only upon a court decision.

Administrative enforcement

The administrative response to non-compliance remains the main path of environmental enforcement. As a first step, recommendations are made on correcting non-compliance. On average, enterprises receive one or two prescriptions for corrective action per inspection; most of them are followed. Compliance with issued prescriptions is checked during follow-up inspections. If non-compliance persists, administrative monetary penalties are applied. Between 50 and 80 per cent of inspections in the period 2010–2015 resulted in fines being applied (table 2.4). The number of damage compensation claims is smaller. The number of other non-compliance responses, such as enterprise shutdown or permit revocation, is very low, according to competent authorities. More often, in cases of serious law violations, inspectors order the suspension of the installation's activity for a period up to 90 days. After remediation of non-compliance, the ban on activity is lifted. Criminal enforcement is used rarely.

Table 2.4: Key non-compliance response indicators, 2010–2015, number

	2010	2011	2012	2013	2014	2015*
Inspections	16 784	22 643	24 309	21 798	22 244	16 148
Prescriptions for corrective action	26 575	31 203	38 254	3 684	3 725	28 307
Fines	13 265	18 931	11 628	11 616	12 866	10 563
Fines (via courts)	..	..	..	1 471	1 869	..
Damage compensation claims	..	..	..	1 663	1 891	..
Damage compensation claims (via economic courts)	..	..	..	49	48	..
Monetary sanctions via prosecutor's office	..	..	..	391	460	..
Suspension of activity	52	47	97	89	123	115

Source: Committee on Environmental Protection, 2015.

Note: * January – September.

The legal procedure requires fines to be paid within 30 days and a damage compensation claim within 90 days. Environmental inspectors have the obligation to follow the collection of the imposed administrative fines and damage compensation claims until they are paid. In the event of non-payment, fines and damage compensation are recovered via the judicial system or through the prosecutor's office.

Levels of fines are expressed in "calculation units", a means used for costing the punitive penalties, duties, social benefits and other mandatory payments. In the period 2012–2015, the calculation unit was established at 40 somoni. The level of fines established by the 2008 Code on Misdemeanours for environmental and natural resource use offences gives the impression of being sufficient for Tajikistan, rising to 40 calculation units for physical persons and 300 calculation units for legal persons. However, the actual level of fines applied is at the bare minimum possible. As a result, environmental enforcement most likely fails to provide a deterrent effect. For example, in 2013 and 2014, the average level of fine applied was about three calculation units (115–120 somoni). This is likely due to very low levels of fines for frequently sanctioned actions. For

example, running a car exceeding the exhaust gas norms can incur, for a natural person, a fine of a modicum of one calculation unit; the improper handling of waste is punished with a fine equal to 1–3 calculation units.

The average level of a damage compensation claim during the last years approaches 1,200–1,500 somoni, which is rather low (table 2.5). The large environmental damage compensation claims are most often contested by the offenders and are resolved in the courts. The average amount of damage claimed through the economic courts in 2013–2014 was within the range of 25,000–52,000 somoni. The claims imposed are poorly collected. The judges in economic courts often lack experience on environmental cases and tend to apply the minimum levels of fines and use mitigating circumstances or procedural arguments to limit or avoid sanctions. At the same time, environmental inspectors face difficulties in gathering evidence (e.g. due to the insufficient capacity of laboratories), although some things have improved since 2010, e.g. several methodologies for damage calculation have been updated. They also face difficulties in presenting evidence in the courts.

Table 2.5: Fines and damage compensation claims applied by the environmental authorities and dealt with by the courts and prosecutor's office, 2013–2014

	2013	2014
Applied by environmental authorities		
Fines applied, number	11 616	12 866
Fines applied, total amount, somoni	1 332 700	1 544 600
Fines collected, total amount, somoni	1 047 700	1 246 000
Share of collected fines, per cent	79	81
Damage compensation claims, number	1 663	1 891
Damage compensation claim applied, total amount, somoni	1 880 300	2 799 400
Damage compensation collected, total amount, somoni	551 100	973 700
Share of collected damage compensation claims, per cent	29	35
Dealt with by the courts and prosecutor's office		
<i>Economic court</i>		
Materials received, number	49	48
Amount imposed, somoni	1 235 600	2 507 500
Amount collected, somoni	85 200	632 100
Share of collected amounts, per cent	7	25
<i>Regular court</i>		
Materials received, number	1 471	1 869
Amount imposed, somoni	401 000	936 200
Amount collected, somoni	189 400	199 200
Share of collected amounts, per cent	47	21
<i>Prosecutor's office</i>		
Materials received, number	391	460
Amount imposed, somoni	780 800	778 900
Amount collected, somoni	145 100	157 700
Share of collected amounts, per cent	19	20

Source: Committee on Environmental Protection, 2015.

The 2008 Code on Misdemeanours is lax on several types of environmental offences; thus, there is an issue with proportionality of enforcement. The breach of requirements on handling "industrial, household and other waste" (art. 232) by an individual is sanctioned by a fine of only 1–3 calculation units. Similarly, a fine of 5–10 calculation units for individuals is foreseen for the violation of environmental requirements related to management of "toxic industrial waste and production and consumption waste" (art. 239) and radioactive materials (art. 240). This fine is much lower than, for example, fines for forest or water law infringements and is similar to the fine applied for selling fuel not compliant with technical standards. However, the environmental and health risks associated with hazardous and radioactive materials are higher and need a stronger response.

Both physical persons and legal persons can be sanctioned according to the Code on Misdemeanours. Reportedly, legal entities are rarely fined, probably as a measure to avoid penalizing the business sector. Most often, the legal entities are found guilty through the responsible persons.

The amount of monetary penalties applied has fluctuated since 2010. The information available does not allow for a pertinent analysis of trends. The collection rates are relatively good (about 80 per cent) for the fines applied by the environmental authorities. They are much lower for damage compensation claims applied by the environmental authorities. Surprisingly, they are low for damage compensation and fines imposed by the judiciary and the prosecutor's offices (table 2.5). Apparently, the mechanisms for enforced collection are not effective.

Criminal enforcement

Reportedly, the number of environmental criminal cases is very limited for non-compliance related to pollution of the environment. The most frequently committed environmental crimes, defined in chapter 24 of the Criminal Code, are poaching, illegal fishing, illegal logging and illegal mining. Some sanctions introduced by the Criminal Code seem not correlated with environmental damage incurred; e.g. the severity of sanctions for "destruction of critical habitats for species included in the Red Book that caused the extinction of their populations" (art. 233) is lower than the one for illegal tree/bush felling or poaching and illegal fishing.

Criminal cases can be initiated either by environmental inspectors or other enforcement agencies or by the prosecutor's office. The

investigative committee of the prosecutor's office conducts enquiries, after which the prosecutors decide whether to press charges in court, suspend the case for lack of evidence or order further investigation. Inspectors can give evidence in courts. Only in about one third of criminal cases initiated by the Committee on Environmental Protection are condemnatory judgments obtained. Prison convictions are almost exclusively pronounced in cases of poaching involving use of guns and disobedience to officials.

NGOs have the right to initiate enforcement actions through the courts, e.g. they have the right to request temporary suspension or termination of economic and other activities that have a negative impact on the environment. These rights are rarely used.

2.10 Conclusions and recommendations

The direction and pace of changes in regulatory and compliance assurance mechanisms in Tajikistan have mainly been driven by factors that are external to the environmental sector. The Government's commitment to improve the investment climate for the enterprise sector and the related reform agenda seems to have played a key role.

The legal framework was further extended in scope, e.g. by adopting the Law on Environmental Audit, and modernized, e.g. by amending the Law on Environmental Protection and a few sector-specific laws. This extended the choice and use of compliance assurance instruments, and improved some of the procedural aspects of environmental regulation and compliance assurance.

The vertical reallocation of permitting tasks in mid-2015 resulted in a system that puts considerable administrative burden on the central level while largely depriving the oblast divisions of the Committee on Environmental Protection of operational flexibility. Technical capacity at the subnational level is much lower than at the central level. At the same time, the number of the Committee's staff at the central level is quite limited and they suffer from a significant workload.

Transparency and coordination of work on compliance assurance is insufficient, and its strategic planning is limited. Horizontally, potential duplications of activities on nature protection are likely to occur between the environmental inspectors and the State Forest and Hunting Inspectorate following the redesign of mandates and the establishment of the Forestry Agency.

Recommendation 2.1:

The Committee on Environmental Protection should:

- (a) *Establish strategic priorities and indicators for the compliance assurance system;*
- (b) *Strengthen internal coordination mechanisms, as well as intragovernmental horizontal coordination with the Forestry Agency.*

Since 2010, the procedural soundness of environmental assessments has marginally improved. At the same time, the scope and procedures of such assessments are not fully adjusted to the international experience. The competent authorities are not involved in the screening and scoping steps of environmental impact assessment (EIA). The State Ecological Expertise Body rarely rejects project dossiers. The lack of guidance materials on EIA and the lack of a publicly accessible information system containing data on previous EIAs are the drawbacks of the current assessment system. Transboundary aspects are almost not pronounced in the legislation. There was no progress towards completing Tajikistan's accession to the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention).

Recommendation 2.2:

The Committee on Environmental Protection should continue the process of aligning the scope and modalities of Environmental Impact Assessment (EIA)/State Ecological Expertise (SEE) procedures with international benchmarks by:

- (a) *Strengthening the involvement of competent authorities in the screening and scoping steps of EIA;*
- (b) *Enforcing the EIA procedure in a stricter and more transparent manner;*
- (c) *Developing materials that would help the regulated community to better understand EIA/SEE procedures and comply with them;*
- (d) *Detailing the transboundary aspects of the EIA in the legislation;*
- (e) *Reassessing the costs and benefits of accession to the Convention on Environmental Impact Assessment in a Transboundary Context with a view to completing the accession process.*

Compliance monitoring activity is shown to be very intense, but its focus is mainly outside the environmental performance of the industrial sector. While the risk-based approach is legally proclaimed, the list of high-risk installations for better planning of environmental inspections has not been developed.

Inspection checklists are used but they are rather generic; there are no environmental checklists for different sectors. Other sector-specific guidance materials are not available. Available information on inspection activities is not analysed and hardly disclosed. Self-monitoring practices remain basic and lack legal ground.

Recommendation 2.3:

The Committee on Environmental Protection should enhance compliance monitoring activities by:

- (a) *Revising the system of measuring environmental inspection activities and outcomes in order to shift the accent from annual intensification of activities towards a more strategic compliance-focused approach;*
- (b) *Further developing risk-based planning of environmental inspections;*
- (c) *Equipping inspectors with sector-specific guidance notes and checklists;*
- (d) *Further improving collection, reporting, analysis and disclosure of information on inspection activities;*
- (e) *Enhancing the legal basis for and extending the practice of self-monitoring.*

The current environmental enforcement practices are biased towards petty offences. Monetary penalties are numerous but established and applied at low levels. The legally set level of fines is lacking proportionality in a number of cases. The court system exhibits low awareness about, and experience in, environmental cases. The collection rates for damage compensation claims applied by environmental authorities and damage compensation and fines imposed by the judiciary and the prosecutor's offices in environmental cases are very low.

Recommendation 2.4:

The Government should:

- (a) *Ensure the proportionality of legally imposed penalties, especially monetary ones, with the consequences that may arise from the breach of law;*
- (b) *Raise the environmental awareness of judges and the judicial system more generally;*
- (c) *Improve collection for damage compensation claims applied by environmental authorities and damage compensation and fines imposed by the judiciary and the prosecutor's offices in environmental cases.*

Chapter 3

ECONOMIC INSTRUMENTS, ENVIRONMENTAL EXPENDITURES AND INVESTMENTS FOR GREENING THE ECONOMY

3.1 Economic instruments

Pollution charges

The system of pollution charges applied in Tajikistan has undergone only relatively minor changes compared with the situation in 2010. All legal and physical persons that are subject to environmental permits must pay for emissions of air pollutants from stationary sources, discharge of water pollutants and the generation and disposal of waste.

Maximum annual limits (ELVs) for emissions of air pollutants from stationary sources, discharge of wastewater effluents and the generation of waste are established for each enterprise. The guidelines for the calculation of these limits are established in the Methodological instructions for levying charges for environmental pollution (RD-01-93), which has not undergone any significant changes since it was introduced in the early 1990s. Pollution within the established limits is subject to payment of pollution-specific and waste-specific base rates. Volumes above the established annual maximum values are subject to payment of five times the corresponding base rate. Regional authorities can apply specific coefficients to base rates in order to take into account local environmental conditions. In the event of accidental emissions, due to technical equipment failure or malfunctioning, the payment due is established taking into account the volume of the emissions and the assessment of environmental and health damage caused. The established annual pollution limits are typically based on the assumption of full use of production capacities, which may not be warranted given the overall economic situation of many of these enterprises.

As regards emissions of air pollutants from stationary sources, the number of pollutants subject to taxation has remained unchanged at 121, which is extremely high compared with most other countries applying air pollution charges. The value of regional coefficients to be applied to base rates is within a range of 1 to 2. To illustrate, for Khujand (the second largest city) it is 1.4; for Tursunzade (where TALCO, the state-

owned aluminium company, is located) it is 1.6, and for Dushanbe it is 2.

In a similar vein, the list of chemical substances and compounds subject to payment of effluent charges comprises 197 items, of which 101 are different types of pesticides. Local coefficients applied to base rates depend on the water basin or reservoir into which the wastewater is discharged. These coefficients range from 1.3 (e.g. for the Bartang and Zeravshan rivers) to 2 (for the Karatag and Isfara rivers as well as for canals, collectors and drainage systems).

The charges for generation of enterprise waste are, since 2011, being applied to an enlarged list of waste categories, which now also includes, notably, wood waste, tyres, soot, non-toxic mining waste and four classes of hazardous waste, based on the degree of toxicity. Local coefficients (ranging from 1 to 5) applied to base rates reflect the type of waste as well as the distance of waste handling facilities from the corresponding city centre. The maximum coefficient of 5 is applied to abandoned waste that is dumped outside waste disposal places (e.g. into rivers).

The principal rules for the payment of pollution charges are established in the 2006 Law on Other Obligatory Payments to the Budget, which regulates all payments to the state budget except those that are determined by the 2012 Tax Code. The specific base rates, as well as the regional coefficients, have been established in a separate decree issued by the Committee on Environmental Protection. Base rates for air and water pollutants and waste categories have not been changed for more than two decades at least. The 2011 Decision of the Committee on Environmental Protection on introducing some amendments and additions to some of the Committee's earlier published documents No. 101, however, introduced some new waste categories that are now subject to payment of pollution charges.

The notable feature is that pollution charges are, in general, quite low (table 3.1). Already-low rates have been eroded by high cumulative inflation (measured by the CPI), which amounted to some 125 per cent in

2014 compared with 2005. As a result, base rates have declined in real terms (i.e. after taking into account the increase in the general price level in the economy) by some 56 per cent over this period. The decline amounted to 32.5 per cent during the period 2010–2014 alone. The fact that base rates were not adjusted at all to compensate for inflation probably reflects the concerns of the Government about the fragile financial situation of large parts of the industrial sector, most of which is state owned. In a more general way, the level of pollution charge rates does not appear to come even close to levels of marginal abatement costs. To illustrate, marginal abatement costs for SO₂ are much higher than the fivefold penalty rate for excess emissions.

In other words, it is cheaper for enterprises to pollute than to invest in pollution abatement measures. No assessment of the environmental effectiveness of the system of pollution charges has been conducted. The sole purpose of the system is to generate revenues for financing environmental protection measures and other government activities.

In addition to the above-mentioned pollution charges, which are related to pollution limits established in

environmental permits, there is a long-standing pollution charge on mobile sources of air emissions. Besides road motor vehicles, mobile sources comprise aircraft, ships and boats, and railways. This tax, which is not included in the 2011 Decision No. 101, is distinct from excise rates on motor fuels established in the Tax Code. The tax base is the total volume of imported and domestically produced motor fuels (gasoline, diesel, LPG and CNG). Taxpayers are the importers or domestic producers of these products. Tax rates per ton vary depending on the motor fuel category, and they are extremely low. The rate for gasoline, LPG and CNG is 0.0312 somoni (some US\$0.005) per ton. In the case of gasoline, this amounts to only some US\$0.00005 per litre. For diesel, the tax rate is 0.0624 somoni (US\$0.010) per ton. Although the tax rate is extremely low, the large and increasing volumes of motor fuel consumption have made this tax a relatively important source of revenues compared with revenues collected from stationary emission sources. These tax rates imposed on motor fuels have not been changed for more than two decades. As is the case for other pollution charges, rates and revenues have been significantly eroded by high inflation.

Table 3.1: Base rates for selected air and water pollutants and enterprise waste

	somoni/ton	US\$/ton
Air pollutants		
Nitrogen dioxide (NO ₂)	3.12	0.51
Nitric oxides (NO)	1.56	0.25
Sulfur dioxide (SO ₂)	1.56	0.25
Ammonia (NH ₃)	3.12	0.51
Nitric acid (NHO ₃)	0.78	0.13
Aluminium oxide (AlO ₃)	3.12	0.51
Coal dust	0.78	0.13
Water pollutants		
Ammonical nitrogen (NH _x)	49.92	8.10
Nitrate-Nitrogen	1.87	0.30
Nitrite-Nitrogen	4.68	0.76
Phosphorous	202.80	32.91
Formaldehyde	2.80	0.45
Chloride (CL-)	0.06	0.01
Waste		
Wood waste	0.11	0.02
Tyres	0.16	0.03
Non-toxic mining waste (per m ³)	0.08	0.01
Toxic waste		
Hazard class I (most toxic)	8.74	1.42
Hazard class IV (least toxic)	1.25	0.20

Source: 2011 Decision of the Committee on Environmental Protection on introducing some amendments and additions to some of the Committee's earlier published documents, No. 101.

Note: Exchange rate for 2015: 1 somoni = US\$0.1623.

Table 3.2: Revenues from pollution charges, 2010–2014, thousand somoni

	2010	2011	2012	2013	2014
Air pollution					
Stationary sources	..	..	754.19	654.86	..
Mobile sources	..	..	1 185.20	902.51	..
Wastewater discharge	146.92	144.18	194.72	246.75	393.92
Waste	..	..	6 016.30	5 822.30	..
Total	4 911.80	5 226.30	8 150.40	9 430.60	11 154.30
Total in US\$ thousand	1 121.67	1 133.64	1 720.33	1 979.47	2 259.05
Per cent of GDP	0.02	0.02	0.02	0.02	0.02
Per cent of general government revenue	0.09	0.07	0.09	0.09	0.09

Source: Committee on Environmental Protection, 2015.

Note: Waste revenues calculated as residual.

Revenues from pollution charges

Payments of pollution charges are, in principle, based on actual volumes of emissions and generated waste reported by enterprises. Volumes are gauged based on technical production parameters, including the effectiveness of technical devices, if any, for retaining air pollutants (gas-cleaning facilities) or on-site wastewater treatment facilities. The enterprise reports are checked by the territorial bodies of the Committee on Environmental Protection, which are also in charge of collecting these revenues. The question is whether its territorial bodies have sufficient administrative capacities for discovering underreporting of pollution volumes. Enterprises can and do demand postponement of payments in the event of economic difficulty but, according to the Committee, there are no exemptions from payments, not even for state-owned enterprises that are facing economic difficulties. No information was provided on annual bill collection rates.

Whereas revenues from water pollution charges are fully allocated to the republican budget, those related to air pollution and waste generation are currently allocated between the central and local government levels, as follows:

- Republican Stabilization Fund of Development of the Economy: 5 per cent;
- Committee on Environmental Protection: 20 per cent;
- Local government budgets: 20 per cent (in principle for environmental protection);
- Territorial bodies of the Committee on Environmental Protection: 55 per cent.

The allocation of funds to the Republican Stabilization Fund became effective in 2013. It was at the expense of the funds allocated to the territorial bodies of the Committee, which had a 60 per cent share of total revenues before 2013. The Fund was

established in 2009 within the framework of the budget law for 2009. The resources accumulated in this Fund are designed to support the development of the energy and social sectors and ensure the timely servicing of foreign state debt.

Total revenues collected from pollution charges are relatively small, though they were on a rising trend during the period 2010–2014. But they amounted to only US\$2.259 million in 2014, corresponding to some 0.1 per cent of total general government revenue during the period 2010–2014 (table 3.2). Waste charges accounted for, on average, more than two thirds of total revenues in 2012–2013.

Liability and environmental insurance funds

The 2011 Law on Environmental Protection contains a provision for a regime of liability and compensation for environmental damage. There is also a provision for insurance to deal with such liability by establishing an environmental insurance fund. Similar provisions already existed in the 1993 Law on Nature Protection. These initiatives have not been supported with further legislation and implementation mechanisms. The 2011 Forest Code provides for compensation for damage to forest and hunting assets (box 3.1).

Tax incentives and other subsidies

Various laws on environmental protection and related areas contain provisions for access to tax preferences and other financial incentives designed to promote environmentally friendly behaviour and rational use of natural resources. This also includes incentives for the promotion of renewable energy, energy savings and energy efficiency. But there are no provisions for this in the Tax Code, given also that the necessary secondary legislation required for the implementation of these provisions is lacking.

Box 3.1: Environmental damage compensation: The case of forest resources

Natural and legal persons that have violated pertinent environmental regulations concerning forests and forest resources, such as wood, flora and fauna, are liable for environmental damage caused and must pay monetary compensation. The corresponding fees have been established in 2014 Resolution of the Government No. 790 "On the manner and amount of compensation for damage caused to the forest fund and other objects of flora and fauna by natural and legal persons" adopted in furtherance of the 2011 Forest Code. The main categories subject to payment of damage compensation include, inter alia, illegal felling of trees, destruction of seedlings and saplings, non-authorized collection of plants and wild forest products, and illegal hunting and fishing.

The total monetary compensation to be paid for illicit acts is calculated by applying a value index (in somoni) to a measure of the volume of trees, plants, wild animals etc. removed from their natural habitat. The value index, in turn, is a fraction or multiple of a calculation unit – a means used for costing the punitive penalties, duties, social benefits and other mandatory payments. In the period 2012–2015, the calculation unit was established at 40 somoni. These payments are tantamount to monetary penalties, which, moreover, do not exempt the responsible party from payment of fines already imposed under the 2008 Code on Misdemeanours for related acts.

A conspicuous feature of this regime is that the Government also applies the notion of environmental damage to relatively minor illicit behaviour (such as damaging a single tree, collecting firewood from damaged trees, killing one more animal (not only those listed in the Red Book) than is allowed in a hunting permit), rather than only to those actions that can really have significant adverse effects on forests and forest resources. Revenues collected from these monetary penalties, moreover, are not earmarked for primarily financing the remediation of specific environmental damage, if any, caused by illicit acts; rather, they are allocated to the general financing of environmental protection, forest management and forest protection activities, including protection of wildlife and wild plants. This contrasts with the dominant pattern in developed countries, where the term "environmental damage" typically is associated with *significant* adverse effects on protected species and natural habitats, water and water bodies, etc., as well as *significant* risk of human health being adversely affected by the environment-related behaviour of natural and legal persons, and where, moreover, the main focus is on ensuring damage remediation, or equivalent environmental measures, by the responsible party, based on an effective environmental damage assessment.

The current 2012 Tax Code (section XVII), which entered into force in 2013, stipulates, however, that *all* machinery and equipment imported by enterprises engaged in the construction of HPPs, cotton processing enterprises, poultry farms and enterprises producing compound animal feed is exempt from VAT and customs duties. The import of agricultural equipment and production equipment is also exempted from VAT (art. 169 of the Tax Code), according to the list of equipment approved by the 2013 Resolution of the Government No. 93. But all these benefits apply independently of the performance of the corresponding machinery and equipment with regard to environmental pollution and natural resource savings.

Fees for use of forest and wildlife resources

Fees for the use of forest and wildlife resources are established by the 2007 Resolution of the Government No. 546 "On approval of the charges for the conduct of legally important activities and the payments for the issuing of permits for the use of natural and other available resources". Fees are set annually and they are, in general, indexed to the rate of inflation. The indexation rate is 0.7 percentage points for each percentage point of annual inflation in the preceding year.

The use of forest and wildlife resources is regulated on the basis of specific annual quotas that are established by the Committee on Environmental Protection in cooperation with a special commission. The exploitation of forest resources is, in general, subject to a permit ("forest ticket") that is issued by the forestry institutions (leskhozoes). The exploitation of rare and endangered species of plants and animals included in the Red Book is subject to issue of a corresponding licence by the Committee in order to ensure the rational and sustainable use of these species. The legal basis for this is the Law on the Licensing of Certain Types of Activities. Licences are issued in accordance with the quota approved on an annual basis by the Government. The quotas for animal and plant species listed in the Red Book are based on recommendations from the Academy of Sciences.

Fees for timber and firewood

There is no information on the volume of allowed timber harvesting in Tajikistan. The standard stumpage fee for industrial roundwood amounts to 245 somoni (US\$37) per m³ in 2015, but the applied prices vary significantly among the different districts.

The official domestic supply of fuelwood is based on the annual allowed cuts (intermediate and sanitary fellings) of trees. The corresponding quota has been in the range of 7,500 to 8,000 m³ in recent years. This quota, however, falls significantly short of the much higher demand for fuelwood, on which about 70 per cent of the population depend as a source of energy for heating and cooking. The gap between low supply and the much higher demand has been, to a greater or lesser extent, covered by illegal logging. Official estimates suggest that illegal logging has been within a range of 1,000 to 1,500 m³. But other estimates suggest that actual annual cutting of fuelwood may be as high as 90,000 m³, which would be more than 12 times the official quota.

The official supply of fuelwood is sold by the forestry institutions to private households and other entities; the enterprises are entitled to sell it at reduced prices to ensure its affordability, notably for the population. The standard price for firewood is relatively high at some 105 somoni (about US\$15.5) per m³ in 2015, and this does not include the costs of transport.

Fees for use of non-timber forest resources

Fees for use of non-timber resources include, inter alia, for the procurement of pistachio resin and collection of wild fruits, nuts, mushrooms, berries, herbs, medicinal plants, honey, and seedlings produced in tree nurseries maintained by forestry institutions. Fees collected are shared equally between the forestry institutions and the territorial bodies of the Committee on Environmental Protection. The revenue was within a range of 2 million to 2.5 million somoni (some US\$0.35 million) in recent years.

There is also a pasturage tax on the use of state forest land for grazing of cattle. This is a flat tax per head of livestock, which amounts to 2.48 somoni (US\$0.4) per season. Revenues collected amounted to some 1.5 million to 2 million somoni in recent years and they are fully allocated to the budgets of the forestry institutions. Grazing of cattle on forest land has been controversial, however, given that it contributes to deforestation and soil erosion. More generally, all these revenues are crucial for ensuring the financial viability of forestry institutions, given their small and insufficient operating funds allocated from the state budget.

Hunting fees

State forest land has also been used for the establishment of hunting farms, but most of the

wildlife that is important for hunting has its habitat outside forest areas. Hunting inside forest areas is managed and controlled by the forestry institutions. Hunting outside state forest areas is mainly organized within the framework of private concessions. In order to promote conservation of endangered game species, the Government has been supporting community-based wildlife management in recent years. These communities manage species such as the Markhor sheep, the Asiatic ibex and the Marco Polo sheep within the framework of the Tajikistan Mountain Ungulates Project. This is a mechanism for generating revenues for local people through conservation and sustainable use of wildlife, i.e. to prevent unsustainable hunting.

Hunting of species for meat is a major motivation for the local population, but hunting is also a source of income for local hunters engaged as guides in international tourism hunting. Hunting fees have also become an important source of revenues for the state budget, due also to the popularity of trophy hunting of species listed in the Red Book, for which very high prices have to be paid. To illustrate, the fee for hunting a Marco Polo sheep (*Ovis ammon polii*) amounted to 55,000 somoni (US\$8,250) in 2011. The quota was set at 65 sheep in that season, generating total revenues of some 3.6 million somoni (US\$0.54 million). In 2015, the annual quota was set at 85. The annual quota for Markhor sheep was limited to seven in 2015, and the fee per head is 213,500 somoni (some US\$34,000).

Revenues from fees for hunting are allocated as follows:

- State budget: 15 per cent;
- Republican Stabilization Fund of Development of the Economy: 5 per cent;
- Committee on Environmental Protection: 20 per cent;
- Territorial bodies on environmental protection: 60 per cent.

The 2014 Law on Hunting and the Hunting Sector establishes a different allocation for hunting fees, which, however, has not yet been implemented because the required secondary legislation has still to be adopted. The Law envisages the following distribution of revenues:

- 40 per cent goes to a special account for self-government of settlements and villages in the area where the hunting has taken place. Funds are to be used for funding of social and economic development, environmental protection and the effective use of game species in rural areas;

- 20 per cent is transferred to a special fund for protected areas (but only in the case of hunting carried out in or near protected areas);
- 40 per cent is transferred to a special account of the authorized state body for hunting (currently the Forestry Agency) for financing work related to the sustainable management of game populations.

Taxes on use of natural resources

There are two categories of taxes on use of natural resources: (i) taxes on use of subsoil and (ii) royalties for use of water resources. Both are regulated by the Tax Code (section XII). All revenues from use of natural resources are allocated to the central government budget.

Use of subsoil resources

Use of subsoil resources requires a special licence and the conclusion of a corresponding subsoil contract between the user and the competent governmental authority. Subsoil users are subject to two types of taxes, namely bonuses and royalties for the extraction of mineral resources. Bonuses are one-time payments determined in the subsoil contract. They comprise the subscription bonus for the right acquired to use subsoil resources and a commercial discovery bonus in the event of discovery of a mineral deposit that is economically feasible for extraction. The effective extraction of mineral resources, including groundwater, is subject to an extraction royalty.

The tax base for royalty payments depends on the type of mineral. In the case of common mineral resources (such as sand, limestone, clay and coal) the tax base is, in general, a measure of the value added (average costs increased by a profit margin) per ton of extracted mineral. In the case of extraction of precious metals (gold, silver, platinum) and some other metals, the tax base is the corresponding average price established at the London Metals Exchange and the London Precious Metals Exchange. Royalty rates range from 4 per cent for coal and peat to 10 per cent for sand and gravel mixtures. This is different, however, from taxation of the effective resource depletion for preventing uncontrolled resource use. In fact, the higher the value of the natural resource, the higher the incentives – at a given tax rate – for increasing resource depletion. There are also royalty rates for the extraction of groundwater, which are determined separately by the Government. Information on these

rates and respective revenues has not been published.

Royalty on use of surface water resources

This royalty has to be paid by HPPs that use water from defined surface water objects for electricity generation (ch. 36 of the Tax Code). The tax base is defined as the volume of produced electricity excluding transmission losses. The royalty rate is 0.06 per cent of a base value (the so-called calculation unit) per 1 MWh of produced electricity. This base value was set by the Government at 40 somoni. Thus, an HPP has to pay 2.4 somoni (US\$0.35) per 1 MWh of produced electricity. Assuming a monthly production of 10 million kWh, the total monthly charge for use of water resources amounts to 24,000 somoni (some US\$3,580). HPPs with an electricity generation capacity up to 1 MW are exempted from payment of the water resources royalty.

There is no information on water abstraction charges, if any, for the production of household drinking water and for use by industry.

Fees for use of irrigation water

Some 90 per cent of water use in Tajikistan is accounted for by irrigated agriculture. The two major crops, wheat and cotton, are the major consumers of water.

Due to the persistent lack of funds for maintenance and renewal investments, the irrigation infrastructure (both off- and on-farm systems) has generally remained in poor condition. The few rehabilitation measures were largely financed by foreign donors. Insufficient maintenance and renewal works have resulted in poor irrigation quality, increased soil salinity and unequal access of farms to water resources. Investment costs for the rehabilitation of the infrastructure are considerable; some estimates are for some US\$2 billion over a period of 15–20 years. While the off-farm irrigation system is managed and operated by the state, there is still no official and/or legal caretaker for the on-farm irrigation systems, which have been without any management since 1991. Before 1991, so-called professional irrigation brigades maintained the irrigation systems of collective farms. There are plans to transfer the corresponding assets from the state to water user associations, which have started to be formed during recent years. Only limited progress has been made so far, notably within the framework of a USAID-supported project.

Photo 3: Breakdowns in irrigation water pipes

The off-farm irrigation system, which is the principal part of the water conveyance and drainage infrastructure, employs a mix of gravity irrigation and lift irrigation by pumping water from rivers to higher elevations. Gravity irrigation is employed for some 60 per cent of irrigated land, and it involves relatively low costs. In contrast, lift irrigation, which is required for some 40 per cent of irrigated land, is much more costly, mainly due to the high energy costs for pumping water to higher elevations and the complexity of the technology employed, which is associated with substantial operating and maintenance costs as well as high depreciation costs. Most of the pump stations are in need of repair or replacement, with a major focus being improvement of the energy efficiency of their operations.

The Ministry of Economic Development and Trade, in fact, established differential fee rates for the two irrigation systems in 2007 in order to improve cost recovery. In May 2008, these rates were even revised upwards to 1.5 dirams/m³ for the gravity system and to 2.39 dirams/m³ for the pump system. But in practice this differential pricing was not used; rather, the tariff of 1.5 dirams/m³ was also applied to water supplied from pump stations. In 2011, the responsibility for setting the fee rate for irrigation water was moved from the Ministry of Economic Development and Trade to the Anti-Monopoly Service. The Service confirmed the use of a unique

tariff for irrigation water supply at the level of 1.5 dirams/m³, excluding VAT. This amounts to 15 somoni (US\$0.225) per 1,000 m³ excluding VAT and to 17.77 somoni including VAT. Given the lack of metering of water use, water bills are calculated on the basis of official water use norms for each major crop.

The unique fee rate allows the broad recovery of the costs of operation and maintenance of the gravity system. But it largely falls short of the corresponding costs for the pump system. Taking into account also the required allowances for depreciation, the irrigation fee rate is, largely, below the full cost recovery level for both irrigation systems. On average, the current fee rate covers only about half of the operation and maintenance costs per m³ (table 3.3).

Irrigation fees are collected mainly by water user associations and transferred to the local offices of the Agency of Land Reclamation and Irrigation (previously the Ministry of Land Reclamation and Water Resources). But the bill collection rate is, on average, only some 60 per cent. The ability of farmers to pay for irrigation is adversely affected by the low profitability of agriculture. And the willingness to pay is restrained by the poor quality of irrigation services, i.e. the lack of reliability of water supply at the time when it is needed.

Table 3.3: Actual and cost recovery irrigation tariffs, 2012, somoni/1,000 m³

	Gravity	Pumps
<i>Cost recovery tariffs</i>		
Operation	3.30	39.50
Maintenance	10.00	19.20
Depreciation	24.00	48.00
Total	37.30	106.70
<i>Actual tariffs</i>	15.00	15.00
<i>Tariffs in US\$</i>		
Cost recovery level	7.87	22.52
Actual tariffs	3.17	3.17

Source: Appendix B: Implementation and investment plan for the irrigation and rural water supply subsector, February 2012. Provision of Technical Assistance to the Tajik Ministry of Land Reclamation and Water Resources and the Water and Energy Council to further develop the National Water Sector Strategy and an Irrigation Sub-sector and Implementation and Investment Plan. Specific contract number: DCI-ASIE/2011/269-301/1, 2012.

Notes: Cost recovery tariffs estimated for 2012. Tariffs exclude VAT.

Exchange rate for 2012: 1 somoni = US\$0.2111.

In principle, revenues from irrigation services are earmarked for the repair and maintenance of the irrigation network. But fee rates that are not cost reflective, in combination with low bill collection rates and limited funding from the state budget, mean that the financial resources available for these purposes are largely insufficient. The annual costs of electrical energy for operating the pumps amount to some 35 million somoni (US\$5.3 million), which is significantly higher than what is allocated for energy in the budget of the Agency of Land Reclamation and Irrigation. In the event, the Agency has not been able to fully pay its energy bill to Barki Tojik, the state energy company, but, rather, has been accumulating debt.

The Agency of Land Reclamation and Irrigation is aware that any strategy for rehabilitation of the irrigation sector and for ensuring its financial sustainability will have to go along with measures designed to improve agricultural productivity and profitability in order to be able to move gradually toward higher cost recovery within a user pays framework. Part and parcel of these efforts is also the introduction of advanced water-saving irrigation systems.

Land tax

The state is the exclusive owner of all land. Landholders who have been allotted plots of land for tenure on an indefinite basis (so-called primary land users), for limited-time tenure or for lifetime

inheritable tenure, must pay a land tax. This is a local tax, which is regulated by the Tax Code. The tax base is the size (in ha) of the land in question. The tax rate depends on the quality and location of the land plot, the cadastral value and the nature of its use and the environmental features of the land. Land tax rates are subject to review by the Government within intervals of five years. But the tax rate can be adjusted annually taking into account the inflation rate of the preceding year. Producers of agricultural products (legal entities and owner-operated farms, including cooperatives) that are eligible for the so-called simplified tax regime, are exempted from the land tax. Base rates for the land tax can vary from 1.09 somoni to 676.53 somoni per ha depending on the location and function of the land. Effective tax rates vary depending on the size of the land plot. Base rates apply for land of up to 800 m²; twice the base rate is applied to land of more than 800 m² up to 2,000 m² for the part of land exceeding 800 m²; land of larger size is taxed at five times the base rate for the part of land exceeding 2,000 m².

Excise taxes on motor fuels and other energy products

Energy products such as crude oil, gasoline, diesel and heating fuel are subject to payment of excise taxes, which are regulated by the Tax Code. The tax base is the volume in tons of the specific product. The tax rate is established in terms of euros, but the payment is in national currency units at the official daily exchange rate at the time of the commercial transaction.

Excise rates are identical for domestically produced and imported energy products, since May 2003. Excise rates on motor gasoline in euros were raised by 10 per cent to €55 per ton effective 1 March 2014 after they had remained unchanged since May 2005 (table 3.4). However, over the same period, the tax rate expressed in national currency units rose by some 94 per cent. This huge difference in comparison with the tax rate in euros reflects the marked depreciation of the somoni over the past decade. But in real terms, i.e. adjusted for inflation, the tax rate in national currency units *fell* by some 20 per cent in 2015 compared with 2005. Given that one ton of gasoline (petrol) corresponds to about 1,350 litres, the excise tax per litre of gasoline amounted to only €0.04 or some 0.30 somoni in 2015. This corresponded to only 5 per cent of the pump price – some 6 somoni per litre – in November 2015.

The excise rate on diesel fuel is even lower, at €8 per ton or €0.007 (0.05 somoni) per litre – one ton of diesel corresponds to some 1,180 litres. From an

environmental perspective, there is no justification for such a difference, if any at all, in taxation between gasoline and diesel. Moreover, the taxation of motor fuels does not differentiate between fuel qualities in terms of octane number (gasoline) and sulphur content (diesel). The current excise tax rates were established by the 2014 Resolution of the Government No. 102 "On setting up excise taxes on selected goods manufactured in the Republic of Tajikistan and imported into the territory of the Republic of Tajikistan", which entered into force on 1 March 2014. The previous resolution, which established excise rates that became effective in May 2005, distinguished different types of fuel quality for motor gasoline, based on the octane number. But the excise rates applied were, nevertheless, not differentiated among the various grades of motor fuel quality.

Petroleum gases and hydrocarbons, as well as heating fuel, became subject to excise tax only as of March 2014, but the tax rates are very low (table 3.4). In addition to excises, all energy products are also subject to VAT of 18 per cent.

Import duties and excises on road motor vehicles

Duty rates for import of road motor vehicles are established in the 2003 Resolution of the Government No. 450 "On the customs tariff of the Republic of Tajikistan". Motorcars and other motor vehicles principally designed for the transport of persons (HS 8703) other than those designed for the transport of ten or more persons (HS 8702) are subject to a duty rate of 5 per cent of the customs value for vehicles with an age up to five years. The customs rate rises to 7 per cent for vehicles with an age of more than five years.

Motor vehicles falling under HS 8703 are, moreover,

subject to an excise tax of 10 per cent of the customs value independent of the age of the vehicle. The excise tax shall not be less than €0.15 per unit (cc) of cylinder capacity. Up to the beginning of March 2014, imports of vehicles under HS 8703 were subject to specific duty rates (per unit of cylinder capacity), which ranged from US\$0.4 per cc for vehicles with an engine size up to 2,500 cc; US\$0.6 per cc for vehicles with an engine size from 2,500 cc to 4,000 cc; and US\$1.20 per cc for vehicles with an engine size above 4,000 cc. Other motor vehicles, such as motor vehicles for transport of goods, are not subject to excise tax.

Tax on vehicles

Legal entities and natural persons who are owners of transport motor vehicles are subject to an annual tax on motor vehicle owners (ch. 40 of the Tax Code). This is a local tax, which is collected for the local budget at the place of vehicle registration. The tax is due at the date of first-time vehicle registration, on annual renewal of registration or at the time of the mandatory annual vehicle technical check-up for road motor vehicles and motorcycles.

The tax base is the engine capacity measured in horsepower (hp) units. Tax rates per unit of hp are set as a percentage of a base fee (a so-called calculation unit), which has been set at 40 somoni (some US\$6). Under the old (2004) Tax Code (i.e. until the end of 2012), the tax rate was set as a percentage of the minimum monthly wage in effect on the day the tax was paid. Tax rates range from 1 to 15 per cent of this base fee. The tax rate for a standard passenger motorcar is 3 somoni (7.5 per cent of 40 somoni) per hp. Assuming a total of 100 hp, the annual tax amounts to 300 somoni (some US\$45). For buses, the tax rate per hp varies with the number of seats; for trucks, the tax rate depends on weight-carrying capacity (table 3.5).

Table 3.4: Excise rates on petroleum products, 2005, 2014, €/ton

Product	2005 (from 1 May)	2014 (from 1 March)
<i>Motor gasoline</i>		
Motor gasoline for road vehicles; aviation gasoline; jet engine fuel	50	55
Other light distillates	50	55
<i>Medium distillates</i>		
Kerosene; jet fuel and other medium distillates	20	25
<i>Heavy distillates</i>		
Gas oil; diesel fuel	7	8
<i>Liquid fuels (black oil fuel)</i>		
Heating oil	0	25
<i>Petroleum gases and hydrocarbons</i>	0	4

Source: 2005 Resolution of the Government No. 126; 2014 Resolution of the Government No. 102.

Table 3.5: Tax on vehicles

Tax object	Tax rate/hp	Tax/hp	
		somoni	US\$
Motorcycles and scooters	2.5	1.0	0.16
Vans and pick-ups (LMVs)	6.0	2.4	0.39
Light duty vehicles (LDVs)	7.5	3.0	0.49
Buses			
up to 12 seats	7.5	3.0	0.49
13–30 seats	8.5	3.4	0.55
more than 30 seats	9.5	3.8	0.62
Trucks with weight-carrying capacity			
up to 10 tons	11.0	4.4	0.71
11–20 tons	12.5	5.0	0.81
21–40 tons	13.5	5.4	0.88
more than 40 tons	14.5	5.8	0.94
Tractors, construction vehicles	2.0	0.8	0.13
Craft, boats	15.0	6.0	0.97
Locomotives used in the railways	1.0	0.4	0.06

Source: 2012 Tax Code.

Note: Base fee (calculation unit) = 40 somoni.

Exchange rate for 2015: 1 somoni = US\$0.1623.

Certain types of vehicles, such as buses used by enterprises in public transport, specialized medical motor vehicles and tractors used in agriculture, are exempt from the tax. This tax promotes neither fuel efficiency nor reduction of emissions from road motor vehicles.

Road user tax

This tax, which is established in the 2012 Tax Code, must be paid by private commercial companies. The tax base, however, has nothing to do with the use of roads; rather, the tax base is the annual outlay of companies, excluding, notably, expenditures on construction projects and the acquisition of machinery and equipment, as well as the depreciation of fixed assets. The minimum tax base corresponds to 70 per cent of the gross revenue of the companies. The tax rates applied as from the beginning of 2015 are as follows: trade and procurement activities, 0.5 per cent; other activities, 1 per cent. The tax was expected to be cancelled as from the beginning of 2017, however it was not cancelled. This tax does not have an environment-related tax base and the reason for labelling it a road user tax is not clear.

Road user fees

Tajikistan levies a fee for the passage of foreign vehicles across its territory. The legal base for this is the Law on Other Obligatory Payments to the Budget. The fee is charged for freight vehicles and for vehicles transporting passengers. The fee rates for freight vehicles depend on their load-carrying

capacity, ranging from US\$100 for vehicles with a load capacity of up to 10 tons to US\$200 for vehicles with a load capacity of over 20 tons. Fee rates for buses depend on the number of seats (e.g. US\$100 for buses with more than 30 seats). Since 2013, there is also a fee for passenger cars (US\$25) and motorcycles (US\$10).

The only toll road in Tajikistan, which leads from Dushanbe to the Uzbek border town of Chanak, a distance of 358 km, has been operational since April 2010. This road is part of a highway network that connects Dushanbe with the northern region of Sughd, which is cut off from the rest of Tajikistan by mountain ranges. The construction and improvements of the road were financed by a US\$280 million loan from China. The Government has concluded a 33-year concession contract with a private company for operating the toll road and being in charge of road improvement and maintenance. The concession contract, which provides for exemptions from different taxes, lacks performance standards and other aspects of a public–private partnership contract. There is no published information on the process of setting road toll rates.

Toll rates depend on the distance travelled and vehicle characteristics (weight, number of seats). Toll rates, which are quite high, have been controversial since the outset. Notably, the local population has complained about excessive charges. Ordinary cars that travel from Dushanbe to Khujand (some 180 km) are charged 54.6 somoni (US\$8), i.e. 30 dirams (US\$0.04) per km. But whether the benefits

associated with the concession contract, notably the quality of road maintenance and improvement services provided by the concessionaire, justify the high tariffs is impossible to judge in the absence of any cost–benefit studies or other publicly available information.

Tariffs for communal services

Water supply and sewerage tariffs

Provisions for the levying of tariffs for drinking water and sewerage services are made in the 2000 Water Code and the 2010 Law on Drinking Water and Water Supply.

The tariff system distinguishes three customer groups: residential consumers, budget organizations (i.e. funded from the state budget) and commercial companies. There are constant volumetric charges (per m³) for each customer category. Most households do not have metered connections to the water system and are charged on the basis of consumption norms, which are then converted into a volumetric charge rate. The Government has launched a metering installation programme, which is supported by foreign donors. In Dushanbe, the capital, some 60 per cent of residential consumers had a metered connection to the central water supply system at the end of 2014. In 2010, there were hardly any households in Dushanbe that had a metered connection to the water supply system. In the whole

country, only some 13 per cent of residential consumers in cities and district centres had a metered water connection at the end of 2014; in rural areas, this applied to only 0.2 per cent of households. Water consumption metering has always been required for non-household customers.

Tariffs for water supply and sanitation were raised considerably between 2010 and 2015, and also in real terms, i.e. after deduction of inflation. Tariffs differ considerably among the three customer groups, although water production costs are quite similar. In Dushanbe, water supply tariffs for households in 2015 correspond to only 13 per cent of what commercial companies have to pay. In fact, household tariffs in Dushanbe are the lowest in the country. The State Unitary Enterprise "Housing and communal services" (Khojagii Manziliu Kommunalni, KMK) applied a unique tariff for each of its major customer groups throughout the country until mid-2014. Since then, differential tariffs have been applied in order to help the regional subsidiaries of KMK generate more of the revenues required for servicing the foreign loans that are financing investments in the improvements of the water sector infrastructure (table 3.6).

The general feature is still that revenues collected from water bills do not allow recovery of the operating and maintenance costs of water utility companies (vodokanals). On average, revenues cover only 70 per cent of operational costs.

Table 3.6: Tariffs for water supply and sewerage excluding VAT, 2010, 2015, somoni/m³

Vodokanal Customer category	Water supply		Sewerage		Total		Total US\$
	2010	2015	2010	2015	2010	2015	2015
KMK							
Residential	0.40	0.70/0.90	0.22	0.38/0.90	0.62	1.08	0.18
Budget organizations	0.50	1.40/2.30	0.30	0.75/1.20	0.80	2.15	0.35
Non-budget (commercial) organizations	0.70	2.40/3.20	0.43	1.25/1.50	1.13	3.65	0.59
Dushanbe							
Residential	0.14	0.33	0.05	0.12	0.26	0.45	0.07
Budget organizations	0.41	1.00	0.19	0.45	0.86	1.45	0.24
Non-budget (commercial) organizations	0.92	2.50	0.50	1.30	2.22	3.80	0.62
Khujand							
Residential	0.60	0.85	0.39	0.55	1.15	1.40	0.23
Budget organizations	1.02	1.45	0.55	0.85	1.87	2.30	0.37
Non-budget (commercial) organizations	3.12	5.00	1.00	1.45	4.57	6.45	1.05

Source: Anti-Monopoly Service, 2015.

Notes: Water supply systems tariffs for KMK in 2015: minimum and maximum tariffs applied among the different districts.

Total tariffs (drinking water and sewerage) for KMK for 2015 is the dominant tariff applied to most of the customers.

Exchange rate for 2015: 1 somoni = US\$0.1623.

The major exception is Khujand Vodokanal; in Khujand, a tariff reform was associated with a major rehabilitation of the water network, which was supported by foreign loans and grants (from EBRD and the Government of Switzerland). In fact, Khujand now has the highest water tariffs in Tajikistan, but this ensures the financial viability of the water company and it has been accompanied by considerably improved quality of water services.

The main reason why the vodokanals cannot recover their operating and maintenance costs are the low tariffs charged to private households, which, in general, account for the large bulk (90 per cent and more) of drinking water consumption. This reflects a dominance of "social" considerations and customary practices. The corresponding losses in revenue can only partly be offset by the higher tariffs applied to commercial enterprises and budget organizations. KMK has calculated that its dominant residential drinking water tariff (0.70 somoni per m³) in 2015 corresponds to only 32 per cent of the full cost recovery tariff for drinking water, which amounts to 2.2 somoni (US\$0.33) per m³. Low tariffs, i.e. significantly below the cost recovery level, are tantamount to an implicit subsidy to households that leads to distortions in their behaviour because it does not provide incentives for economical use of water. This implicit subsidy, moreover, benefits mainly those households that could well afford cost-reflective tariffs and which have typically higher water consumption than poor households.

The pervasive lack of metering of household connections to the water supply system, moreover, does not encourage economical use of water. Lack of meters also makes it impossible for water companies to properly gauge the actual water demand and to analyse their own economic and financial performance. Total water production also tends to be difficult to gauge, given that bulk flow meters at water intake sites are, in general, obsolete or lacking.

There are other factors that help explain the large gap between the collected water revenues and production costs of most water companies. Unit costs of water production tend to be underestimated because no allowances are made for the high volume of non-revenue water from the technical losses from pipelines. And bill collection rates are always assumed to be 100 per cent. There is only anecdotal evidence on collection rates for water bills, which, however, and notably in urban areas, seem to be relatively high – but not 100 per cent. Also, in

general, no or insufficient allowance is made in the tariff calculations for the need to build reserve funds for addressing the ageing and obsolescence of the capital stock of the water supply sector.

The upshot is that the operations of water companies are not financially sustainable. Subsidies from the central and local government budgets have been largely insufficient to compensate for the losses incurred. Improvements in the economic and financial management of water companies have emerged as a *sine qua non* for ensuring the urgently needed further rehabilitation and extension of the water supply and sewerage system.

Tariffs for municipal waste services

Some 90 per cent of the urban population has access to solid waste management services, although in smaller cities and towns this share is only some 70 per cent.

The Anti-Monopoly Service establishes tariffs for waste collection and disposal, based on tariff proposals from local waste companies and/or city and district governments. Information on the process of tariff setting is sparse, but it seems to involve cooperation between local subsidiaries of the Service with city and district governments. In general, the tariff system distinguishes three customer categories: households, budget organizations and commercial entities. Dushanbe has separate waste companies for each of its four districts.

Tariffs for residential customers are based on the number of persons per household and the type of residence. In 2015, these flat tariffs range from 2 to 3 somoni (US\$0.3–US\$0.5), including VAT, per person per month and, given that they are not volumetric, they do not create any financial incentives for waste minimization. The tariffs for other customer groups are set per m³ of waste. On average, they amounted to 27 somoni (US\$4.38) for budget institutions and 35.33 somoni (US\$5.73) for commercial companies. But the monthly waste bills of non-household entities are calculated based on waste volume norms that are expressed in terms of physical indicators, such as m³ of waste per m² of business premises. Tariffs for all customer categories in 2015 are significantly above the corresponding rates in 2010 (table 3.7), also in real terms, i.e. after taking into account inflation. The tariff structure suggests that low household waste tariffs are supported by cross-subsidies from commercial company tariffs.

In Dushanbe, there is a separate gate fee of 7 somoni (US\$1.05) per ton for the disposal of solid waste at the landfill. Waste bills for households are still collected by tariff collectors, who go door to door. The collection rates depend on accurate information about the actual household size and the ability of households to pay. The scope for enforcement of penalties for non-payment is weak. Bill collection rates vary among the districts, but figures have not been published. Non-household entities in Dushanbe, and possibly other major cities also, can conclude contracts with private companies for the collection and transport of waste to the landfill. In 2012, some 40 per cent of non-household waste in Dushanbe was collected in this way. The fact that there is demand for private waste collection companies in the non-household sector suggests that commercial companies find these services cheaper than those of the public sector waste company.

There is no published estimate of the level of tariff required to achieve full cost recovery, but tariffs and related revenues in Dushanbe are too low to cover the operating and maintenance costs of waste management activities. There are few, if any, funds for adequate repair and maintenance, which has led to deterioration of the quality of waste services. Waste companies do not, at least officially, receive any subsidies from local budgets.

There is little published information on municipal waste tariffs applied outside Dushanbe. Since July 2011, KMK applies a unique tariff of 28 somoni (US\$4.2) per m³ for the collection and transport of household waste to all its regional subsidiaries. A new price list was published in July 2015 concerning the collection, transport and disinfection of municipal solid waste. Tariffs per m³ depend on the type of vehicles needed for the waste handling. Information on the financial performance of local KMK waste companies has not been published, but there is a severe lack of own funds for upgrading waste management services.

Electricity tariffs

Tariffs are differentiated by customer category, but partly also by season (table 3.8). Tariffs for households in 2015 correspond to only some 35 per cent of tariffs for industrial and other commercial companies, which is indicative of the substantial cross-subsidization incorporated into the tariff scheme. Within industry, TALCO, the state-owned aluminium company, which is the largest single electricity consumer in the country, benefits from tariffs that historically have been quite low. The profitability of the company is strongly dependent on electricity tariffs, given that electricity accounts for more than half of total production costs. Since April 2012, seasonal tariffs have been introduced for TALCO, which now pays a much lower tariff during summer months compared with winter months. By far the lowest energy tariffs are available for pumping stations for water supply and irrigation water for agriculture, for which seasonal tariffs have also been introduced since 2012. In 2015, summer tariffs for pumping stations correspond to only 17.5 per cent of household tariffs.

Tariffs are higher by some 40 per cent, on average, in 2015 compared with 2010. But in real terms, after taking into account inflation, tariffs have been broadly stable over this period. In fact, tariffs have continued to be set at rates that, in general, remain significantly below the level required to recover costs. In 2013, weighted average tariffs per kWh were some 20 per cent lower than the costs of supply. Low tariffs have been tantamount to providing implicit subsidies to the corresponding customer groups. More generally, low energy tariffs do not create incentives for more efficient use of energy resources, which also affects the energy intensity of investments in the economy. In the case of low household tariffs, the implicit subsidies are regressive, given that they benefit high-income households more than poor households because the former tend to have higher electricity consumption.

Table 3.7: Tariffs for municipal waste collection and disposal in the Ferdowsi, Shah Mansur and Sino districts of Dushanbe, 2010, 2015

Customer category	Unit	somoni		US\$
		2010	2015	2015
Apartment blocks with refuse chute from 9th floor	per person per month	0.9	2.50	0.41
Apartment blocks without refuse chute	per person per month	0.8	2.10	0.34
Private houses	per person per month	1.0	3.00	0.49
Barracks	per person per month	1.0	2.83	0.46
Government budget-funded organizations	per m ³	5.0	27.00	4.38
Commercial enterprises	per m ³	14.0	35.33	5.73

Source: Anti-Monopoly Service, 2015.

Note: Tariffs excluding VAT. Exchange rate for 2015: 1 somoni = US\$0.1623.

Table 3.8: Electricity tariffs, 2010, 2012, 2015

Customer category	somon/kWh			US\$/kWh
	2010	2012	2015	2015
Households (incl. VAT)	0.090	0.1100	0.126	0.0204
Industrial and non-industrial consumers	0.213	0.2663	0.306	0.0497
SUE Tajik Aluminium Company (TALCO) (incl.VAT)				
from 1 May to 30 September	0.082	0.0625	0.072	0.0117
from 1 October to 30 April	0.082	0.1025	0.118	0.0192
State budget organizations; municipal utilities	0.085	0.1063	0.122	0.0198
Pumping stations for water supply and irrigation water (incl. VAT)				
from 1 May to 30 September	0.057	0.0188	0.022	0.0036
from 1 October to 30 April	0.057	0.0713	0.082	0.0133
Use of electrical boilers and electrical settings for hot water supply and heating				
for state budget organizations	0.156	0.195	0.224	0.0364
for the non-budget sector	0.527	0.6588	0.758	0.1230

Source: Anti-Monopoly Service, 2015.

Note: Excluding VAT (18 per cent) unless otherwise indicated.

Exchange rate for 2015: 1 somoni = US\$0.1623.

Low tariffs have played a role in the persistent financial difficulties that Barki Tojik has been facing for many years. Other important factors have been volatile and low bill collection rates and the accumulation of high arrears. In January 2014, Barki Tojik's receivables for electricity supply amounted to some 1,078 million somoni (US\$165 million). About half of this debt was accounted for by non-payment of bills for electricity needed for the operation of the lift pump irrigation systems managed by the former Ministry of Land Reclamation and Water Resources. Other important debtors are TALCO and private households. In the event, Barki Tojik's revenues have been insufficient to cover the required operating and maintenance costs as well as other payment obligations, viz. debt servicing, payments to independent power producers and taxes.

Against this background, the Government initiated an individual restructuring programme for Barki Tojik in 2011 (chapter 11), with the aim of making the company commercially viable and, accordingly, to separate the generation, transmission and distribution functions into different business units and eventual commercial operation. But progress in these matters has been slow. It also involves the installation of a wholesale metering system to measure and record energy transfers between generation, transmission and distribution. A move towards cost-reflective tariffs will have to be part and parcel of these restructuring efforts and will have to take into account the important issue of affordability of adequate energy supply for poor households.

A separate tariff regime applies to the Pamir Energy Company, which manages the state-owned electricity infrastructure in the remote and sparsely populated

Gorno-Badakhshan Autonomous Oblast. This is a joint-stock company that was established in 2002 based on a 25-year concession agreement with the Government. This was the first public-private partnership arrangement in Central Asia. The Aga Khan Fund for Economic Development (AKFED) owns 70 per cent of the company shares; the International Finance Corporation (IFC), the private sector lending arm of the World Bank Group, holds the remaining 30 per cent. The energy tariffs charged by Pamir Energy Company are governed by the concession agreement and are set with reference to a maximum average tariff across all customer categories (households, commercial companies and government bodies). The Company applies for tariff increases to the Anti-Monopoly Service and relevant ministries (Economic Development and Trade, and Energy and Water Resources). A special feature of the tariff regime is that the affordability of electricity for the poorest households has been ensured by a lifeline subsidy scheme that has been mainly financed by a grant from the Government of Switzerland.

Affordability of communal service tariffs

Given the widespread poverty in Tajikistan, it is important to ensure affordable access of the poor to adequate supply of water, waste and energy services. In 2011, the Government launched a pilot project for targeted social assistance in two districts, which was more effective in reaching the poorest 20 per cent of the population – based on proxy means tests – when compared with existing social assistance programmes. The pilot project, which is supported by the World Bank/International Development Association (IDA), was extended to 25 districts in

2014. Nationwide coverage, also involving the introduction of a single targeted poverty benefit, is planned for 2016. Affordability of adequate energy supply is particularly important for low-income households in rural areas, given that they spend a much larger share of their monthly budget on electricity, notably during the heating season, compared with urban households.

Household budget surveys suggest that the share of expenditures on communal services (including energy), corresponded to only 4.7 per cent of total expenditures in 2013–2014 and 4.9 per cent in 2015 (table 3.9). This may be regarded as being relatively low compared with international standards, but the question is to what extent this reflects the fact that many rural households do not yet have adequate access, if any at all, to communal services.

3.2 Environmental expenditures

The general feature of government environmental expenditures in Tajikistan is that current (operating) environmental expenditures are financed from the state budget while spending on investment projects depends largely on access to foreign loans and grants. Some budget organizations, such as the Committee

on Environmental Protection, have special budget funds, for which the major source of revenues are earmarked taxes and other charges, as well as revenues from the provision of services, i.e. from commercial activities that are undertaken by them. Thus, special funds are accumulated from the collection of pollution charges. Revenues from commercial activities include, notably, the fees collected from use of flora and fauna. But not all of the revenues collected are used for environmental and/or nature protection, but are often also allocated to financing general activities at the central and local government levels. Since 2013, moreover, 5 per cent of the revenues collected are transferred to the Republican Stabilization Fund of Development of the Economy.

Budget of the Committee on Environmental Protection

The budget of the Committee is relatively small, corresponding to only 0.15 per cent of total general government expenditures in 2014–2015. During 2010–2012, the share was some 0.30 per cent, but this included the (operating) budget for forestry and hunting, which was separated from the Committee as of 2014 (table 3.10).

Table 3.9: Distribution of average monthly household expenditure, 2010–2015, per cent

Expenditure category	2010	2011	2012	2013	2014	2015
Food	64.1	67.4	63.8	61.2	58.9	57.8
Non-food	24.5	22.6	24.6	26.1	27.8	27.6
Services, of which:	11.3	10.0	11.6	12.7	13.3	14.6
Housing and communal services	3.9	3.5	4.1	4.7	4.7	4.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Main indicators of the household budget survey of Tajikistan, Agency of Statistics, 2015 and 2016.

Table 3.10: Budget of the Committee on Environmental Protection, 2010–2015, million somoni

Funding source	2010	2011	2012	2013	2014	2015*
State budget	14.31	17.55	23.95	22.02	11.97	13.60
Special funds (Environmental Fund)	5.25	5.95	6.59	11.31	8.64	7.10
Total	19.56	23.50	30.54	33.32	20.61	20.70
as per cent of total general government expenditures	0.30	0.29	0.34	0.30	0.16	0.14
<i>Memorandum item</i>						
Forestry Agency budget	..	..	..	..	13.21	15.52

Source: Committee on Environmental Protection, 2015.

Note: * planned budget.

There is no information on the financing of specific projects, if any, from the budget of the Committee, including the use made of the earmarked revenues from pollution charges. There is, moreover, only partial information on the resources collected from earmarked revenue sources for the environmental funds at the level of local government, which receive 20 per cent of these revenues. In Dushanbe, the Division of Environmental Protection has used these funds in recent years (1.5 million somoni (US\$0.16 million) in 2014) to finance 12 additional staff who are not paid from the regular state budget, the organization of workshops, planting of trees and (co)financing of the construction of a new office building. The use of funds by the Committee on Environmental Protection and its territorial bodies is subject to approval by the Ministry of Finance. There is no published information on the costs of implementing the State Environmental Programme for the period 2009–2019.

Forestry Agency

The Forestry Agency had an annual budget of 15.52 million somoni (US\$2.52 million) in 2015, of which 70 per cent is absorbed by salaries of staff, including the staff of the more than 40 forestry institutions. The remaining small funds for investments are inadequate for proper maintenance of the state forest fund and the management of flora and fauna. The forestry institutions are crucially dependent on revenues from commercial activities for their day-to-day operations. The Programme for Development of Forestry for the period 2006–2015 (2005 Resolution of the Government No. 396) was significantly underfunded; only 30 per cent of the estimated financial needs were supported from the state budget.

Environmental protection investments

Environmental protection investments in 2012–2013 have largely focused on wastewater treatment and riverbank fortification. Based on data published by the Agency of Statistics (table 3.11), environmental

protection investments, which are supposed to cover all sectors of the economy, were quite low, corresponding to 0.32 per cent of total state budget expenditures in 2013 (0.14 per cent in 2012).

Functional classification of government expenditures

Tajikistan has been using a functional classification of government expenditure as the main basis on which the budget is legally approved. The classification is broadly in accordance with the international Classification of Functions of Government (COFOG), but there is no equivalent counterpart to item 5 (Environmental Protection) of COFOG. In Tajikistan, this spending area is combined with item 6 (Housing and communal Services) of COFOG, and it includes forestry, which in COFOG is recorded under item 4 (Economic Affairs). This aggregate corresponded, on average, to some 11 per cent of total (current and capital) state budget expenditures during the period 2010–2014 (table 3.12).

Foreign financial assistance

Foreign financial assistance has become the mainstay of efforts to promote the economic and social development of Tajikistan. The Government's annual Public Investment Programme (PIP) is entirely financed by foreign donor funds. Foreign financial funds were allocated predominantly to the sectors of energy and transport, which accounted for some 51 per cent of total disbursements during the period 2011–2014. Water supply and sanitation, together with other communal services, had a share of 5.2 per cent, while environmental protection (in the narrow sense) accounted for 2.3 per cent of total foreign aid (table 3.13).

Environmental expenditures by enterprises

There is no information available on environmental expenditures of enterprises.

Table 3.11: Environmental protection investments in Tajikistan, 2009–2013, million somoni

Domain	2009	2010	2011	2012	2013
Air protection	0.001	0.650	0.771	0.771	0.000
Water protection	..	..	8.802	7.097	31.914
Soil protection	0.009	7.793	8.191	4.370	3.954
Total	0.010	8.443	17.764	12.238	35.868
as per cent of total general government expenditures	0.000	0.130	0.220	0.140	0.320
as per cent of GDP	0.000	0.034	0.059	0.034	0.089

Source: Statistical Yearbook, Agency of Statistics, 2014.

Note: Investments at current prices.

Table 3.12: State budget expenditures by functions of government, 2010–2014, million somoni

Category	2010	2011	2012	2013	2014
Housing and municipal services, environment, forestry	448.9	686.8	585.4	1 083.2	1 331.3
Agriculture, fishing, hunting	219.3	300.3	235.4	247.8	274.1
Total state budget expenditures	6 712.5	8 562.1	9 107.7	11 591.6	13 190.4
<i>Per cent of total</i>					
Housing and municipal services, environment, forestry	6.7	8.0	6.4	9.3	10.1
Agriculture, fishing, hunting	3.3	3.5	2.6	2.1	2.1
<i>Per cent of GDP</i>					
Housing and municipal services, environment, forestry	1.8	2.3	1.6	2.7	2.9
Agriculture, fishing, hunting	0.9	1.0	0.7	0.6	0.6

Source: Agency of Statistics, 2015; ECE Secretariat calculations.

Table 3.13: Foreign aid provided to Tajikistan, 2011–2014, US\$ million

Sector	2011	2012	2013	2014	Total, per cent
					2011-2014
Agriculture and irrigation	3.7	15.3	15.0	12.8	6.3
Environment	4.3	3.5	5.2	4.5	2.3
Water supply and other communal services	11.3	8.0	13.5	5.8	5.2
Energy	54.8	18.2	13.3	33.1	16.0
Transport	111.9	39.9	60.1	46.9	34.8
Health	7.8	22.6	20.6	22.7	9.9
Education	8.2	9.9	14.2	12.9	6.1
Private sector and industry	2.6	7.3	16.4	16.4	5.7
Other, incl. multisector activities	17.6	15.5	40.7	28.1	13.7
Total	222.2	140.1	198.9	183.3	100.0
as per cent of GDP	3.4	1.8	2.3	2.0	

Source: State Committee on Investments and Management of State Property, Foreign Aid Reports, 2014, 2013, 2012, 2011.

3.3 Legal, policy and institutional framework

Legal framework

The 1996 Land Code stipulates the importance of a system of legal, economic and other measures designed to ensure protection and rational use of land, conservation of soil and prevention of land degradation. The Code provides for economic incentives that promote the rational use of land and land protection, including from adverse environmental impacts due to industrial activities. These economic incentives can include the allocation of funds from the state budget for the restoration of land that was adequately managed by the land users, exemptions from land tax for land under agricultural development or in the improvement stage, soft loans for land improvement activities designed to improve land utilization, and incentives to improve land quality and increase soil fertility. Information on the extent to which these economic incentives were effectively used has not been provided.

The 2007 Law on Natural Monopolies classifies water supply and sewerage services management as a natural monopoly that is subject to state regulation.

The 2011 Law on Environmental Protection, which has replaced the 1993 Law on Nature Protection, confirms the principles of polluter pays and user pays as core concepts in environmental policymaking. It also contains provisions for state support for the development and diffusion of clean technologies, promotion of renewable energy and the use of secondary materials for minimizing waste disposal. Provisions for these charges have also been included in sector-specific legislation, namely the 2012 Law on the Protection of Atmospheric Air, the 2000 Water Code and the 2002 Law on Waste from Production and Consumption. The Law on the Protection of Atmospheric Air also has provisions for charging for the emission of polluting substances from mobile sources.

All this legislation also contains provisions for access to tax preferences and other financial incentives

designed to promote environmentally friendly behaviour and the rational use of natural resources.

The 2010 Law on Renewable Energy Sources indicates the use of special mechanisms for enhancing the use of RES. The 2013 Law on Energy Saving and Energy Efficiency provides for the promotion of energy saving technologies, materials and equipment by means of state support. The secondary legislation required for the application of these provisions, however, has not been developed and/or adopted to date.

The 2011 Forest Code contains provisions for the use of economic mechanisms for the management of forest resources. These now also include fees for the harvesting of timber (industrial roundwood) as well as of fuelwood. But the extent of timber harvesting is quite small; there is no timber industry in Tajikistan, and the large bulk of timber, which is used mainly for construction purposes, is imported. Under the 1993 Forest Code, industrial timber harvesting was prohibited. Only tree cuttings for forest maintenance and improvements (intermediate and sanitary fellings) were allowed and all of this wood served as fuel, mainly for heating and cooking by the rural population. The 2011 Forest Code stipulates that user fees shall be set taking into account "the benefits of forests, quality and accessibility of forest resources and market prices for forest products". There is also a provision to use financial incentives to increase the forest cover of the state forest fund lands by means of afforestation and changes in forest land use away from agriculture.

Similarly, the 2014 Law on Hunting and the Hunting Sector stipulates the use of economic mechanisms for the management of game animals.

Charges for the use of natural resources (other than forest and wild animal resources) are regulated by the 2012 Tax Code. These are broken down into bonuses and extraction royalties. Royalty rates for extraction of groundwater are directly regulated by the Government. The Code also regulates the excise duty rates on motor fuels and other energy products, as well as taxes on road motor vehicles and the land tax.

There are no specific tariff methodologies for communal services. The framework for the calculation of communal services tariffs is established by the 1999 Resolution of the Government No. 210 "On approval of the Regulations for calculation of the costs of goods (works, services) in enterprises and organizations of the Republic of Tajikistan" and the 2007 Instruction of the Minister of Economic Development and Trade

No. 10 "On the definition, approval and management of tariffs and tariff estimates for goods (works, services) of natural monopoly entities".

The 2012 Law on Public–Private Partnership establishes the principles of PPP projects and procedures for their implementation in the field of infrastructure and social services. The Law also contains restrictions with regard to areas where it will not apply, such as granting rights for subsoil use. Other restrictions are specified in the 2014 Resolution of the Government No. 581, which includes the list of infrastructure and social services that are not covered by the Law on Public–Private Partnership. The State Institution "Centre for Implementation of Public–Private Partnership Projects" was established by the 2013 Resolution of the Government No. 289. The Centre is financed from the republican budget and has five staff.

The 2011 Law on Public Finances establishes the legal framework for the organization of public finances. The state budget system has two levels, viz. the republican budget and the local government budgets. The Law assigns responsibilities for service provision to the two levels of government (central, local) or to them jointly. Local governments have limited fiscal autonomy, being dependent on revenues from a few local taxes and some other charges. Transfers from the central government budget, designed, in principle, to ensure a minimum level of standards of service provision in all localities, are ad hoc and cannot be relied on.

The 2013 Law on Energy Saving and Energy Efficiency has a provision for the establishment of a "fund for the development of renewable energy sources, and energy conservation and efficiency", which is meant to support state policy in these areas. In late 2015, a fund was not yet established.

Policy framework

The National Development Strategy for the period until 2015 provided the broad framework for government policies and measures designed to ensure the sustainable development of Tajikistan over the past decade. The implementation of the National Development Strategy took place on the basis of Poverty Reduction Strategy (PRS) papers, which covered two successive three-year periods, 2006–2009 and 2010–2012. For 2013–2015, the Government adopted a Living Standards Improvement Strategy (LSIS), which has a similar structure to the PRS papers.

Since 2004, the main documents for medium-term public investment management within the framework of the PRS and the LSIS have been the three-year State Programmes on Investments, Grants and General Construction (e.g. the State Programme on Investments, Grants and General Construction for the period 2013–2015 (2012 Resolution of the Government No. 608), the State Programme on Investments, Grants and General Construction for the period 2014–2016 (2013 Resolution of the Government No. 556) and the State Programme on Investments, Grants and General Construction for the period 2015–2017 (2014 Resolution of the Government No. 798)). Their two main components are the Public Investment Programme (PIP) and the Centralized State Investment Programme. The PIP is financed by foreign loans and – mainly – grants, although some of the projects may have required some co-financing from the Government. The Centralized State Investment Programme is financed by central and local government budgets. Total funds planned for the Centralized State Investment Programme corresponded to less than 10 per cent of the planned funds for the PIP under the LSIS.

Table 3.14 shows the allocation of total funds planned within the framework of the LSIS 2013–2015 for the financing of infrastructure projects. Total planned expenditures amount to a considerable US\$3.9 billion, of which some 85 per cent is accounted for by the energy and transport sectors. Water supply and sanitation has a share of 3.2 per cent of the total; the share of environmental protection is US\$1.3 million or 0.03 per cent. There is no published information on the implementation of the LSIS and the associated actual investment

expenditures for each of the sectors. At the time the LSIS was launched, financing of more than 50 per cent of the projected aggregate expenditures was not ensured. Large gaps between projected financing needs and planned funding also existed for the PRS 2010–2012. The Ministry of Economic Development and Trade has been in charge of coordinating and monitoring the implementation of the PRS and the LSIS, but available information concerning implementation is limited to the *number of key actions* that were implemented.

A recurrent feature has been that identified investment needs have often tended to exceed feasible financing, leaving aside the issues pertaining to the reliability of cost estimates and the importance of gauging how realistic the overall resource requirements are. More generally, the lack of effective appraisal and proper selection of projects has been one of the weak spots in the management of public investments in Tajikistan.

The Concept for Reform of the Housing and Utilities Sector for the period 2010–2025 (2010 Resolution of the Government No. 321) acknowledged the fact that the operations of water companies are not financially sustainable and subsidies from the central and local government budgets have been largely insufficient to compensate for the losses incurred. The Programme of Development of the Housing and Utilities Sector of the Republic of Tajikistan for the period 2014–2018 (2014 Resolution of the Government No. 506), which has been designed for the medium-term implementation of this Concept, among others, identifies a range of measures designed to ensure the financial viability of the water sector.

Table 3.14: Allocation of credit funds of the State Programme on Investments, Grants and General Construction for the period 2013–2015, US\$ million

Functional sector	2013	2014	2015	Total	Per cent
				2013-2015	2013-2015
Management of economy	9.0	12.5	12.7	34.2	0.9
Agriculture	15.2	4.7	4.0	23.9	0.6
Irrigation and rural water supply	8.9	101.9	151.5	262.3	6.8
Water supply and sanitation	28.0	43.6	53.6	125.2	3.2
Environment protection	1.2	0.2	0.0	1.3	0.0
Energy	92.2	667.5	702.5	1 462.2	37.8
Transport	368.2	739.2	707.8	1 815.3	46.9
Education	7.0	31.4	50.0	88.5	2.3
Health care	9.6	16.9	21.7	48.3	1.2
Multisector and other sectors	0.0	2.2	8.8	11.0	0.3
Total	539.4	1 620.2	1 712.7	3 872.2	100.0
<i>Memorandum item</i>					
as per cent of GDP	6.3	17.5	20.1	..	..

Source: Living Standard Improvement Strategy for 2013–2015.

Strategic documents on water supply and sanitation

Providing countrywide adequate access to safe water and sanitation services remains a major challenge for Tajikistan. Water supply systems throughout the country are in need of extensive rehabilitation and lack of adequate maintenance is widespread. The negative economic impacts of inadequate access to safe drinking water and sanitation services are estimated to correspond to some 4 per cent of GDP. KMK estimates that investment needs in the water sector amount to some US\$2 billion. Almost all investments so far have been in urban areas; the rural areas have been largely neglected, although the Programme on Improving Access of the Population to Clean Drinking Water 2008–2020 (2006 Resolution of the Government No. 514) calls for measures to rehabilitate the existing infrastructure and extend it, notably to the rural areas.

The institutional framework for water supply and sewerage services is fragmented and the capacity of KMK to deliver adequate management services is weak. A strategy for providing water supply and sanitation services in rural areas is lacking. Central and local government budgets cover only a small proportion of the total investments required in the sector. Public finances are already strained, given that revenues collected from water tariffs do not even cover the operating costs of water supply systems. Limited state budgets for water and sanitation make the role of foreign financial support very crucial for the sector financing. Urban water sector infrastructure development is mainly supported by the EBRD and the World Bank. The Swiss Agency for Development and Cooperation (SDC), UNDP and Oxfam are major actors concerning water supply and sanitation programmes in rural areas.

The Government, with support from the World Bank, has developed a Municipal and Communal Service Development Strategy, which is designed to ensure that the population has access to quality communal services at affordable prices, while at the same time the operations of water companies are financially sustainable. A key element of the Strategy is the establishment of a Communal Services Development Fund that would mobilize funds from donors for the rehabilitation and modernization of the water supply and sanitation infrastructure. But the success of such a Fund is also dependent on institutional capacity building and policy reform, including, inter alia, the decentralization of water supply and sanitation services, greater financial autonomy of local governments that allows them to borrow and pay back debts taken on for financing the needed water

sector investments, and the transition to cost-reflective tariffs.

Medium-term expenditure framework

The introduction of a medium-term expenditure framework (MTEF) was launched in 2006, but progress towards the goal of achieving full coverage for the government sector by 2018 has been slow. The MTEF covers a moving three-year period. The Committee on Environmental Protection is one among many line ministries and agencies that are not yet included in the MTEF. Currently, only four line ministries (Agriculture; Education and Science; Health and Social Protection of the Population; and Labour, Migration and Employment of the Population) are subordinated to the MTEF.

The broad objective of the MTEF is to develop sector strategies – based on national strategies – that have well-defined objectives (outputs) associated with reliable estimates of costs involved for their achievements. The role of line ministries (and entities such as the Committee on Environmental Protection) in the formulation of sectoral policies is still very limited, given the lack of capacities for providing estimates of costs for investment and other projects. This has made them dependent on external support. The Planning, Bookkeeping and Finance Unit of the Committee on Environmental Protection is mainly concerned with the financing of the central apparatus of the Committee. In the event, the budget process is dominated by the Ministry of Economic Development and Trade and the Ministry of Finance. At the national level, a major challenge has been the integration of the MTEF with the National Development Strategy, the PIP and other foreign assistance programmes.

Institutional framework

Anti-Monopoly Service

The Anti-Monopoly Service was first established in 2000 as a department of the Ministry of Economic Development and Trade, but it became a separate agency under the Government in 2010 (2010 Resolution of Government No. 227). It has the mandate to set tariffs for communal services, viz. water supply and sanitation, municipal solid waste management, and electricity and heat supply. The process of tariff setting is opaque and involves, besides the Service itself, the operators of communal services, which prepare tariff proposals, and other government bodies, notably the Ministry of Economic Development and Trade and the Ministry of Finance.

The Service develops electricity tariffs based on a proposal from Barki Tojik, the state-owned energy company, which then undergo a review process that involves several ministries, notably the Ministry of Economic Development and Trade, the Ministry of Finance and the Ministry of Energy and Water Resources. The decision on the agreed final tariff rates is issued as a governmental resolution. Only end-user tariffs are published; there is no information on the underlying tariff components for power generation, transmission and distribution. A draft energy tariff methodology has been developed recently with the support of the ADB and EBRD, but it is not clear whether and when it will be implemented.

State Unitary Enterprise "Housing and communal services"

The state agency in charge of control and technical regulation of water supply services is the SUE "Housing and communal services" (KMK). KMK also operates water supply and sewerage services through its regional subsidiaries for cities, district centres and urban settlements. In a number of major cities (Dushanbe, Khujand, Nurek, Roghun and Sarband), water supply services are operated by municipality-owned water companies (vodokanals). KMK is currently in charge of both the regulation and, in many parts of the country, the operation of water supply. This is a potential source of conflicts of interest. In most cities and districts, the collection and disposal of solid waste is controlled and operated by the regional subsidiaries of KMK, which, in part, are also engaged in other activities, such as repairs of local roads, maintenance of green spaces and street cleaning.

In some larger cities, such as Dushanbe and Khujand, solid waste management services are operated by municipality-owned waste companies.

Agency of Land Reclamation and Irrigation under the Government

Irrigation management and operation was transferred in November 2013 to the Agency of Land Reclamation and Irrigation under the Government established for these purposes. The former Ministry of Land Reclamation and Water Resources, which was in charge of management of the national irrigation sector, was abolished. The overall responsibility for water sector policy and regulation has been transferred to the restructured Ministry of Energy and Water Resources. This is part and parcel of ongoing efforts to introduce integrated water

resources management (IWRM) and river basin management in Tajikistan (chapter 6).

State Committee on Investments and Management of State Property

The State Committee on Investments and Management of State Property is the central body for promoting the attraction of investments for implementation of state programmes, including loans and grants from international financial institutions and donor countries. It is also responsible for the coordination of foreign aid provided to Tajikistan and for cooperation with donors. The State Committee is also in charge of maintaining the database of the Aid Coordination and Project Monitoring System. The database has been maintained and modernized with the support of ADB technical assistance projects.

Donor Coordination Council

The Donor Coordination Council is designed to ensure an efficient coordination process between the authorities and donors, as well as coordination among donors with the aim of maximizing the complementarity of projects. In 2009, the Government and development partners signed a Joint Country Partnership Strategy for 2010–2012, which was designed to promote more effective aid coordination and distribution to support the implementation of the National Development Strategy for the period until 2015.

3.4 Conclusions and recommendations

The long-standing system of charges on emissions of air pollutants, discharges of water pollutants and generation of industrial waste has not undergone any significant changes since 2010. The number of air and water pollutants subject to charge rates is extremely high, which raises the issue of the resources required to administer this system relative to the environmental benefits. In fact, there is no supportive evidence for any significant environmental effectiveness of this charging regime. Charge rates, which have remained unchanged for some two decades in the presence of high cumulative inflation, are too low compared with the marginal abatement costs of any significant pollution reduction.

The system of charge rates is combined with annual limits for pollution and waste generation that do not appear to be binding constraints on the operations of enterprises, given that they are based on actually installed technologies. The main function of these pollution and waste charges is to generate

government revenue, mainly for financing general environmental expenditures.

Recommendation 3.1:

The Government should:

- (a) *Review the number of pollutants subject to charges and limit them to major priority pollutants;*
- (b) *Raise pollution charge rates to levels that create effective incentives for significant pollution abatement measures;*
- (c) *Replace charges on industrial waste generation with effective waste management charges to create incentives for waste minimization;*
- (d) *Complement the system of reformed pollution and waste charges with a system of permits that impose strict limits on emissions and discharges of other pollutants, notably those that are of toxic nature, including toxic industrial waste.*

Besides the tax on emissions of atmospheric air pollutants from stationary sources, the Government also levies a tax on mobile sources of air pollution in the form of an excise duty on motor fuels. Although the tax rate was raised in 2014, it is still very low and unlikely to promote emission reductions from road motor vehicles. Rates are also not differentiated based on fuel quality, notably as regards the sulphur content of diesel. Another indirect tax on mobile sources of air pollutants is an excise tax on the volume of imports and domestic production of motor fuels, but it is also too small to make a difference with regard to environmental impacts from motor vehicles.

Recommendation 3.2:

The Government should raise excise tax rates on motor fuels as well as differentiate them based on fuel quality standards (sulphur content).

Tariffs for services provided by municipal utilities (water supply and sanitation, waste collection) have been raised significantly for all customer categories since 2010. The important feature of the tariff regime is, however, for tariffs applied to legal entities, notably enterprises, to be significantly higher than household tariffs. This points to a continuing system of cross-subsidies in favour of the population, for whom the low-cost provision of communal services has been regarded as part of social policy. In the event, total revenues collected by municipal utilities are largely insufficient for recovering operating costs.

A major problem is that most households are not yet equipped with water meters, although significant progress with the installation of meters has been made in urban areas. Water meters are central to reforming the water sector on the demand side, because without meters there are no incentives for more economical use of water. The installation of meters is, moreover, a necessary condition for the introduction of cost-reflective household tariffs.

Tariffs for electricity supply, which has remained a state monopoly, were also, in general, on an upward trend in recent years. Average tariffs, however, are not cost reflective, with household tariffs continuing to be significantly lower than tariffs applied to industry. Low household tariffs, below the cost recovery level, are regressive because they benefit mainly above-average-income earners. Within the industrial sector, moreover, privileged seasonal tariffs are granted to TALCO, the state-owned aluminium company, which is the largest single electricity consumer in the country. Privileged seasonal electricity tariffs are also granted to water pumping stations that ensure supply of irrigation water for agriculture. The upshot is that Barki Tojik, the state electricity company, has been unable to cover its operating costs with the revenues collected. Revenues were also adversely affected by volatile bill collection rates for households and other customer groups.

A common feature of both municipal services (water supply, waste collection) and electricity supply is the lack of specific tariff methodologies for determining full cost recovery tariff levels.

Recommendation 3.3:

The Government should:

- (a) *Adopt for each of the utility services a tariff setting methodology so as to be able to recover all costs incurred in provision of these services;*
- (b) *Apply cost recovery tariffs that, combined with stringent bill collection, ensure the financial viability of service providers;*
- (c) *Introduce clearly defined and transparent targeted social support measures that ensure affordability of utility services for lower income private households;*
- (d) *Continue to support the installation of meters for household water supply services and complete the corresponding programmes as soon as possible.*

Agriculture plays an important role in the economy of Tajikistan; water for irrigation of agricultural crops accounts for more than 90 per cent of total water use. The irrigation infrastructure is in a dilapidated state because available financial resources for adequate maintenance and modernization are largely insufficient. One important factor behind this is low agricultural productivity, which is constraining the income of farmers. Another factor, partly related to this, is irrigation tariffs that are too low to allow for recovery of the costs of operation and maintenance – a feature that has been aggravated by low bill collection rates.

Recommendation 3.4:

The Government should:

- (a) *Gradually raise irrigation tariffs to cost recovery levels over a well-defined time period;*
- (b) *Support farmers who cannot afford to pay cost recovery irrigation tariffs during the transition period;*
- (c) *Support programmes for installation of water meters for gauging the water supplied by the off-farm irrigation system and water used by the on-farm irrigation systems;*
- (d) *Adopt an adequate tariff methodology for establishing cost recovery irrigation tariffs.*

See Recommendation 6.5.

State budget funds allocated to environmental protection have remained quite limited and were mainly used for financing recurrent expenditures. A more or less predictable source of financing for environmental expenditures is the earmarked revenues from the collection of pollution taxes and other earmarked charges. However, in general, these resources are too small to finance significant investments. There is a lack of information concerning the kinds of projects and measures financed from these special funds and also as regards

the criteria for evaluating and selecting them. The efficiency of the allocation of public funds is therefore difficult to gauge. There is also incomplete information concerning the revenues collected from each of the earmarked pollution taxes and other charges. A comprehensive computer database on detailed revenues and expenditures that would facilitate analysis of past revenue streams and expenditures and help improve planning for the future, is lacking in the Committee on Environmental Protection. There are also no medium-term planning processes that align environmental priorities with well-developed expenditure programmes. It is not clear when the Government expects to integrate the Committee into the Medium-Term Expenditure Framework, given the challenge to develop the necessary skills and capacities within the Committee.

Recommendation 3.5:

The Committee on Environmental Protection should develop a comprehensive and modern system for the collection and analysis of information on planned and actual revenues collected from earmarked taxes and other charges and on expenditures on environmental and nature protection purposes.

Recommendation 3.6:

The Government should:

- (a) *Establish clear and transparent criteria for allocation of scarce public funds to different uses with a view to ensuring economic and environmental effectiveness of expenditures;*
- (b) *Ensure that the Committee on Environmental Protection reports on the extent to which objectives of financed environmental projects were achieved;*
- (c) *Start developing the capacities required for the envisaged full integration of the Committee on Environmental Protection into the Government's Medium-Term Expenditure Framework.*

Chapter 4

ENVIRONMENTAL MONITORING, INFORMATION, PUBLIC PARTICIPATION AND EDUCATION

4.1 Environmental monitoring

Air quality

Tajikistan carries out air quality monitoring in Dushanbe and four towns (Khujand, Kurgan-Tyube, Spitamen and Tursunzade) (table 4.1). According to the reports of the Hydrometeorology Agency (Tajikhydromet), only one stationary ambient air quality monitoring point is operating in each of the settlements, as well as a mobile ambient air quality monitoring station in Dushanbe. Information on monitoring observations is published on a daily basis on Tajikhydromet's website (www.meteo.tj). Ambient air quality data for Spitamen in 2015 are not present on the website because ambient air quality was not temporarily monitored at this point (table 4.2). Ambient air monitoring in some towns, e.g. Spitamen and Khujand, was not conducted on a regular basis and did not strictly follow the required frequency of measurements, e.g. three times per day for non-automated measurements. Irregular monitoring and failure to monitor the ambient air quality at individual points that were operating earlier are also related to lack of fuel for making visits in order to take measurements. Also, in some of these towns ad hoc measurements are made at several points while, according to the official reports, there is only one stationary monitoring point per town.

Table 4.1: Measurements of air quality, 2013–2014, number

City	2013	2014
Dushanbe	1 795	1 942
Khujand	964	968
Kurgan-Tyube	2 430	2 232
Spitamen	140	16
Tursunzade	1 528	1 238

Source: Tajikhydromet, 2015.

Only one of the ambient air quality monitoring stations located in the territory of Tajikhydromet's Central Office in Dushanbe operates on an automatic basis; others are run manually. Ambient air quality monitoring points are basically located in the areas of hydrometeorological centres and are located far from

stationary industrial pollution sources. On some days, MACs, mainly with regard to nitrogen dioxide and dust, are exceeded. The current location of air quality monitoring points and their limited number do not allow the use of Tajikhydromet data for pollution assessment from stationary sources; rather, the data show pollution from motor vehicles and construction operations, whereas current economic development leads to establishment of new stationary sources of pollution, e.g. metal, brick and cement production, coal extraction and coal-fired power plants. These stationary sources are not properly covered by air pollution monitoring by Tajikhydromet and analytical control laboratories.

Monitoring at pollution sources themselves is conducted for four pollutants, including nitrogen oxides, carbon monoxide and hydrogen fluoride. At the boundaries of enterprises' sanitary protection zones, nine parameters are usually monitored. For most other stationary sources, ambient air pollution measurements are performed by means of mobile tools for monitoring by a limited number of parameters. In particular, an information bulletin of the Khatlon Oblast Division on Environmental Protection for the first half of 2015 includes only data on excess of dust (PM₁₀) from stationary sources. In the case of TALCO, at the sanitary protection zone boundary, concentration is measured for carbon monoxide and dioxide, nitrogen oxide and dioxide, sulphur dioxide, hydrogen fluoride, phenol and formaldehyde. In general, most attention is paid to monitoring of ambient air pollution from this enterprise operation, for which monitoring is conducted at 15 points.

Water, including drinking water and bathing water

Surface water monitoring is conducted by the Environmental Monitoring Division of Tajikhydromet located in Dushanbe and the regional laboratory in Khujand. As a rule, sampling for surface water pollution analysis is performed on a monthly basis. In general, Tajikhydromet's surface water monitoring system covers 31 monitoring points (table 4.3).

Table 4.2: Measured pollutants and published data on air pollution

City	Measured pollutants	Published data on measured pollutants*
Dushanbe	SO ₂ , CO, CHOH, NO, NO ₂ , dust	SO ₂ , CO, CHOH, NO, NO ₂ , dust
Khujand	SO ₂ , CO, NO, NO ₂ , dust	SO ₂ , NO ₂ , dust
Kurgan-Tyube	SO ₂ , CO, NO, NO ₂ , dust	SO ₂ , NO ₂
Spitamen	SO ₂ , CO, NO, NO ₂ , HF, dust	
Tursunzade		SO ₂ , NO ₂ , HF, dust

Source: Tajikhydromet, 2015.

Notes: * Observations on data published on the website of Tajikhydromet, December 2015.

Table 4.3: Monitoring points for quality of surface waters

Place	Number
Total	31
Khatlon-Vaksh River	6
Kayrakkum Reservoir	5
Sangiston	6
Yavan-Yavansu River	3
Pandema	2
Khushere-Varzob River	3
Pyanj River - Khirmanjo	2
Yahsu River - Karboztonak	1
Ziddi (Varzob River)	2
Kyzylsu River - Somonchi	1

Source: Tajikhydromet, 2015.

Surface water pollution is monitored based on 28 physical and chemical parameters, including those conducted immediately at a sampling place – temperature, smell, dissolved CO₂, oxygen and BOD₅ (biological oxygen demand). Further sample analysis is carried out in a stationary laboratory based on the following parameters: temperature, transparency, smell, colour, turbidity, NO₂, NO₃, Fetotal, pH, Eh (oxidation-reduction potential), HCO₃, SO₄, Cl, Al, Mg, K⁺, Σ, Cu, Mn, Cl₂, Cr, PO₄, Htotal and Ca. Tajikhydromet does not perform analysis of surface water samples for pesticide content, nor does it perform bacteriological analysis.

Tajikgeology carries out groundwater sample analysis for salinity, hardness, calcium, magnesium, potassium, sodium compounds, chlorides, sulphates, pH, hydrocarbonates and carbonates, nitrates and ammonium nitrites.

Laboratories of water supply facilities and of the sanitary and epidemiological services conduct drinking water monitoring on a daily basis. However, many water supply facilities do not have their own laboratories to monitor the quality of drinking water, and neither do around half of the districts' sanitary and epidemiological services. Thus, not all water supply facilities regularly monitor the quality of

drinking water. If drinking water samples are analysed by water supply facilities themselves, they are then obliged to promptly inform sanitary and epidemiological services of pollution that was identified and that exceeds prescribed standards.

Laboratories of sanitary and epidemiological services in Dushanbe, Khujand, Kurgan-Tyube, Kulob and the Gorno-Badakhshan Autonomous Oblast carry out, on a periodic basis, drinking and bathing water sample analysis for physical and chemical, virological and bacteriological indicators. Physical and chemical parameters based on which drinking water is monitored mainly include analysis for residual chlorine, combined chlorine, hardness and turbidity, but this applies to a greater extent to the water supply enterprises of major cities. In many small towns and rural settlements of an urban type, drinking water is supplied to the population along pipes from open water storage tanks. At the same time, a large part of the rural population makes use of outdoor water taps that are often not closed because that may cause the sanding up of pipes and water freezing in pipes in winter. In these conditions, drinking water is not regularly chlorinated because facilities are lacking funds for it. The quality of drinking water is monitored only occasionally due to the lack of chemical agents.

Soil

To a very limited extent, soil monitoring includes soil pollution by diffuse sources, namely pesticides and fertilizers. No data on soil monitoring are available, including on its frequency and number of samples taken. Soil pollution monitoring of dumpsites for municipal solid waste is a competence of the Service of State Sanitary and Epidemiological Surveillance of the Ministry of Health and Social Protection of the Population, and its monitoring data are not available.

Noise and vibration

Noise and vibration monitoring is within the competence of the Service of State Sanitary and Epidemiological Surveillance of the Ministry of Health and Social Protection of the Population; however, in practice, it is not conducted due to the lack of means and equipment. This type of environmental monitoring may only be conducted at large industrial enterprises in Tajikistan. Nonetheless, respective monitoring data are unavailable.

Radioactivity

Tajikhydromet conducts irregular γ -radiation monitoring, mainly in the location of its hydrometeorological and hydrological stations. The number of points for such measurements is gradually reducing, standing at eight as of late 2015. According to Tajikhydromet, monitoring data do not exceed 50 mCr/h and are constantly within normal range.

Biodiversity and forests

Forest and biodiversity monitoring are not conducted. Related data are estimated and results may not reflect the real situation in this area. Parameters related to biodiversity and forest monitoring, such as forested areas, forest species composition, reforestation and afforestation, and population size of animal and bird species, are estimated by the Forestry Agency on the territories of the state forest fund and specially protected natural areas.

Analytical laboratories

The laboratory of the Centre for Analytical Control in Dushanbe is equipped minimally. The analytical control laboratory in Tursunzade is better equipped for sample analysis performance. The laboratory of Tajikhydromet's Division of Environmental Monitoring in Dushanbe is equipped comparatively well, while its regional offices, except for Khujand, have no equipment necessary for surface water sample analysis. The laboratories of Tajikgeology

and the sanitary and epidemiological stations in Dushanbe and the oblast centres are also comparatively well equipped. However, according to the Service of State Sanitary and Epidemiological Surveillance, about 50 per cent of the sanitary and epidemiological stations in districts and towns have no analytical laboratories, as is the case with most water supply enterprises.

Assessment

The environmental monitoring system is extremely underequipped. Published monitoring data and indicated frequency of sampling raise doubts because measuring at remote monitoring points is not in place.

In particular, the equipment of the analytical control laboratory in Dushanbe and laboratories of regional offices of Tajikhydromet consists of very old muffle furnaces and analytical balances, test pipes, retorts and a few mobile measuring devices. The laboratories do not have adequate capacity to serve the existing monitoring networks as they often lack fuel to carry out regular sampling at remote monitoring points.

4.2 Environmental information and data reporting*Data reporting by enterprises*

According to the Committee on Environmental Protection, about 60 enterprises conduct self-monitoring. Enterprises do not submit self-monitoring data on a regular basis to the Committee on Environmental Protection; however, these data are available during inspections. At the same time, enterprises provide data on a quarterly basis to the Committee on payment of environmental pollution charges, which allows verification of compliance of reported volumes of emissions with the limits prescribed in the permits.

Statistical data

Along with self-monitoring data, enterprises must submit a number of statistical reports to the Agency of Statistics. The Agency collects and processes statistical data in accordance with an annual programme. The annual programme, approved for 2016 by the 2015 Resolution of the Government No. 613, includes reporting by enterprises on:

- Ambient air protection (annual reporting forms 2-tp (air) and 2-atmosphere);

- Natural and man-made emergencies and emergency response and prevention measures (semi-annual reporting form 1-emergencies);
- Solid municipal waste (annual reporting form 1-waste);
- Specially protected natural areas (annual reporting form 1-reserves, preserves).

Statistical data on air emissions from individual stationary sources are not disclosed, but public access is provided to aggregated data on air pollution by both selected pollutants and regions, as well as on amounts of financing of measures to prevent and reduce ambient air pollution. Available statistical data on solid municipal waste have to date covered only total volumes of such waste generation, and also, separately, volumes collected in markets, by street and park cleaning, and generated by transport and other enterprises. Statistical information on natural and man-made emergencies includes their total number by year, type, number of damaged facilities and number of families that needed to be relocated as a consequence of an emergency.

In 2010, the Agency of Statistics suspended the collection, and thereafter the dissemination, of statistical reporting data on water (reporting form 2-tp (water economy)) and does not include relevant data on the annual programmes of statistical works. The Agency explained that, currently, it is able to cover this by reporting on just a proportion of water users. This, therefore, could not serve as a reliable source of information. In general, instead of data collected through statistical reporting the Agency often uses data collected from the so-called administrative data sources, i.e. obtained upon request from the environmental monitoring, regulatory and enforcement authorities, as well as calculations and measurements conducted by environmental experts. For instance, the Agency of Statistics includes in statistical books such data from national inventories of greenhouse gas (GHG) emissions and removals by sinks, monitoring data on biodiversity and forests, and monitoring data on drinking water supply and sanitation.

Databases and data processing

The Committee on Environmental Protection collects information and data from its territorial bodies, on 18 reporting forms, on a monthly basis. Also, every month, Tajikhydromet presents information to the Committee on the observations of environmental pollution monitoring.

Tajikistan lacks environmental pollution databases. According to the Committee on Environmental

Protection, the water cadastre has not been maintained since 2005, and there are no databases on air pollution and waste.

Monitoring information is, to a large extent, collected and processed manually, e.g. graphs are drawn and data are entered from hardcopy reports into a computer. Information from monitoring stations is sent via text messages using mobile phones or by email. This is accounted for by both the inadequate provision of computer equipment and regular power cuts. The Agency of Statistics collects and processes basic statistical data, except for ambient air pollution, manually, i.e. typing them from reports presented in hard copy.

Environmental indicators and their use

Currently, the systems of environmental monitoring that are managed by Tajikhydromet and the analytical laboratories of the Committee on Environmental Protection and the Service of State Sanitary and Epidemiological Surveillance of the Ministry of Health and Social Protection of the Population, as well as by the Forestry Agency and Tajikgeology, cover the very limited number of key environmental indicators that are included in the Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia (now referred to as Online Guidelines for the Application of Environmental Indicators, ECE). No reliable monitoring systems are in place to enable the use of recommended environmental indicators, e.g. water losses, fertilizer consumption or passenger transport demand. Hence, there is no significant progress with the implementation of the Guidelines.

For instance, in the case of environmental indicators on air emissions, ambient air quality in urban areas or drinking water quality, monitoring networks are in place but the regime of their operation is very limited, due to the lack of financial, technical and human resources. For instance, it does not cover at all PM_{2.5} and ground-level ozone (O₃) in ambient air of urban areas covered by monitoring, and air emissions monitoring from most stationary sources is limited to nitrogen oxides, carbon monoxide, hydrogen fluoride and sometimes even to dust only. For the same reason of lack of resources, the monitoring of drinking water quality covers a limited number of sampling points in the system of centralized and decentralized drinking water and frequency of sampling is extremely insufficient. A relatively better situation is observed with the setting and implementation of recommended environmental indicators on consumption of ODS and GHG emissions, because of their regulation and

international support under the regimes of the Montreal Protocol to the Vienna Convention for the Protection of the Ozone Layer and the United Nations Framework Convention on Climate Change (UNFCCC).

Basic Shared Environmental Information System (SEIS) principles are not implemented. For example, sharing information with others for many purposes and maintaining the readiness of data and information for provision to public authorities, enabling them to easily fulfil their legal reporting obligations, are not applied in relation to monitoring data and statistics. For example, although Tajikhydromet and the Centre for Analytical Control of the Committee on Environmental Protection perform sampling for environmental monitoring over a very wide area covering Dushanbe and districts under republican subordination, and carry out monitoring even beyond these areas, these data are not published, publicly accessible or shared. Only aggregated data are available to the public or shared with other public authorities, and are more or less designed to make comparisons at the levels of countries, regions and settlements.

Most of the monitoring data and data on environmental enforcement are inconsistent or not comparable because the sources of data are frequently changing or not compatible. The limited data and information are not stored electronically but are available only in paper form. Often, the environmental information is available only to a very limited number of governmental employees and, since almost all the information flows are vertical, data are not available horizontally to other public authorities at the same management level.

Pollutant Release and Transfer Register (PRTR)

In the period 2011–2013, Tajikistan participated in the project "Enhancing Capacity Building for the Development of the National Registers of Pollutant Release and Transfer in Two Countries in Transition: Republic of Belarus and Republic of Tajikistan under the Aarhus Convention", supported in the framework of the Strategic Approach to International Chemicals Management. The main results under this project include:

- Review of the existing national reporting system on pollutant releases and transfer;
- Development of a preliminary list of enterprises and pollutants according to the annexes to the Protocol on PRTRs;

- Preparation of the draft legal documents for accession to the Protocol;
- The holding of several round tables, meetings and seminars for stakeholders and NGOs, by Aarhus centres in Dushanbe, Kurgan-Tyube, Sarband and Khujand.

However, no PRTR is yet established and the absence of financial resources is indicated as the main reason for this.

4.3 Publication and use of environmental information and state of the environment reports

Dissemination of environmental information has improved as compared with 2010; this applies in particular to the Committee on Environmental Protection. Its Environmental Information Centre prepares twice-yearly environmental information bulletins with data on control activity and environmental monitoring. Some regional divisions of the Committee on Environmental Protection also issue information bulletins containing environmental data, e.g. the office in Kurgan-Tyube publishes bulletins twice a year. In addition, the Committee publishes two print editions for the wider public, namely, "Inson va Tabiat" (Human and Nature) newspaper 1–2 times a month with a circulation of 1,000 copies, and the quarterly "Hifzi Tabiat" (Nature Protection) magazine with a circulation of 500 copies. Also, compared with 2010, the Committee is more actively working on dissemination of environmental information through mass media. The Committee hosts an ecojournalists' club as a monthly forum for journalists to hold meetings and discussions with representatives of the Committee.

The Committee on Environmental Protection maintains a website (www.hifzitablet.tj), where it posts information on the Committee, the National Ozone Centre, and environmental projects, along with news in the area of environmental protection, the texts of some environmental conventions, and legislative acts and programmes. However, the content of the website is still limited.

Tajikhydromet's website (www.meteo.tj) contains information about the organization, its publications, texts of some legislative documents and programmes, and, on a daily basis, data of ambient air pollution monitoring, weather forecasts and warnings on extreme weather events. Tajikhydromet also publishes the *Yearbook of Ambient Air, Water and Radiometry Monitoring* and *Yearbook of Water Quality Monitoring*.

On its website (www.stat.tj), the Agency of Statistics provides free access to electronic copies of its statistical books, thereby improving public access to statistical data. Previously, hard copies of these publications were unaffordable for the public, e.g. the statistical book *Environmental Protection in the Republic of Tajikistan* costs approximately US\$20.

Other public authorities actively disseminate environmental information on a more limited basis. Sanitary and epidemiological services provide monthly reports to local executive authorities, and prepare for the Government an annual review of the sanitary situation that specifies the number of monitoring facilities, number of inspections and administrative measures against offenders. The Agency for Standardization, Metrology, Certification and Trade Inspection under the Government provides access, on request and for a fee, to the texts of national, intergovernmental and international standards in hardcopy or electronic form.

The report on the state of the environment was last published in 2010. In early 2016, the Agency of Statistics began to establish an online state of the environment report (www.gksintranet.tj/ecostat/). However, not all data are available in the online report; available data mostly concern air pollution, climate and biodiversity.

Use of environmental information in decision-making

In general, environmental information collected by public authorities for decision-making purposes flows upwards through periodic (monthly, quarterly, semi-annual and annual) reports. The use of environmental information in decision-making does not have a systemic character. In most cases, environmental information is considered primarily to be information about non-compliance with payment of environmental pollution charges, data from reports by enterprises and the results of state analytical control of pollution from sources with an excess of prescribed standards. Other environmental information is used mostly for planning long-term measures in strategies, programmes, plans and policies.

Environmental information related to events of imminent threat to human health or the environment is used by the central government and local executive authorities to take immediate action. It includes, inter alia, weather forecasts and information on extreme weather events from Tajikhydromet and information on the sanitary and epidemiological situation from sanitary and epidemiological authorities. Such

environmental information circulates from subordinated organizations to superior ones, as well as directly from regional departments of relevant monitoring authorities to local executive authorities. It enables local executive authorities to take measures to prevent or mitigate harm arising from threats.

4.4 Availability of and access to information

Public environmental authorities make environmental information on their activities publicly available through their websites and thematic publications, as well as by dissemination through mass media. Public access is provided free of charge to electronic copies of statistical books, texts of some legislation, strategies, plans and programmes, international environmental agreements and news on environmental activities. Full access to legislation, policies, plans and programmes, texts of international and national standards, and paper copies of statistical books is provided for fees that are often too high for the general public to pay. For example, the online legislative database "Adlia" (www.adlia.tj) charges a minimum fee equivalent of around US\$30 for access to up to five documents.

Public requests for access to environmental information ("passive" access) are not common. The annual average number of public requests for environmental information submitted to the central office of the Committee on Environmental Protection is less than one hundred. Most of those concern access to information on environmental activities by public authorities, in particular on taking measures to prevent, control and reduce environmental pollution and nuisance from environmental factors (odour, noise). This type of environmental information is provided to the public free of charge.

No regular functions of public authorities are established to collect and analyse environmental information on the state of human health and safety, conditions of human life, or cultural sites that are affected or may be affected by hazardous factors or activities.

Environmental analyses necessary for environmental decision-making are very limited. Information on factors affecting or likely to affect elements of the environment, such as pollutants, energy, noise, radiation, etc., remains incomplete and sparse, being ill managed by public authorities. For instance, data on emissions of environmental pollutants from stationary and mobile sources are not easily available, with the exception of a few large emitters such as TALCO and Anzob Mining and Concentration Plant. Reporting to the Committee on

Environmental Protection is focused on the collection of charges rather than on data and information processing and analysis for entry into databases or cadastres to support decision-making. Furthermore, statistical reporting maintains as confidential the data on air emissions from individual emitters and does not cover discharges of pollutants into water.

4.5 Public participation

Environmental NGOs

According to the Ministry of Justice, more than 2,600 NGOs were registered in Tajikistan in 2015. However, most of them are not currently operational due to the lack of funding and reduction of NGO grant programmes by international and foreign donor organizations. Fewer than 100 operational NGOs are dealing with environmental issues and there are no established programmes for their funding from the national or local budgets. The Committee on Environmental Protection and the Forestry Agency cooperate actively with a number of environmental NGOs, e.g. by undertaking joint public environmental awareness campaigns and joint actions such as planting trees and conducting seminars and training on various environmental issues. Other public authorities are less used to cooperation with environmental NGOs and activists.

Public participation

Public participation in EIA/SEE

In the current EIA/SEE system, public participation as a mandatory element of the procedure is envisaged only at the EIA stage (chapter 2). At the SEE stage, the possibility of public participation is provided through the so-called public ecological expertise, which is rarely conducted in practice.

Public participation in EIA continues to be limited and is mainly organized as part of the projects co-funded by international financial institutions. Examples of projects involving public participation in EIA include:

- Rehabilitation of Vose–Khovaling road and asphaltting of the second layer of the Sairon–Karamik section (2013);
- Development of the 3,600 MW Rogun HPP (2013–2014).

According to the environmental and social impact assessment reports for the Rogun HPP project, public participation in decision-making was organized in two stages. In 2013, meetings with representatives of

national and international NGOs were held, mainly in relation to resettlement and biodiversity conservation of Tugai ecosystems along the Amu Darya River. In August 2014, prior to finalization of the assessment reports, two public meetings were held in the cities of Rogun and Dushanbe, involving approximately 500 participants.

It is worth mentioning efforts taken by seven Aarhus centres with the support of the OSCE Office in Tajikistan on expansion of opportunities for public participation in decision-making on certain types of activity, in accordance with the requirements of article 6 of the Aarhus Convention. In particular, the Khujand Aarhus Centre actively promotes public participation in decision-making on the shutdown of uranium tailing dumps in Istiklol (formerly, Taboshar). The Aarhus centres in Dushanbe, Garm and Kurgan-Tyube conduct training on public participation in EIA and arrange public discussions of various environmental aspects of the activities of public authorities and companies.

Public participation in permitting

Public participation in environmental permitting is not provided for under national legislation.

Public participation in strategic planning and legislation

A more common practice is public discussion of draft laws and strategic documents (programmes and action plans). For example, such public discussion was organized on laws on environmental protection and ecological expertise adopted in 2011 and 2012, respectively, and on the draft environmental code in 2015. An example of public participation in decision-making on plans and programmes in relation to the environment is the discussion of the draft action plan on adaptation to the consequences of climate change, held by the Committee on Environmental Protection in November 2015. At the same time, according to NGOs, weak points of public participation in adoption of strategic documents are the failure to provide access to draft documents under discussion and the fact that public consultation results are not always taken into consideration by decision-makers.

Public participation in GMO-related decision-making

There is no practice of public participation in GMO-related decision-making. The procedure for permitting the deliberate release of GMOs into the environment is established by the national legislation but was never triggered. It is likely that the main

obstacle to this is the absence of laboratories to identify GMOs and study the risks associated with their release into the environment. In general, there is no GMO-related decision-making in place and thus, no public participation in it.

Access to justice

The public seldom takes up opportunities for access to justice on environmental matters. However, NGOs have sometimes challenged in the courts the denial of requests for environmental information, some of which cases were won e.g. in Sughd Oblast. More common is the practice of administrative review of complaints by representatives of the public on environmental matters. One example is provided by the website of the information service in Dushanbe (www.mometavonem.tj), where online complaints are filed on municipal services for the population, including those relating to the environment. The public has started to actively use this online service since 2014, with most complaints regarding the lack of power and drinking water, street cleaning, removal of solid municipal waste, and non-functioning sewerage systems. The Committee on Environmental Protection also maintains a hotline by means of which residents of Dushanbe and the districts under republican subordination can discuss various environmental matters. Every year, the hotline receives approximately 80 calls from residents, whose complaints mainly relate to illegal waste dumping, solid municipal waste burning, and the felling of trees.

4.6 Environmental education and education for sustainable development

Preschool

At preschool level, the main work on raising children's environmental awareness is carried out in kindergartens. It includes representatives of district units of the Committee on Environmental Protection meeting children and the organization of drawing contests on environmental topics. Such events are held especially during preparation for and on World Environment Day, 5 June. For example, employees of the Khatlon Oblast Division on Environmental Protection conducted 27 meetings with kindergarten children in 2015.

Primary school

To support environmental education, representatives of the Committee on Environmental Protection also meet children and organize children's drawing contests in primary schools. A number of subjects

related to environmental topics are included in the formal school curricula, e.g. Natural History is a subject in the primary school curriculum, focusing on an introduction to basic knowledge on the environment and natural phenomena.

Secondary school

The main subjects included in the school curriculum and aimed at environmental education in secondary schools are:

- Ecology (grade 9);
- The Environmental and Social Geography (grade 9);
- Nature and Natural Resources of Tajikistan (grade 10).

According to NGOs, textbook supply has improved slightly, e.g. a textbook on ecology was republished in 2014. Nevertheless, most of the educational materials being used do not include many key contemporary environmental topics. Another weak point of formal environmental education is the limited approaches to and capabilities for teaching lessons aimed at developing children's practical abilities and skills related to environmental protection and natural resources conservation.

Vocational training

The curricula of vocational schools also include ecology and some environmental topics. The current focus in the system of vocational training is on access to it for girls and socially vulnerable groups. Also, the relevant educational institutions are managed by the Ministry of Labour, Migration and Employment of the Population, and the main thematic priorities for the Ministry are associated with market-oriented education and pre-employment of potential migrant workers to make them more competitive and strengthen their capacities for social integration in their countries of destination. At the end of 2015, the ADB initiated a US\$32 million project to support the improvement of infrastructure and quality of the vocational training system in the country.

Higher education

Several universities train students in environmental specializations; in particular, Tajik National University trains ecologists, Tajik State Pedagogical University trains teachers of ecology and Tajik Technical University trains environmental engineers. The Russian-Tajik Slavic University participates actively in promoting environmental education in its curricula. Tajik National University provides the core

course General Ecology for students of 18 faculties, to develop understanding of the basics of environmental protection, specially protected areas, nature use and environmental law. The curricula of eight universities include Human Development, a course developed with the support of UNDP, which has one module dedicated to environmental development. A special teaching manual for this course, published in 2014, includes sections on environmental and gender aspects of human development and the roles of civil society organizations, local communities and the private sector in the promotion of human development.

Some universities have developed action plans to contribute to implementation of the 2015 State Comprehensive Programme of Development of the Environmental Awareness and Education of the Population for the period until 2020. For example, the main focus of Tajik National University's action plan is on raising public environmental awareness by conducting conferences and seminars, and more active involvement by university teachers and students in educational work outside the university.

Training and in-service training

Teacher training

Specialized NGOs, with the participation of national centres for teacher retraining, are working on delivery of professional development for teachers on environmental and sustainable development matters, e.g. the public association Little Earth is actively working in this direction. During the 2013–2014 academic year, jointly with the Dushanbe Professional Development Centre for Teachers (a department of the Institute for Training of Teachers of the Ministry of Education), Little Earth organized seminars and workshops on environmental education, energy saving and climate change for Dushanbe's teachers of biology and ecology. In November 2015, it conducted a workshop on environmental education together with the Committee on Environmental Protection.

Civil servants

The Institute of Public Administration under the President conducts professional development courses for civil servants; however, environmental topics are poorly integrated into them. Until 2010, the Institute conducted a course on the Environment and Sustainable Development, but teaching was terminated on expiry of the Memorandum of Understanding with the UNDP. With the Institute of Professional Development for Customs Officers, the

Institute of Public Administration conducted a professional development course on working with ODS, and it is planned to integrate this topic into specialized college curricula.

From time to time, some employees of the Committee on Environmental Protection take training courses in the Institute of Public Administration. Courses are also organized as part of the various projects of international and donor organizations. However, such opportunities for professional development are not regular, often limited to the narrow topic or topics of international projects and available only for a limited number of the Committee's employees. Other public authorities have no systems of training on environmental issues.

Private sector and state-owned companies

Training and in-service training on environmental matters for companies is not yet widespread in Tajikistan, and there are rare examples of initiatives in this area. One such example is the creation, with the assistance of the National Ozone Centre of the Committee on Environmental Protection, of four training centres in Dushanbe, Khatlon Oblast, Sughd Oblast and Gorno-Badakhshan Autonomous Oblast to train personnel of companies providing refrigerator and freezer sales and servicing. Such training is compulsory for obtaining a licence to work with refrigerators and freezers containing ODS.

Informal education

Informal education is supported by the efforts of specialized NGOs, Aarhus centres and employees of regional and district departments of the Committee on Environmental Protection. In the case of the Committee, such work is one of the main functional responsibilities of information sections of regional divisions of environmental protection and environmental inspectors. Staff responsible for information work produce monthly reports on this area of activity. Public authorities other than the Committee on Environmental Protection do not carry out active work on informal and non-formal environmental education.

The main forms of activity in this area are public meetings, contests and exhibitions on various environmental topics held in kindergartens, schools, and medical and teacher training colleges. These are considered the most accessible venues, given regular power cuts and the unavailability of Internet connection and unaffordability of printed publications for the majority of the population. Work on raising the environmental awareness of the public

is aimed at solving problems with municipal solid waste, drinking water safety and the felling of trees for firewood and cooking, and promoting energy efficiency, water saving and more environmentally sound technologies in agriculture.

Education for sustainable development

Activities related to education for sustainable development (ESD) are only implemented by NGOs and the Committee on Environmental Protection with the support of international and donor organizations such as the UNDP, ADB and the Regional Environmental Centre for Central Asia. This work relates to including various ESD topics in curricula and courses at different levels of the formal educational system, e.g. on the issues of energy efficiency, waste management and climate change.

Textbooks and teachers' guidance materials for ESD are almost non-existent. In 2014, UNDP, in cooperation with several higher educational institutions, published the textbook *Sustainable Development*, which responds to the needs of bachelor's, master's and PhD programmes in ESD. The course Sustainable Development is integrated into the curricula of eight higher educational institutions.

4.7 Legal, policy and institutional framework

Environmental monitoring

Legal framework

The 2011 Law on Environmental Monitoring defines the following goals:

- Observation of the state of the environment, including at the location of sources of anthropogenic impact, and observation of such sources' environmental impacts;
- Assessment and forecast of changes in the state of the environment under the influence of natural and anthropogenic factors;
- Meeting the needs of the State and the public for reliable information about the state of the environment and changes to it, in order to prevent and reduce unfavourable consequences of such changes.

The 2013 Resolution of the Government No. 571 defines the Committee on Environmental Protection as the "authorized state body" for environmental monitoring. Based on the 2011 Law on Environmental Monitoring, the Committee is thus the national authority responsible for the organization

and management of a Consolidated State System of Environmental Monitoring and maintaining the state register of environmental monitoring objects.

For the purposes of implementing provisions of the 2011 Law, the 2014 Resolution of the Government No. 791 defines the Procedure of organization of the Unified State Environmental Monitoring System and on the state register of environmental monitoring objects. Thus, an attempt is being made to create a system that will cover the sources of anthropogenic impacts on the environment, state of elements of the environment (ambient air, water, soil, land, underground resources, fauna, flora, ecosystems as a whole, landscape and natural sites, genetic resources) and environmental conditions of human settlements. This initiative provides for the creation of national, regional and local centres of state environmental monitoring, which would gather environmental monitoring data collected by various public authorities and organizations, as well as natural resource users.

It is unlikely that the consolidated system will cover other national authorities that deal with environmental monitoring, e.g. the Ministry of Health and Social Protection of the Population, the Ministry of Agriculture and Tajikgeology, since there are no explicit provisions in this regard in the legislation on environmental monitoring. Also, the legislation does not address the key issues on how the environmental monitoring data collected will be shared with other public authorities and made publicly available. However, the system is currently at the initial stage of implementation only, and thus it is still difficult to evaluate further aspects of its development.

Policy framework

The National Development Strategy for the period until 2015 emphasizes the overall weakness and inefficiency of environmental monitoring in the country and the need to improve it. It refers to 4,000 environment pollution sources. However, there are no clearly defined expected outcomes in terms of the environmental monitoring system and use of relevant data for decision-making.

The State Environmental Programme for the period 2009–2019 (2009 Resolution of the Government No. 123) defines a task of improvement and expansion of the analytical control and environmental monitoring system.

The Environmental Monitoring Programme for the period 2013–2017 (2012 Resolution of the

Government No. 685) includes measures on enhancement of the legislative and institutional framework, the creation of new monitoring points and provision of technical equipment for existing monitoring points, the strengthening of analytical laboratories for conducting sample analysis, and improvement of the information and data storage system based on environmental monitoring observations. Financing of the respective activities has not increased considerably, compared with 2010. The total budget of this Programme, in the amount of 17.2 million somoni, provides for allocating 5.56 million somoni from the state budget and raising the remaining funds for implementation from international organizations and foreign donors. In 2014, a hydrometeorological centre was created and equipped in Kulob, but it has not yet been in operation because it failed to recruit staff. A meteorological station in Maikhura was built with funds from this Programme. In practice, financing from this Programme primarily allows for operational expenditures related to conducting state environmental monitoring to be covered.

The Programme of Recovery of Hydrometeorological Stations and Hydrological Posts for the period 2007–2016 (2006 Resolution of the Government No. 408) is still valid. It is aimed at modernizing the equipment of the hydrometeorological and environmental monitoring system, establishing new stations and posts, and mobilizing resources for the implementation of these planned activities. The total budget of this Programme amounts to 14.4 million somoni. However, implementation is rather weak, as evidenced by the state of environmental monitoring in the country.

Institutional framework

The Committee on Environmental Protection continues to play the role of a key public authority in relation to conducting state environmental monitoring. It manages the systems of monitoring of surface waters and ambient air, as well as pollutant emissions into ambient air, water and soil from stationary and diffuse pollution sources. The Division of Monitoring and Environmental Policy is directly included in the structure of the central apparatus of the Committee, and performs the functions of monitoring data consolidation and analysis, as well as creation of a Consolidated State System of Environmental Monitoring.

The main functions of the Committee in the area of monitoring are performed by the Hydrometeorology Agency (Tajikhydromet) for background monitoring,

and by analytical laboratories for monitoring of stationary and certain diffuse pollution sources. Tajikhydromet has been transformed from the State Institution on Hydrometeorology to the Hydrometeorology Agency, but, in practice, this resulted only in increasing the number of its employees with the status of government official (civil servant) and, accordingly, had an influence only on the level of their salaries. The Hydrometeorology Agency includes the National Hydrometeorological Centre and Division of Environmental Monitoring in Dushanbe, regional hydrometeorological centres in Khatlon Oblast, Sughd Oblast and Gorno-Badakhshan Autonomous Oblast, and also centres of climate and ozone-layer research, automated communications and glacier study. The Division of Environmental Monitoring in Dushanbe implements its functions in both the capital and the districts under republican subordination.

Analytical control laboratories of the Committee are located in Dushanbe, Khujand, Kulob and Kurgan-Tyube. The laboratory in Dushanbe is subordinated directly to the Committee, while regional laboratories are part of the territorial divisions of the Committee. Monitoring of pollution sources in the districts under republican subordination is conducted by the laboratory of the Centre for Analytical Control in Dushanbe, while TALCO's emissions are monitored by a special unit of the analytical control laboratory located in Dushanbe.

Unlike the situation in 2010, the competence of the Committee does not now include the monitoring of forests and biodiversity. Since 2014, the Forestry Agency is responsible for forest and biodiversity monitoring, which is handled by the state forestry institutions and the State Institution of Specially Protected Areas (chapter 8).

Groundwater pollution monitoring is a competence of the Main Administration on Geology under the Government (Tajikgeology), whose structure has not essentially changed since 2010. The Kayrakkum Integrated Geological Branch and the South Hydrogeological Branch conduct groundwater monitoring in the Sughd Oblast and in other parts of the country, respectively.

Sanitary and epidemiological stations of the Ministry of Health and Social Protection of the Population, represented on the level of regions and districts, conduct monitoring of drinking and bathing water pollution, and air pollution in the workplace. They are also responsible for monitoring of noise and vibration.

Information, access to information and public participation

The 2011 Law on Environmental Information defines environmental information as documented information containing data on the state of the environment and environmental impact, measures to protect the environment, and also on human exposure to environmental impact, which composition is defined by this Law, other regulatory legal acts and international agreements to which Tajikistan is party. The Law describes "passive" access to information as the right of the public to get access to existing information upon request and "active" access to information as the duty of public authorities to collect and disseminate information upon their own initiative. Before adoption of this Law, access to environmental information was regulated by more general provisions of the 1993 Law on Nature Protection, 2006 Law on Citizens' Appeals and 2008 Law on Access to Information. The procedure for passive access to information is still based on the provisions of the 2006 Law on Citizens' Appeals and 2008 Law on Access to Information, while the 2011 Law on Environmental Information specifies the scope of environmental information, provides the legal framework for active access to information and defines the obligation of public authorities to disseminate environmental information.

In addition to the 2011 Law on Environmental Information, the grounds for refusing disclosure of information to the public are defined by a number of laws, including the 2014 Law on State Secrets (providing confidentiality of information on international relations, national defence and public security), 2005 part 3 of the Civil Code (providing confidentiality of commercial and industrial information and protection of intellectual property rights), 2001 Law on Informatization and 2010 Law on State Statistics (providing confidentiality of personal data and protection of interests of third parties). However, some of those laws require dealing with confidentiality in a restrictive way, e.g. art. 21, para. 2. of the Law on State Secrets requires that information on the state of the environment and human health shall not be treated as confidential.

The current legislation on access to environmental information shows some gaps. For example, it does not regulate access to information in relation to the EIA procedure. The absence of established procedure and requirements for active access to environmental information is making public participation in environmental decision-making processes ineffective, even when such opportunities are provided to the public. Another rather controversial legal document

is the Procedure for compensation of the costs of provision of information by public authorities (2009 Resolution of the Government No. 610). It provides rather broad discretionary power to public authorities for calculation of a charge for supplying information. On the one hand, this document determines that the main costs for compensation are costs to make a copy of the requested information and to send it by post; on the other hand, it provides controversial exemptions for information having commercial value and for organizations dealing with provision of information for a charge.

Public participation in decision-making and policymaking relating to the environment is regulated by the 2011 Law on Environmental Protection, 2012 Law on Ecological Expertise and 2014 Procedures for the organization and conduct of environmental impact assessment (2014 Resolution of the Government No. 509). The Law on Environmental Protection stipulates public participation rights in decision-making on specific activities and in decision-making on plans, programmes and legislation concerning the environment. However, the legislation does not prescribe mechanisms for public participation in decision-making on plans, programmes and legislation relating to the environment.

The Law on Ecological Expertise enables citizens and NGOs to participate in decision-making on specific activities (development projects). In accordance with this Law, public ecological expertise is recognized and is the main legal way to fulfil the right of public participation on specific activities. It can be initiated by one or more environmental NGOs and/or a group of citizens as a parallel process to the SEE. Also, the Law requires public participation in EIA of new projects and activities that may affect the environment, while the 2014 Procedures stipulate the provisions on how public participation should be ensured in the EIA procedure. Although, formally, the provisions on public participation are applicable to all categories of projects, in practice, they are mostly used for projects co-funded by international financial institutions. According to the Law on Ecological Expertise, NGOs have the right to recommend their representatives for participation in the SEE, but no mechanisms of such involvement are developed.

With regard to public participation in GMO-related decision-making, the 2005 Law on Biological Safety sets the requirements for public notification on the accidental release of GMOs into the environment. It also sets the procedure of public participation in decision-making on the import and subsequent

release of GMOs into the environment and their placing on the market. The Law establishes the time frames, such as 10 days for public notification and 30 days for submitting comments by representatives of the public. However, it is not clear whether the procedure of public participation is applicable to decision-making on the deliberate release of GMOs into the environment and placing of GMOs on the market outside the decision-making on the import of GMOs.

The main legal act that regulates the establishment, registration and activities of NGOs is the 2007 Law on Public Associations. This Law was amended in 2015 by the provisions on foreign funding of NGOs, which require the registration of such sources of funding in the Registry of Humanitarian Aid.

The Committee on Environmental Protection is the key public authority that promotes access to environmental information and public participation in environmental decision-making processes. Functions for the collection and processing of environmental information are fulfilled by various departments of the Committee, while the Environmental Information Centre, subordinated to the Committee, and territorial bodies of the Committee disseminate and publish that information.

Environmental education and education for sustainable development

The 2013 Law on Education sets the legal framework for state policy on development of education and regulates institutions of formal education. The 2010 Law on Environmental Education of the Population addresses the integration of environmental education and awareness into the educational system.

The policy framework for the development of education is established by a number of strategies and programmes. The State Programme for Development of Education for 2010–2015 (2009 Resolution of the Government No. 254) addresses the needs of all levels of formal education, but it does not deal specifically with environmental education and ESD. The State Programme for Development of Professional Education for 2008–2015 (2007 Resolution of the Government No. 529) covers vocational training, higher education, postgraduate education and the training of teachers. One of its main goals is to ensure that adequate tools and materials for the education of students are accessible. The State Programme for Development of Preschool Education for 2012–2016 (2011 Resolution of the Government No. 457) provides, among other matters,

for establishment of pre-school institutions with an ecological focus.

The State Comprehensive Programme of Development of the Environmental Awareness and Education of the Population for the period until 2020 promotes raising public environmental awareness in and through institutions of formal education, as well as communities, families, the media and NGOs. This Programme goes beyond the framework of formal environmental education and covers both informal and non-formal environmental education. The Committee on Environmental Protection pays much attention to implementation of activities under this Programme, but no financing from the budget is provided for them.

The Ministry of Education is the key public authority for development and implementation of state policies in institutions of formal education, while the Committee fulfils this role with regard to raising the environmental awareness of communities, the media and NGOs. The Committee also works actively on the environmental education of pupils from kindergartens, primary and secondary schools and colleges. Also, the Ministry of Labour, Migration and Employment of the Population deals with the system of vocational training, and its Department of Primary Vocational Training and Education for Adult People is responsible for policymaking in this area.

4.8 Global and regional agreements and instruments

Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

Tajikistan has been a Party to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) since 2001. According to the 2009 Law on Normative Legal Acts, the Convention's requirements are directly applicable.

In 2003, Tajikistan signed the Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs), but has not ratified it to date. No national PRTR is in place, although a project on PRTR was implemented in the period 2011–2013. In early 2016, the Committee on Environmental Protection requested assistance from the Aarhus Convention Secretariat for capacity building and establishment of the national PRTR.

Tajikistan is not yet a Party to the 2005 Almaty Amendment on GMOs to the Convention, which refers to public participation in decision-making on the deliberate release of GMOs into the environment and the placing of GMOs on the market. The 2005 Law on Biological Safety includes some public participation requirements; however, their scope of application is not clear and there is no practical experience in implementation.

Strategy for Education for Sustainable Development

The main aim of the ECE Strategy for Education for Sustainable Development is to encourage countries to integrate ESD into all forms (formal, non-formal and informal) and levels of their education systems. The implementation of the Strategy requires the establishment by countries of policy, legal and operational frameworks to support ESD. There is no evidence of significant progress with the achievement of this objective by Tajikistan since 2010. The country regularly participates in the meetings of the Steering Committee for ESD, but did not submit any national implementation report in all three cycles of reporting on the Strategy. A national plan for implementation of the Strategy was not adopted and no relevant legal and operational frameworks supporting ESD were identified as of late 2015.

4.9 Conclusions and recommendations

The environmental monitoring networks are poorly equipped. In particular, this applies to the networks under the Committee on Environmental Protection, including Tajikhydromet, and the Ministry of Health and Social Protection of the Population. Due to poor equipment, and the lack of chemicals and fuel required to travel to monitoring points, monitoring covers limited monitoring points and monitored parameters on ambient air and water pollution. For regulatory purposes, information on compliance with requirements on air and water pollution is based mainly on calculations. Forests and biodiversity are monitored using estimating methods.

Recommendation 4.1:

The Government should strengthen the environmental monitoring networks by:

- (a) *Funding the implementation of the Programme of Recovery of Hydrometeorological Stations and Hydrological Posts for the period 2007–2016 and the Environmental Monitoring Programme for 2013–2017;*

- (b) *Adequately funding the modernization of the laboratories of the Centre for Analytical Control and regional offices of Tajikhydromet.*

There has been no visible progress with implementation of the ECE Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia. In general, the current environmental monitoring system is not indicator based. The report on the state of the environment was last published in 2010. In early 2016, the Agency of Statistics began to establish an online state of the environment report. However, not all data are available in the online report; available data mostly concern air pollution, climate and biodiversity.

Recommendation 4.2:

The Committee on Environmental Protection, in cooperation with the Agency of Statistics and other relevant stakeholders, should ensure:

- (a) *The use of key environmental indicators included in the ECE Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia;*
- (b) *That future state-of-environment reports are indicator-based.*

Since 2010, the Agency of Statistics has suspended the collection of statistical reporting data on water (reporting form 2-tp (water economy)). Some territorial units of the Committee on Environmental Protection collect data using this reporting form, as they did previously. However, comprehensive data on water use and water pollution are no longer available.

Recommendation 4.3:

The Agency on Statistics, in cooperation with the Committee on Environmental Protection, should reestablish the statistical reporting on water use and pollution covering all water users.

Environmental information is used mostly for reporting to higher levels and, to some extent, for planning some measures. It is hardly used as a tool for development and implementation of environmental policy, monitoring and evaluation of environmental performance by public authorities or providing access to information to the public for effective public participation in environmental decision-making processes.

The Committee on Environmental Protection does not maintain electronic databases for monitoring and reporting environmental data. Moreover,

environmental data are spread over numerous institutions such as the Agency of Statistics, Ministry of Health and Social Protection of the Population, Ministry of Economic Development and Trade, Ministry of Industry and New Technologies, Committee on Emergency Situations and Civil Defence, Forestry Agency, Main Administration on Geology, and Academy of Sciences.

Information on factors affecting or likely to affect the environment, such as pollutants, energy, noise, radiation and waterborne diseases, remains very incomplete and sparse, not being properly managed by public authorities; it is not disseminated to the general public, with the exception of data on air pollution in a few urban territories. Easily available environmental information is mostly limited to information published in statistical books, newspapers and journals or placed on the websites of public authorities. The Committee on Environmental Protection is in the initial phase of developing the Consolidated State System of Environmental Monitoring, which is focused on centralized collection of monitoring data from its various departments and some other public authorities, instead of establishing protocols to access data from their sources. However, it is unlikely to address the main weakness of the current system of environmental information management, such as the very limited availability of the end products to other public authorities and the general public.

The current legislation on access to environmental information shows some gaps, e.g. it does not regulate access to information in relation to the EIA procedure and provides rather broad discretionary power to public authorities for calculation of a charge for the provision of information.

Recommendation 4.4:

The Government should:

- (a) *Ensure that all governmental bodies collecting and managing environmental information and data apply Shared Environmental Information System (SEIS) principles to their respective environmental information and data;*
- (b) *Establish a "one-stop shop" portal in line with SEIS principles for environmental data and information and using geographic information system (GIS) technologies to improve the online accessibility of environmental information and data;*
- (c) *Ensure access to all environmental information in accordance with the provisions of the Convention on Access to Information,*

Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention).

Public participation in environmental decision-making processes is limited mainly to strategic environmental decisions (plans, programmes) and legislation. However, in the absence of well-established procedures for public participation in decision-making on strategic documents and legislation, the current public participation framework is not effective. Procedures for public participation in EIA remain complicated and are used to a limited extent, namely, in cases of development projects co-funded by international organizations. The modalities for public participation in SEE, through recommending public representatives for participation in SEE, are not clear, while the public ecological expertise is rarely used. The capacity of governmental bodies to ensure implementation of public participation procedures remains low.

Recommendation 4.5:

In line with its obligations under the Aarhus Convention, the Government should:

- (a) *Provide mechanisms in the legislation to ensure effective public participation in the development of plans, programmes and other strategic documents and legislation in accordance with articles 7 and 8 of the Convention;*
- (b) *Provide mechanisms in the legislation to ensure effective public participation in decision-making on specific activities in accordance with article 6 of the Convention;*
- (c) *Ensure the translation of the Maastricht Recommendations on Promoting Effective Public Participation in Decision-making in Environmental Matters to national language and disseminate them among public authorities and relevant stakeholders;*
- (d) *Undertake capacity building for public authorities dealing with public participation procedures.*

Tajikistan signed the Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs) but has not ratified it. No national PRTR is in place. In early 2016, the Committee on Environmental Protection requested assistance from the Aarhus Convention Secretariat for capacity building and establishment of the national PRTR. Participation in this international legal regime would strengthen the country's efforts to provide public access to information related to emissions into the environment.

Recommendation 4.6:

The Government should:

- (a) *Introduce legislation and institutional and technical measures required for establishing a national pollutant release and transfer register;*
- (b) *Establish a national pollutant release and transfer register;*
- (c) *As soon as appropriate capacities for implementation are available, ratify the Protocol on Pollutant Release and Transfer Registers to the Aarhus Convention.*

The country is not a Party to the 2005 Almaty Amendment on genetically modified organisms (GMOs) to the 1998 Aarhus Convention, although participation in the Amendment would ensure opportunities for the public to participate in decision-making on the deliberate release of GMOs into the environment and their placement on the market, thereby widening the application of the Convention's public participation pillar and increasing the quality of decision-making on GMOs.

Recommendation 4.7:

The Government should ratify the Almaty Amendment on genetically modified organisms to the Aarhus Convention.

Tajikistan has achieved progress on environmental education but has not yet moved towards integration of the elements of Education for Sustainable

Development (ESD) into its educational system. Some initiatives to promote ESD take place within the framework of international projects; however, there are no specific legal and policy frameworks to support ESD. The country did not submit any national implementation report under the three cycles of reporting on the ECE Strategy for Education for Sustainable Development. Textbooks and guidance materials for teachers on ESD are almost non-existent.

Recommendation 4.8:

The Ministry of Education and the Committee on Environmental Protection should:

- (a) *Develop legal and policy frameworks to support education for sustainable development (ESD), including the national implementation plan for the Strategy for Education for Sustainable Development;*
- (b) *Communicate the progress on implementation of the Strategy for Education for Sustainable Development to the ECE Steering Committee for Education for Sustainable Development;*
- (c) *Consider adaptation of textbooks and guidance materials on ESD from other countries for use in Tajikistan;*
- (d) *Ensure regular training for teachers to enhance national educational capacities as regards teaching on sustainable development and environment-related topics, from preschool to higher education levels.*

PART II: MEDIA AND POLLUTION MANAGEMENT

Chapter 5

AIR PROTECTION

5.1 Sources of air pollution information

The national source of information on air emissions in Tajikistan is the Agency of Statistics, which provides mainly aggregated data (total emissions) and a few tables on some individual substances, such as sulphur dioxide, nitrogen oxide, hydrocarbons and lead.

As Tajikistan is not a Party to the Convention on Long-range Transboundary Air Pollution (CLRTAP), the country does not report to the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) under CLRTAP. For that reason, the air emission levels of Tajikistan, as presented in the yearly EMEP status reports, are the result of expert estimates based on indicators such as GDP, comparison with other countries, projections, extrapolations and information from other sources and studies. The EMEP Centre on Emission Inventories and Projections (CEIP) in Vienna performs these estimates and publishes them in modelling reports by EMEP's Meteorological Synthesizing Centres, East (MSC-E) and West (MSC-W). In 2012, EMEP extended its grid, which led Tajikistan to be included in its assessments.

According to the CEIP models, the contribution of individual sectors (industry, traffic, agriculture) to the emissions of different pollutants is different in the EMEP West region (Western Europe) and the EMEP East region. For Tajikistan, this chapter uses the standardized distribution of the emissions from different sectors according to the EMEP East region; however, measured or calculated data for the distribution of the emissions from different sectors in Tajikistan are not available.

Data on total air pollution provided by the Agency of Statistics, which are mostly calculated by using emission factors, are of the same order of magnitude as the estimated data from EMEP, with the exception of emissions of sulphur dioxide, nitrogen dioxide and carbon monoxide, which are four times higher in the EMEP data. In contrast with the EMEP data, which show a gradual increase in air emissions in the last 5–10 years, data from the Agency of Statistics show a small reduction in emissions from both stationary and mobile sources. Data on emissions from recently

built coal-fired power units and emissions resulting from the increased use of coal in industry due to the cut in import of natural gas are not yet visible in Tajikistan's national statistics.

5.2 Trends in emission levels

Air emissions

Agency of Statistics data

Table 5.1 shows total emissions from stationary sources in the various regions of the country. The emissions data for stationary sources are based on the reports of a limited number of enterprises and do not give a full picture of such emissions. Information is not given on the distribution of emissions by economic sector. Table 5.2 shows air pollutant emissions from mobile sources. The increase in total emissions from mobile sources from 2009 to 2014 can be coupled with the 25 per cent increase in the number of vehicles (figures 12.1 and 12.2).

The trend in table 5.1 shows that the highest emissions from stationary sources occur in the districts under republican subordination. This is due to the emissions from the TALCO plant, which is responsible for 65–80 per cent of the country's total emissions from stationary sources. In recent years, this percentage has reduced because the production of aluminium has been reduced significantly.

Emissions data show the impact of TALCO on total industrial emissions and the decrease in the company's annual production in recent years. The increase in emissions in Dushanbe in 2014 can be attributed to the new coal-fired power plant that came into operation in that year.

EMEP reports

In the last nine years, emissions of all main pollutants – SO₂, NO_x, NH₃, NMVOC, CO and particulate matter (PM) – have gradually been increasing, according to the estimates in the EMEP reports (table 5.3). The emission trends estimated by the EMEP experts show a constant increase in emissions, based on, for example, population growth criteria, the number of cars, economy and trade, but they do not

take into account the decline in economic activities in 2009/2010 as a result of the economic crisis.

The 2015 EMEP Status Report presents a general distribution pattern per economic sector for the main air polluting substances in the EMEP East Region. In practice, this pattern will be different for individual countries in the East Region, but as most of those countries have not yet assessed their air emissions per sector and established annual reporting to EMEP, this

general sector contribution can be used as a first approach. For Tajikistan, it is certain that the contribution of mobile sources is considerably higher than is presented in the general distribution pattern of the EMEP East Region, which leads to a higher contribution of mobile sources to the emissions of NO_x, NMVOC, CO and PM_{2.5}. The contribution of the agricultural sector to the NH₃ emissions is estimated at 80 per cent.

Table 5.1: Air pollutant emissions from stationary sources, 2005–2014, thousand tons

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tajikistan	34.4	31.9	37.2	35.1	36.0	36.4	41.1	39.2	31.1	34.4
Dushanbe	2.0	2.5	3.2	1.2	2.6	2.8	0.6	2.4	1.4	8.9
Towns and districts under republican subordination	23.3	22.2	23.3	23.3	21.2	25.4	29.5	26.5	19.0	16.6
Sughd Oblast	3.9	3.4	3.5	3.1	3.2	4.5	5.9	7.3	8.5	10.7
Khatlon Oblast	5.2	3.8	7.2	7.5	9.0	3.7	5.0	3.0	2.2	2.1
Gorno-Badakhshan Autonomous Oblast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Agency of Statistics, 2015.

Table 5.2: Air pollutant emissions from mobile sources, 2009–2014, thousand tons

	2009	2010	2011	2012	2013	2014
Total	249.1	260.4	260.0	260.2	275.0	330.4
CO	178.8	191.2	190.9	184.3	194.8	236.9
CxHy	38.8	38.7	38.8	38.1	40.3	48.9
NO _x	31.1	30.1	30.0	34.6	36.6	44.4
Pb	0.4	0.3	0.3	0.4	0.4	0.1
SO ₂	..	..	..	2.8	2.9	0.1

Source: Agency of Statistics, 2015.

Photo 5: Tandir (traditional oven for baking bread), Roshorv village, Bartang valley, GBAO



Heavy metals

The main sources of atmospheric contamination by emissions of heavy metals are thermal power plants (TPPs), iron and steelworks, transport, oil production and processing, mining, non-ferrous metal smelters and construction materials manufacturing.

Based on estimates by CEIP and EMEP, average heavy metal emissions in Tajikistan are relatively higher than those in EU countries. Most EU countries have experienced big reductions in lead, cadmium and mercury emissions in the last 10 years – on average, 90, 75 and 70 per cent, respectively.

EMEP estimates that only a small part of depositions of heavy metals in Tajikistan (about 10 per cent) originates from national sources, while the influence of transboundary pollution is essential.

Estimated data show a 90 per cent decrease for lead in the period 1990–2014 (table 5.4). Lead emissions from traffic sources sharply decreased in the most recent period due to the use of liquefied gas rather than leaded gasoline in private cars. The decrease in lead emissions is logical; since 2005, the number of cars that use leaded gasoline is much lower. For cadmium and mercury, no changes were assessed. This is mainly due to the lack of any reliable data. The highest emissions of heavy metals prevail in bigger cities such as Dushanbe and some industrial areas. In the east of Tajikistan, emissions of heavy metals are negligible.

Persistent organic pollutants

The most important emission sources of unintentionally produced persistent organic pollutants (POPs) (dioxins and furans) to air in Tajikistan are enterprises engaged in the production and processing of metals and production of electric power and thermal energy, along with the uncontrolled combustion of fuels, mainly in rural areas. Due to their lack of access to natural gas and coal and the limitation of electricity supply during winter, the rural population mainly uses biofuel – firewood and cotton stalks – for cooking and heating purposes. In addition, the uncontrolled combustion of solid municipal waste and medical waste is an important source of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) emissions to air.

Because of the important role of agricultural production, the use of pesticides has been very high in the past. As a result of restructuring in the agricultural and economic sectors, the use of pesticides has been significantly reduced in the last decade. In contrast with emissions and deposition of heavy metals, emissions and deposition of POPs originate, for the greater part, from national and local emissions; however, for a few substances, such as HCB and PCB-153, the transboundary air pollution from other countries is considered to be at higher levels. An expert estimation of the emission levels of POPs in Tajikistan is given in table 5.5.

Table 5.3: Emission trends, 2000, 2005–2014, Gg

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SO ₂	20	31	34	36	39	41	43	47	50	54	57
NO _x	31	49	53	57	62	64	68	73	79	84	90
NH ₃	19	30	32	34	37	39	41	44	47	51	54
NM VOC	14	23	25	26	29	30	32	34	36	39	42
CO	360	575	615	663	715	742	791	849	913	980	1 046
PM _{2.5}	12	19	20	21	23	24	26	27	30	32	34
PM ₁₀	23	37	40	43	46	48	51	55	59	63	67

Source: Transboundary air pollution by main pollutants (S, N, O₃) and PM in Tajikistan, EMEP, 2016.

Table 5.4: Emissions of heavy metals, 1990, 2014, tons

	Pb		Cd		Hg	
	1990	2014	1990	2014	1990	2014
Emissions	645.0	64.0	1.2	1.2	2.2	2.2

Source: www.msceast.org/tables/TJ_tab

Table 5.5: POP emissions, 1990, 2014

Emissions	B(a)P, t		PCDD/Fs, g TEQ		HCB, kg		PCB-153, kg	
	1990	2014	1990	2014	1990	2014	1990	2014
	2.8	2.8	63	141	0.8	0.8	10	1.9

Source: www.msceast.org/countries/country_rep/TJ.pdf

Estimates are not based on measurements or nationally reported data. The EMEP/MSC-East experts assume that POP emissions generally have not changed much since 1990. Only a significant change of PCB-153 emissions has been estimated. Both the 1990 data and the 2014 data are greatly uncertain; however, the 2014 data are somewhat closer to an accurate assessment. The relatively high emissions of PCDD/Fs are attributed to the uncontrolled combustion of cotton stalks (*guza-paya*) and of solid municipal waste.

Greenhouse gas emissions

With GHG emissions of 0.4 ton of CO₂ per capita, Tajikistan ranks 160th out of 200 countries. Since 2005, GHG emissions have been stable but, due to the future growth of the population, increased traffic, a growing economy and industrial and agricultural production, GHG emissions are expected to increase in the near future. The causes of the (relatively) very low GHG emissions in Tajikistan include the presence of hydropower and the limited use of fossil fuels for cooking and heating purposes. The agricultural sector is responsible for the largest contribution to GHG emissions.

The inventory of GHG emissions as reported in the Third National Communication to the UNFCCC covers the period 2004–2010. The total emissions of GHGs in Tajikistan in 1990 were estimated at 24,181 Gg of CO₂ equivalent, which means that the 2010 GHG emissions, 8,826 Gg of CO₂ equivalent, were about one third of those in 1990.

In 2010, the major contribution to GHG emissions excluding land use, land-use change and forestry (LULUCF)/ land-use change and forestry (LUCF) in Tajikistan (69.76 per cent) came from the agricultural sector, while the energy sector was the major contributor in 1990 (figure 5.1). From 1990 to 2010, there has been an enormous shift in the sources of GHG emissions. In 1990, the energy sector was by far the largest source of GHG emissions (70.46 per cent) and CO₂ by far the most emitted GHG. In 2010, GHG emissions from the energy sector reached 7.47

per cent of those in 1990. Industrial emissions of GHGs in 2010 were 41.49 per cent of the 1990 level. GHG emissions from the agricultural sector increased since 1990 by 17.25 per cent (figure 5.1).

In 2010, N₂O accounted for 34 per cent of GHG emissions, followed by CH₄ (33 per cent), CO₂ (24 per cent) and perfluorocarbons (PFCs) (9 per cent). In 2010, total GHG emissions were estimated at around 8,824 Gg of CO₂ equivalent. The absorption of CO₂ by trees, plants, and LUCF is estimated at 2,091 Gg of CO₂ equivalent (table 5.6).

Since 2005, the supply of fossil fuels for the production of heat and power for the rural population has almost ceased and the people have had to change to using available biomass. Only 2.95 per cent of the country is covered by forest, a percentage that has not changed much since 1970.

In the period 2014–2020, GHG emissions in the energy and industry sectors are projected to rise, due to population growth, the enhancement of agricultural production, increased use of coal in industry and the start-up of new coal-fired power plants that are needed to cover gaps in electricity production during winter.

Paragraph 3.10 of the Third National Communication to the UNFCCC deals with the uncertainty assessment. Three levels of (final) uncertainty are defined: low level (under 10 per cent), medium level (between 10 and 50 per cent) and high level (>50 per cent). The uncertainty of the inventory in Tajikistan is assessed to be at the medium level.

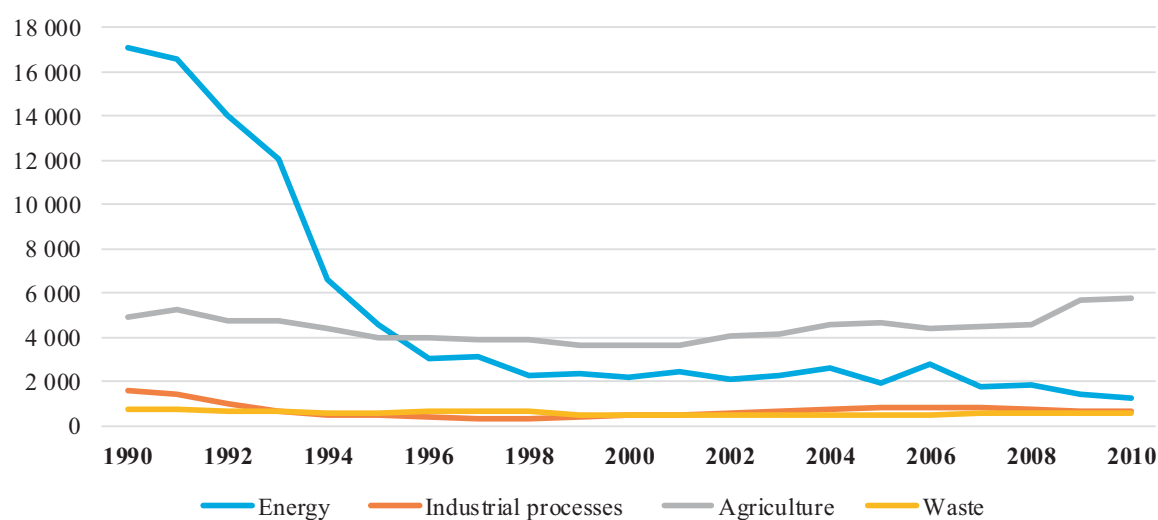
Ozone-depleting substances

Chlorofluorocarbon (CFC) consumption was phased out in the period up to 2005. The phase-out of hydrochlorofluorocarbon (HCFC) consumption (figure 5.2) is now accelerated with the help of the UNDP/Global Environment Facility (GEF) Project: "Initial Implementation of Accelerated HCFC Phase Out in the CEIT Region" (i.e. countries with economies in transition), which began in 2013.

Table 5.6 Greenhouse gas emissions, 2010, Gg CO₂ equivalent

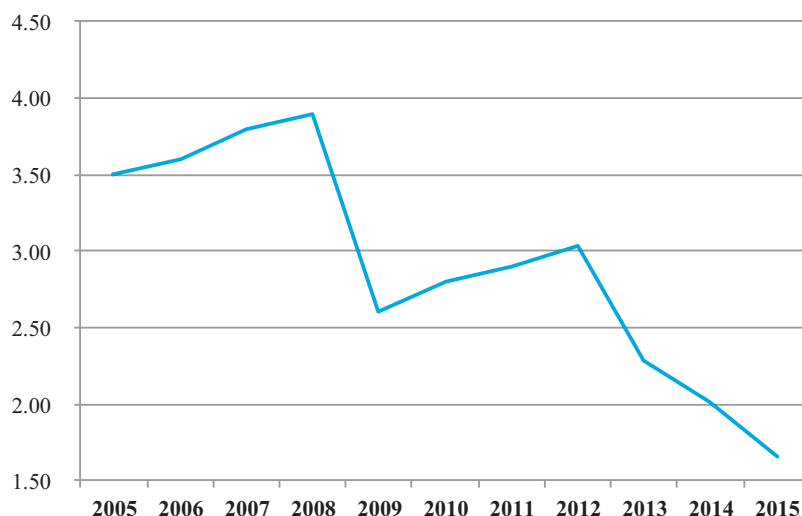
GHG sources and sink categories	CO ₂	CO ₂	CH ₄	N ₂ O	NO _x	CO	NMVOCs	SO _x
	emissions	absorption						
Total emissions and removals by key gases	1 907	-2 091	167	9	6	208	25	9
1. Energy	1 251	0	1	0	5	8	2	3
A. Fuel combustion	1 251	..	0	0	5	8	2	3
1. Electricity	98	..	0	0	0	0	0	0
2. Industry and construction	328	..	0	0	1	0	0	1
3. Transport	406	..	0	0	3	7	1	1
4. Other	420	..	0	0	1	1	0	2
5. CO ₂ emissions from biomass burning	0	..	0	0	0	0	0	0
B. Fugitive emissions from fuel	0	..	1	..	0	0	0	0
1. Solid fuels	..	..	1	..	0	0	0	0
2. Oil and natural gas	..	..	0	..	0	0	0	0
2. Industrial processes	656	0	0	0	1	192	24	5
A. Mineral products	132	..	..	..	..	0	3	0
B. Chemical industry	0	..	0	0	0	0	0	0
C. Metal production	524	..	0	0	1	192	0	5
D. Other types of production	0	..	..	..	0	0	21	0
3. Solvents	..	..	..	0	..	..	0	..
4. Agriculture	..	..	139	9	0	7	..	..
A. Enteric fermentation	..	..	116	..	..	..	..	..
B. Manure management	..	..	17	0	..	..	..	..
C. Rice cultivation	..	..	6	..	..	..	..	..
D. Agricultural soils	..	..	..	9	..	..	..	..
E. Savanna burning	..	..	0	0	0	0	..	..
F. Burning of agricultural residues	..	..	0	0	0	7	..	..
5. Land use change and forestry	..	-2 091	0	0	0	0	..	..
A. Changes of forest and other woody biomass	..	- 614	..	..	..	..	..	..
B. Conversion of forests and pastures	..	..	0	0	0	0	..	..
C. Wastelands	..	..	..	..	..	..	..	..
D. CO ₂ emissions and removals in soils	..	- 60	..	..	..	..	..	..
E. Other	..	-1 418	0	0	0	0	..	..
6. Waste	..	..	26	0	0	0	0	0
A. Solid waste disposal on land	..	..	25	..	..	..	..	..
B. Wastewater handling	..	..	1	0	..	..	..	..

Source: Third National Communication to the UNFCCC, 2014.

Figure 5.1: Greenhouse gas emissions, 1990–2010, Gg CO₂ equivalent

Source: Third National Communication to the UNFCCC, 2014.

Figure 5.2: HCFC consumption, 2005–2015, ODP tons



Source: UNEP, 2015.

Millennium Development Goals

Measured by the Millennium Development Goal (MDG) Indicator 7.2, CO₂ emissions (total, per capita and per US\$1 GDP (PPP – purchasing power parity)), Tajikistan's emission levels in 2000 were 65–70 per cent below those in 1990. From 2005–2007, the emission levels (total, per capita) rose by around 30 per cent, followed by a 20 per cent decrease from 2008–2011 as a result of the global economic crisis. For emission levels per US\$1, there was a rise of 20 per cent followed by a decrease of 40 per cent in the same periods. Energy use per US\$1,000 GDP (constant 2005 US\$ PPP) decreased by 30 per cent from 2005–2011. Although the total level of CO₂ emission has decreased slightly, the efficiency of energy use shows an overall increase.

As for the MDG Indicator 7.3, Consumption of ozone-depleting substances, in 2005, CFC use had been phased out, while HCFC consumption decreased by 35 per cent in the period 2005–2013.

5.3 Pressures

Agriculture

The agricultural sector in Tajikistan is the largest source (accounting for around 80 per cent) of NH₃ emissions, and of GHG emissions (accounting for 63 per cent of CH₄ and N₂O emissions together). Around 10 per cent of the GHG emissions from the agricultural sector come from manure management;

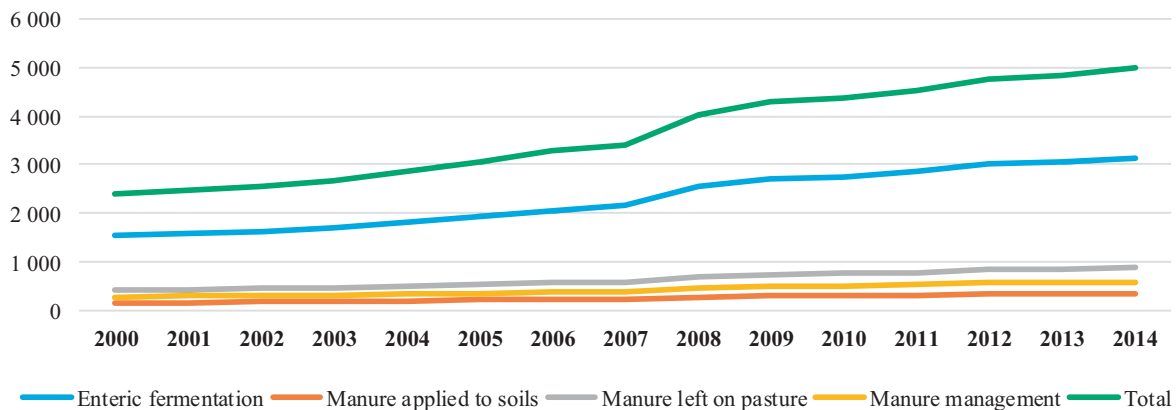
in the period 2000–2010, these emissions increased from 300 to 550 Gg CO₂ equivalent. The enteric GHG emissions of cattle are 5–6 times higher than the emissions from manure management.

Animal husbandry and mineral fertilizers are the main contributors to NH₃ emission. The emission of ammonia is calculated by applying emission factors, taking into account the different ways of breeding and manure storage, treatment and application. In Tajikistan, 85 per cent of fertilizer used is organic and 15 per cent is mineral.

In the period 2000–2014, livestock grew up by 64.34 per cent (table 9.5). In the same period, GHG emissions from livestock doubled, from 2,418.55 Gg CO₂ equivalent in 2000 to 4,996.70 Gg CO₂ equivalent in 2014 (figure 5.3).

As current meat and dairy production levels in Tajikistan are not sufficient to feed the population (65 per cent of meat and dairy products must be imported), and given the rapidly growing population, a considerable increase in livestock numbers in the future is most probable. For the moment, Tajikistan still has a low CO₂ footprint with regard to meat production.

Under a business-as-usual scenario, NH₃ emissions are expected to rise to more than 80 Gg/y in 2020. The estimated maximum technically feasible ammonia emission reduction in livestock husbandry amounts about 20 per cent of current emissions.

Figure 5.3: GHG emissions from livestock, 2000–2014, Gg CO₂ equivalent

Source: FAO (<http://faostat3.fao.org>), 2016.

The amended Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) to the CLRTAP foresees emissions reduction based on (European) BAT. Tajikistan is not party to this Convention and its protocols but is considering becoming a Party in the future. Technical measures based on European BAT in stables could lead to NH₃ emissions in 2020 of around 40 kGg/y. However, extensive assessment of the ammonia emission reduction potential in livestock husbandry shows high abatement costs.

Energy

Air polluting emissions from energy production are relatively low in Tajikistan, as most of the electricity production (98 per cent) comes from hydropower (chapter 11). In 2010, there was still hardly any use of coal, but this had changed by 2014. Additional TPPs are used for back-up production during winter. New coal-fired power plants came into production in 2014. The lower emissions in 2009–2010 are a reflection of the economic situation (table 5.7).

Industry

The largest volumes of industrial emissions to air in Tajikistan are from the metallurgical (non-ferrous metal) and mining industry, and chemical and cement plants. The food and textile industries are also important industrial sectors but they generally do not generate much air pollution.

Emissions from industrial processes in the period 2003–2010 are shown in table 5.8. Most of the industrial production is much smaller than in 1990 and so are the emissions of harmful substances such

as sulphur dioxide, nitrogen oxides and dust. From 2005 to 2007, industrial growth was at 5–6 per cent a year, but in 2008 and 2009 there was a decrease of 4 and 6 per cent, respectively, due to the global economic crisis. From 2010–2012, industrial production grew again, at 8 per cent per year, and in 2013 it grew at 4 per cent.

The growth of industrial production, especially in the mining and metal industry and cement plants, and the increased use of lignite and anthracite for energy purposes in these facilities, may, without the use of adequate abatement techniques, lead to an increase in industrial emissions of SO₂, NO_x and particulate matter in the future.

After the suspension of natural gas supply at the end of 2012, TALCO switched its gas use from natural to synthetic gas (a mixture of CO and H₂ from the gasification of coal). The synthetic gas is a by-product of the plant's coking process, which produces coke and tar for the production of anodes for the electrolysis process to produce aluminium. There is hardly any impact on the emissions to air; only NO_x emissions might be slightly higher, due to higher combustion temperatures, and CO and CH₄ emissions are lower.

In recent years, production at TALCO varied between 200,000 and 300,000 tons/y, but capacity is almost double this. TALCO's contribution to the annual total amount of harmful emissions from industry in Tajikistan is 65–80 per cent. Concerns about cross-border pollution from TALCO have been raised by the Government of Uzbekistan, as well as by Uzbek NGOs and the public (A/67/872).

Table 5.7: Emissions from energy production by electricity production, industry, transport and other sources, 2003–2010, Gg

	2003	2004	2005	2006	2007	2008	2009	2010
CO ₂	2 140	2 567	1 856	2 663	1 725	1 782	1 377	1 251
CH ₄	7	3	3	4	2	2	1	1
NO _x	11	11	9	11	6	6	6	5
CO	12	21	11	10	9	11	8	8
NMVOG	2	4	2	2	2	2	1	2
SO ₂	4	5	4	4	3	4	3	3

Source: Third National Communication to the UNFCCC, 2014.

Table 5.8: Emissions from industrial processes, 2003–2010, Gg

	2003	2004	2005	2006	2007	2008	2009	2010
CO ₂	628	731	789	811	814	735	633	656
NO _x	0.5	0.5	0.6	0.6	0.7	0.6	0.5	0.6
CO	171	192	204	222	224	214	193	192
NMVOG	4	5	7	8	10	19	25	24
SO ₂	5	5	6	6	6	6	5	5

Source: Third National Communication to the UNFCCC, 2014.

TALCO has installed air filters (electro filters and wet scrubbers) to prevent harmful emissions, but the equipment should be modernized as its efficiency is lower in comparison with technical measures that are in line with European BAT-associated emission levels for the non-ferrous metals industry. The modernization of the plant is under way. Since 2006, measurements taken at different distances around the plant did not show exceedances of MACs.

A brand new cement plant in the town of Yavanh uses coal for energy input, and other such plants will follow. These developments will lead to higher emissions of sulphur dioxide, nitrogen oxides and particulate matter; however, the new installations are, or are expected to be, equipped with electro filters, bag filters and desulphurization installations, to abate the extra emissions to the air.

Transport

The transport sector causes 80 per cent of the CO, 80 per cent of the NO_x and around 50 per cent of the PM emissions in the country. With regard to the CO and NO_x emissions, the transport sector is by far the largest contributing party (power plants and industry follow, jointly contributing 15 per cent). Due to the large volume of emissions of CO and NO_x, mobile sources contribute over 80 per cent of the total emission of air polluting substances.

The transport sector (vehicles and aviation), moreover, contributes 20 per cent to the emission of

CO₂. Due to economic pressure, around 60 per cent of the vehicles now use liquefied gas as fuel. The use of leaded gasoline has almost disappeared.

As the number of cars will rise, from about 420,000 registered cars in 2014 to probably 650,000 in 2020, traffic jams will occur more frequently in the cities. In some hotspots, air quality standards will probably be exceeded, although the increased use of liquefied gas as fuel is favourable in this respect, as it would lower emissions of air polluting substances (especially particulate matter and hydrocarbons) compared with emissions from cars that use gasoline and diesel as fuel.

Housing

Urban residential buildings used to have gas-fired central heating systems. However, due to the problems with the gas supply in recent years, many of the central heating systems stopped working and heating in buildings in the cities is now generated by electricity or coal. Residential and district heating systems that are fired by coal and wood make a relatively high contribution to bad air quality in the settlements during cold periods in winter. This is mainly related to the type of fuel used and the efficiency of the heating installations.

Natural gas is almost never used now for heating residential buildings. For cooking, energy use mainly consists of electricity (50 per cent), wood (20 per cent) and bottled liquid gas.

The growing number of urban residential buildings as a consequence of the rapid population growth will lead to considerably higher emissions of SO₂, NO_x and particulate matter in autumn and winter, due to the combustion of wood, coal and animal waste for heating purposes. Realization of energy saving in domestic heating is a big challenge, as recent UNDP research has found that houses in rural areas are losing 50–60 per cent of the generated heat.

5.4 Air pollution measurements

Daily averaged concentrations of pollutants, expressed in percentages of the MACs, are published every day on Tajikhydromet's website (www.meteo.tj). Yearly reports are not published online, but only as hard copies.

For TALCO, concentration of the following pollutants is measured at the sanitary protection zone boundary: carbon monoxide and dioxide, nitrogen oxide and dioxide, sulphur dioxide, hydrogen fluoride, phenol, formaldehyde. In general, most attention is paid to the monitoring of ambient air pollution from this enterprise operation, for which monitoring is conducted at 15 points. Concentrations of hydrogen fluoride in ambient air in 11 residential areas varying from 0.5 to 8 km distance from TALCO are measured. The maximum allowable yearly mean concentration for hydrogen fluoride is 0.005 mg/m³.

For most other stationary sources, ambient air pollution measurements are performed by means of mobile tools for monitoring by a limited number of parameters.

5.5 Legal, policy and institutional framework

Legal framework

The 2012 Law on the Protection of Atmospheric Air, adopted in place of the 1996 Law, covers the competences of various state bodies, setting of norms and standards for air quality and for emissions from stationary and mobile sources, permitting, economic incentives on air protection, monitoring, inventory and reporting. It defines air protection requirements for: (i) stationary and mobile sources; (ii) combustion of fuel and waste; (iii) measures to be implemented in the event of unfavourable meteorological conditions; and (iv) harmful physical impacts on the atmosphere.

The Law requires taking into account information on BAT during the design of a facility. Such information is to be provided by the national environmental

authority. It also requires the setting up of sanitary protection zones around facilities emitting air pollutants. Stationary pollution sources should be equipped with measurement points and may be required to be equipped with automated emission control systems. In the event of unfavourable meteorological conditions, when monitoring data reveal the exceedance of MACs for air pollutants, enterprises are to implement measures on reducing the emission of polluting substances; such measures are to be indicated in their permits. A specific article is dedicated to measures on climate change and the protection of the ozone layer.

For enterprises, the Law is implemented in the permits that are issued and inspected by the Committee on Environmental Protection. Permit conditions are derived from ambient quality standards. The criteria for the emission levels are compliance with the ambient air quality standards in the residential areas and/or sanitary zones. Data on inspections and enforcement of the permits are not made public.

The 2002 Law on Hydrometeorological Activity, amended in 2014, is the legal basis for gathering and dissemination of hydrometeorological and environmental information, including information on air quality. The Law sets the requirements for access to environmental information, with specialized information to be provided on a contractual basis. There are not yet sufficient reliable data on air quality, due to a lack of funding.

The 2015 Law on Ensuring the Environmental Safety of Road Transport introduces measures aimed at prevention and reduction of the negative impact of vehicles on air quality. These measures include ecological classification of imported vehicles, inspection of the environmental performance of vehicles, the introduction of technical requirements for motor fuels, organization of production of clean motor fuels, systematic control of fuel quality, and introduction of technology for reuse or safe disposal of batteries. The Law also provides for the responsibility of vehicle owners to install proper equipment to decrease the toxicity of exhaust gases.

The 2005 Resolution of the Government No. 517 introduces a complete ban on import and export of all ODS listed in annexes A and B of the Montreal Protocol and products containing such ODS. This Resolution has been fully implemented.

The 2015 Resolution of the Government No. 643 approves: (i) the National Strategy on the Reduction of Consumption of Ozone Depleting Substances in

the period 2015–2020; (ii) Regulations on import and export of ODS; (iii) unified list of ODS and products containing ODS prohibited for import and export; and (iv) import quotas for ODS for 2015–2020 (for less harmful substances). This Resolution also bans, starting from 1 January 2017, import of products containing ODS listed in Group I of Annex C of the Montreal Protocol. Handling of ODS is a licensed activity (chapter 2) and is regulated by the 2007 Resolution of the Government No. 172.

Policy framework

Air-related aspects in general policy documents on environment and sustainable development

The Concept of Transition to Sustainable Development (2007 Resolution of the Government No. 500) names climate change adaptation, ecologization of the economy and improvement of environmental monitoring among priorities in the environmental sphere (chapter 1).

In 2012, the Government issued the National Review: Towards a Green Economy in Tajikistan, supported by the United Nations Department of Economic and Social Affairs and UNDP. The Review recognizes that transition to a low carbon economy is of strategic importance for Tajikistan as a country with scarce hydrocarbon resources, and is to be implemented by developing new HPPs. The Review describes additional measures to prevent air pollution from stationary and mobile sources; for mobile sources, state control of exhaust gases was to be intensified.

The State Environmental Programme for the period 2009–2019 (2009 Resolution of the Government No. 123) includes a section on air protection that emphasizes the need to improve data collection and analysis and strengthen control over emissions from stationary and mobile sources, as well as to develop regional norms and standards for air quality. Its Action Plan (2009 Resolution of the Government No. 602) provides for such measures as organization of eco-posts and technical service stations for vehicles at customs entry points and main roads; rehabilitation and reconstruction of dust-separating equipment and equipment for decontamination of industrial waste; organization of mobile environmental laboratories; organization of environmental monitoring in the area impacted by TALCO; and restoration of aerometeorological stations in Dushanbe and Khorog. In the framework of this Programme, TALCO has implemented an environmental management system according to ISO 14000. Environmental monitoring in the vicinities around TALCO is conducted.

The Programme of Recovery of Hydrometeorological Stations and Hydrological Posts for the period 2007–2016 (2006 Resolution of the Government No. 408) has as a main objective the restoration and upgrading of Tajikhydromet’s network. The World Bank’s Central Asia Hydrometeorology Modernization Project (2011–2018) largely contributes to the implementation of objectives of the Programme.

National Implementation Plan on Realization of the Stockholm Convention on Persistent Organic Pollutants

The 2007 National Implementation Plan (NIP) of the Republic of Tajikistan on Realization of the Stockholm Convention on Persistent Organic Pollutants (2007 Resolution of the Government No. 502) was the first step taken for identification and implementation of the country’s POP priorities. Initial inventories of POPs were conducted in 2004, such as inventories of storage facilities with obsolete and banned pesticides, and of emissions of unintentionally produced POPs (chlorinated dioxins and furans).

The NIP covers the period until 2028 and includes the commitments of Tajikistan to ensure the establishment of a National Centre and focal point on implementation of the Stockholm Convention, scientific research, environmental measures, dissemination of public information on POPs, elaboration of information exchange with other countries, and regular submission of reports under the Convention.

For air protection, the main issues in the NIP are identified as being the development of better monitoring of POPs in the environment, priority measures aimed at reduction of unintentional releases of POPs, and research for prevention by the better control of processes leading to the generation of POPs such as chlorinated dioxins and furans. Best environmental practices and BAT to prevent or eliminate emissions of POPs into the air should be developed in the first NIP period (2008–2013) and applied.

The inventory of polychlorinated biphenyls (PCBs) used in electrical equipment such as transformers has been conducted in the first phase of the NIP. Tajikistan has never produced the chemicals for crop protection, nor PCBs; these substances have always been imported. Important elements of the NIP are the improvement of the inventory of emissions of unintentionally produced POPs and the application of BAT in order to prevent these emissions. Industrial sources of unintentionally produced POPs are anode

production in the non-ferrous metal (aluminium) sector, production of iron and copper from scrap, combustion of fossil fuels and wood, and combustion of solid municipal waste in the open air.

In November 2015, at the "Subregional consultation on the implementation of the Rotterdam Convention in synergy with Basel and Stockholm Conventions: An integrated approach to pesticides and chemicals management at national and regional level" organized by the United Nations Environment Programme (UNEP) and the Food and Agriculture Organization of the United Nations (FAO), a number of key actions and recommendations for countries were formulated. The following recommendations related to the implementation of the NIP on the Stockholm Convention were addressed to Tajikistan: continue the inventory of PCBs; facilitate elimination of DDT and illegal imports; improve correct labelling and disposal of DDT, including evaluation of best storage conditions; clean up certain areas of obsolete pesticides in territories where people are living; and carry out an inventory of POPs included in the Stockholm Convention at the last Conference of the Parties. Tajikistan should also ask for financial and technical assistance for the repackaging of decommissioned electrical equipment containing PCBs and export it to countries with the necessary technology for its destruction.

Climate-change-related documents

The National Action Plan on Climate Change Adaptation (2003 Resolution of the Government No. 259) includes measures on further development of renewable energy (small HPPs, wind energy) and sustainable forest management. An important achievement in its implementation has been the adoption of the 2010 Law on Renewable Energy Sources. Several policy documents address the promotion of RES (chapter 11).

National Strategy on the Reduction of Consumption of Ozone Depleting Substances

The National Strategy on the Reduction of Consumption of Ozone Depleting Substances in 2015–2020 (2015 Resolution of the Government No. 643) replaced the National Programme on the Termination of Use of Ozone Depleting Substances (2002 Resolution of the Government No. 477). The Strategy contains a detailed survey of the use of HCFCs in Tajikistan. HCFCs are used mostly in the refrigeration and air-cooling sector. The growth in use of HCFCs, caused by the increased use of such equipment, stabilized in 2012 and since then started to decrease. Assessing the consumption of HCFCs in

2012 as 55 tons of HCFC-22, the Strategy sets the target to completely phase out consumption of HCFCs by 2020. The Strategy provides for a set of legal, regulatory and institutional measures, including:

- Strengthening regulatory control over HCFCs by, inter alia, the introduction of quotas on import of HCFCs, banning the import of second-hand (not new) equipment containing HCFCs, and strengthening monitoring and control of ODS and ODS-containing equipment;
- Improving technical and institutional capacity by, inter alia, strengthening coordination between the Committee on Environmental Protection and Customs Service, and training the representatives of customs and enforcement authorities;
- Developing a system for refrigerants management, including establishment of a national centre for disposal of refrigerants.

Institutional framework

The Committee on Environmental Protection is responsible for the national air protection policy, regulation and coordination of activities of other governmental agencies, hydrometeorological activities, the national environmental monitoring system, information on air pollution and protection, GHG reduction, policy for the protection of the ozone layer and international cooperation.

The Hydrometeorology Agency (Tajikhydromet), under the Committee on Environmental Protection, monitors air quality and provides daily information online. Since 2014, the Hydrometeorology Agency has been responsible for compilation of data and preparing the national GHG inventory, assesses vulnerability to climate change, distributes information on UNFCCC implementation and is responsible for international cooperation (with the Intergovernmental Panel on Climate Change, UNFCCC Secretariat). The head of the Hydrometeorology Agency is the UNFCCC focal point.

The Committee on Environmental Protection, which includes a Unit of State Control of the Use and Protection of Air, is responsible for issuing the permits and inspections of companies in respect of air protection. Permits are granted for three to five years (chapter 2).

The Environmental Police under the Ministry of Interior is responsible for conducting regular emission tests of vehicles (chapter 12). Periodic technical inspections of vehicles have been

outsourced to a private company and are supervised by the Road Police under the same Ministry.

The Centre for Analytical Control measures the pollution from stationary sources (chapter 2). The Centre has its own mobile equipment for measurements of air pollution in the ambient air around the plants. It performs measurements at around 60 installations, most of them twice a year, but at TALCO, every two weeks. The data are sent to the Unit of State Control of the Use and Protection of Air of the Committee on Environmental Protection and used for inspection purposes, as well as for the generation of information about air pollution.

Licensing in the area of ODS is handled by the Committee's Centre for Standardization and Environmental Norm-Setting.

Since 2013, the Ministry of Energy and Water Resources has been in charge of energy-related policies and regulations, including promotion of renewable energy (specifically, hydropower) and energy efficiency. It serves as the designated national authority for the Clean Development Mechanism under the UNFCCC. The Ministry is responsible, among other matters, for the elaboration of strategies for fuel-energy industry development and management.

The Ministry of Transport develops road and other infrastructure in the country, for which air pollution aspects are to be taken into account.

The Ministry of Agriculture develops and coordinates state policy in the agricultural area and develops programmes and forecasts of agricultural production. Crop growing and livestock breeding have a major role in the emissions of GHG and ammonia.

The Ministry of Industry and New Technologies develops and implements state policy in the industrial sector. It is in charge of the setting up and implementing of research and development programmes, and innovative projects leading to energy saving technologies and green products to help decrease air pollution and prevent climate change.

The Ministry of Health and Social Protection of the Population covers issues related to climate change risks and health aspects of air pollution.

The Agency of Statistics publishes aggregated data on air emissions from stationary and mobile sources.

The National Academy of Sciences provides scientific support for the implementation of air pollution policy.

The local public administration bodies are responsible for planning, financing and implementation of local air protection programmes and keeping track of facilities that have an impact on air quality.

In 2014, the National Ozone Centre was set up as a non-profit organization financed by UNEP. The main purpose of the Centre is to facilitate the fulfilment of the obligations of Tajikistan under the Montreal Protocol and the realization of governmental policy documents on ODS. Activities of the Centre include monitoring of the use of ODS, sharing information, reporting to UNEP and providing training and information to users of cooling substances.

Information sources

Information on air quality is given on a daily basis on www.meteo.tj. Yearly reports are not published online, but are available in paper copies.

5.6 Air-related global and regional agreements

United Nations Framework Convention on Climate Change

Tajikistan acceded to the United Nations Framework Convention on Climate Change (UNFCCC) in 1998 and to the Kyoto Protocol in 2008. As a non-Annex I country, Tajikistan has only general obligations, such as collecting relevant information, submitting national reports with GHG inventories to the UNFCCC and undertaking vulnerability and mitigation studies. The Third National Communication was submitted in 2014. As of late 2015, there are no projects in Tajikistan registered with the Clean Development Mechanism's Executive Board.

In 2015, Tajikistan submitted its Intended Nationally Determined Contribution for the UNFCCC COP-21. Depending on substantial international funding and technology transfer, Tajikistan assessed its potential to reduce GHG emissions to 65–75 per cent of the 1990 level by 2030. Without substantial new funding, only 80–90 per cent of the 1990 emissions level can be reached by 2030. In the reference year 1990, GHG emissions were 25.5 million tons CO₂ equivalent. The existing assessed contribution of Tajikistan to global GHG emissions is less than 0.02 per cent.

In April 2016, Tajikistan signed the 2015 Paris Agreement. Although at present the contribution of Tajikistan to global GHG emissions is very low, Tajikistan is highly vulnerable to the impacts of climate change. The rapid entry into force and effective implementation of the Agreement is therefore beneficial to Tajikistan. Ratification of the Agreement by Tajikistan would be a step to urge other countries with higher emissions to ratify too.

Convention for the Protection of the Ozone Layer

Tajikistan acceded to the Vienna Convention for the Protection of the Ozone Layer in 1996, to the Montreal Protocol on Substances that Deplete the Ozone Layer in 1998, and to the Copenhagen, Montreal and Beijing Amendments in 2009. The 2002 National Programme on the Termination of Use of Ozone Depleting Substances and the 2015 National Strategy on the Reduction of Consumption of Ozone Depleting Substances in the period 2015–2020 were adopted to ensure the implementation of the Convention and the Protocol. In 2014, the National Ozone Centre was set up to support activities related to the two agreements.

Tajikistan supports the 2016 Kigali amendment to the Protocol regarding restrictions on the use of HFCs with no ozone-depleting characteristics but in some cases a higher potential global warming profile, and replacing these with other substances such as propane, butane, ammonia and pentane. This involves measures in the production sector where HCFC is used as a cleaning fluid and blowing agent and in refrigerants.

Convention on Persistent Organic Pollutants

Tajikistan ratified the Stockholm Convention on Persistent Organic Pollutants in 2007. A National Implementation Plan (NIP) was adopted in 2007. There is a National Centre under the Committee on Environmental Protection in charge of fulfilment of the country's obligations under the Stockholm Convention.

Convention on Long-range Transboundary Air Pollution and protocols

Tajikistan is not a Party to the Convention on Long-range Transboundary Air Pollution and its protocols.

Selected projects

Pilot Programme for Climate Resilience

Since 2010, Tajikistan participates in the Pilot Programme for Climate Resilience (PPCR), which is part of the Climate Investment Funds. The Programme assists developing countries in integrating adaptation to climate change and climate change mitigation into national development planning. Different projects are now running to finance climate change adaptation initiatives (such as "Environmental land management and rural livelihoods", "Reduction of crop loss and diversification of agriculture", "Improvement of drinking water supply in towns"). Selected projects implemented in the first phase (2010–2014) are presented in box 5.1.

Box 5.1: Selected projects implemented in the first phase (2010–2014) of the Pilot Programme for Climate Resilience

Hydroclimate Modelling and River Basin Approach to Climate Resilience. Executed by Tajikhydromet and the Ministry of Energy and Water Resources, funding US\$750,000, under the leadership of the Asian Development Bank.

Results: The project conducted an assessment of necessary capacity building needs for climate science and impact modelling in Tajikistan, and a four-month training of 15 staff members of Tajikhydromet on hydroclimate modelling, climate change projections of daily air temperature, precipitation, evapotranspiration, and other important parameters to deliver data for climate risk assessments. Based on the risk assessments, essential climate adaptation options were identified for the short and medium term. The roles of the different stakeholders in climate change risk management were established. The project provided Tajikistan with a reliable picture of the climate changes that can be expected in 70 per cent of the country over the next century.

Improving the Climate Resilience of Tajikistan's Energy Sector. Executed by the Ministry of Energy and Water Resources and Barki Tojik, funding US\$300,000, under EBRD management.

Results: Implications for the hydropower sector associated with trends in temperature, precipitation and extreme events were established. Hazards were described, model simulations of future energy production executed and flood safety investigated (Tajik Sea (formerly, Kayrakkum Reservoir) and Nurek Reservoir).

The PPCR in Tajikistan covers six priority investment areas, of which four are air related: i) Building capacity for climate resilience; ii) Improving delivery of weather, climate and hydrological services; iii) Developing a climate science and modelling programme; and iv) Enhancing the energy sector's climate resilience.

Initial Implementation of Accelerated HCFC Phase Out in the CEIT Region

The UNDP/GEF project was designed to respond to the obligations of participating countries (Belarus, Tajikistan, Ukraine and Uzbekistan) under their respective phase-out schedule for HCFCs of the Montreal Protocol. The project started in mid-2013 and will undergo a mid-term review in 2016. The project is successful in Tajikistan, with a 90 per cent phase-out result in 2015.

5.7 Conclusions and recommendations

Discussions with neighbouring countries about transboundary effects of air pollution on the population and the environment caused by installations near the borders, show the importance for Tajikistan of exercising better management of the effects of transboundary air pollution. Participation by Tajikistan in the Convention on Long-range Transboundary Air Pollution would give the country better access to the necessary knowledge to develop a monitoring strategy on air pollution, a solid system of emission inventories and an air quality strategy.

Recommendation 5.1:

As soon as appropriate capacities for implementation are available, the Government should accede to the Convention on Long-range Transboundary Air Pollution and its amended protocols, i.e. the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, the Protocol on Heavy Metals and the Protocol on Persistent Organic Pollutants.

Emissions of NH₃ have increased in the last 10 years due to the growth of livestock husbandry. Tajikistan has not yet assessed the emission abatement potential. Technical measures based on the application of BAT in stables and manure management can reduce the emission of reactive nitrogen compounds. Uncertainties in emission inventory lead to the limited accuracy of emission modelling.

Recommendation 5.2:

The Committee on Environmental Protection, in cooperation with the Ministry of Agriculture, should perform an emission data inventory of NH₃ and

scenario projections for the NH₃ emission trends in order to investigate the necessity of possible reductions in the emission of reactive nitrogen compounds in the future.

Heat and power plants, the chemicals industry and manufacturing industries make an important contribution to the SO₂ emissions by their combustion of fossil fuels. Although the use of fossil fuels in Tajikistan is relatively low, growing use is possible because of the rapid population growth and uncertainties surrounding the future use of hydropower, due to climate change risks.

Recommendation 5.3:

The Ministry of Industry and New Technologies and the Committee on Environmental Protection should encourage the application of best available techniques (BAT) in all industrial sectors and, in particular, to reduce SO₂, PM and other emissions to air.

Tajikistan is a Party to the UNFCCC and has to monitor GHG emissions regularly. Technical capacities to ensure a regular and reliable GHG inventory are, however, limited. The uncertainty of the inventory is assessed to be at the medium level, which means that the overall uncertainty of the data is between 10 and 50 per cent, in particular in the energy and industry sectors. Emissions in the agricultural sector, however, are twice those of the energy and industry sectors as calculated in CO₂ equivalents. Therefore, in the energy and industry sectors also, reliable monitoring on GHG emissions is necessary.

Recommendation 5.4:

The Committee on Environmental Protection and the Hydrometeorology Agency should ensure the delivery of good quality information on greenhouse gas (GHG) emissions by reducing uncertainties in the monitoring of GHGs.

Many central heating systems in residential areas have boiler houses heated with natural gas or fuel oil, which are no longer working, since gas imports decreased after 2010. Heating of houses in these areas is now mostly achieved by electricity, bottled gas or coal-fired stoves. Such stoves contribute to a deterioration of the ambient air quality, as emissions are not abated and chimneys are relatively low. In rural areas, much of the cooking of meals is over wood and takes place outside the houses.

Recommendation 5.5:

In areas not connected to functional central heating, the Government should promote by awareness

raising activities the use of heating installations and energy saving equipment for cooking that have only limited effects on the ambient air quality, taking into account the safety of these installations and indoor air quality.

In April 2016, Tajikistan signed the 2015 Paris Agreement. Although at present the contribution of Tajikistan to global GHG emissions is very low, Tajikistan is highly vulnerable to the impacts of

climate change. The rapid entry into force and effective implementation of the Agreement is therefore beneficial to Tajikistan. Ratification of the Agreement by Tajikistan would be a step to urge other countries with higher emissions to ratify too.

Recommendation 5.6:

The Government should ratify the 2015 Paris Agreement.

Chapter 6

WATER MANAGEMENT

6.1 Water supply and demand – current situation and trends

Tajikistan has an abundance of freshwater resources, as water availability is estimated at 981.5 km³/year. More than 1,000 glaciers with a length more than 1.5 km, and snow fields, are registered and have an approximate area of 8,500 km², which represents 5.6 per cent of the territory of the country. About 576 km³ of water resources reserves are concentrated in glaciers and snow fields. Sixteen glaciers each have a length more than 16 km. In 2014, the largest glacier, Fedchenko Glacier, had a volume of 93.6 km³ while the second largest, Grumm-Grzymailo Glacier, had a volume of 22.5 km³.

There are 1,300 natural lakes in Tajikistan; the total area of the water surface is 705 km². The total water volume in these lakes is 46.3 km³, of which freshwater resources account for about 20 km³. Lake Sarez, currently with a volume of 17 billion m³ of water was formed in 1911 by a landslide triggered by an earthquake (box 15.3). The largest reservoirs include Tajik Sea (formerly, Kayrakkum reservoir) (with the volume of 3,410 million m³) and Nurek reservoir (10,500 million m³).

The total renewable annual flow of the 947 rivers and intermittent rivers flowing in the territory of Tajikistan is about 64 km³, of which about 1.1 km³ is in the Syr Darya River basin and about 62.9 km³ in the Amu Darya River basin. The total renewable annual flow of all rivers flowing in Tajikistan is about 80 km³, of which 29.50 km³ or 36.77 per cent is of drinking water quality (table 6.1). There are also mineral springs as well as sources of thermal water. Renewable groundwater resources are 18.7 km³/year, with 6 km³ approved for use.

Taking into account only the annual surface flow and the population in 2014, the annual water availability per capita is 7,661 m³/cap/year.

Main river basins present at the territory of Tajikistan include the Syr Darya, Panj, Vakhsh, Zeravshan and Kafirnigan. On a more aggregated scale, these basins form part of the basins of the two large rivers of the Central Asian region: the Syr Darya and Amu Darya rivers.

Table 6.1: Selected surface water resources of drinking water, km³

River	Average annual runoff		Of which, of drinking water quality	
	km ³	Per cent	km ³	Per cent
Panj	33.37	41.61	21.39	51.40
Vakhsh	18.90	23.57	6.86	29.10
Syr Darya	15.98	19.92	0.20	1.00
Kafirnigan	5.19	6.47	0.52	8.00
Zeravshan	5.14	6.41	0.51	7.90
Surkhan Darya	1.02	1.27	0.02	1.60
Isfara	0.46	0.57	0.00	0.70
Katasai reservoir basin	0.15	0.18	0.00	0.20
Total	80.199		29.49	

Source: Agency of Statistics, Environmental Protection in Republic of Tajikistan, 2015.

6.2 Management of water use

Irrigation is the main water use, accounting for 77 per cent of total consumption during the period 2009–2014. In the same period, each of the other economic sectors accounted for between 3 and 4 per cent. In 2014, the consumption of water by households was 330 million m³, which represents 3.73 per cent (figure 6.1).

Total water consumption appears to have been broadly stable since 2009, and amounted to 8,844 km³ in 2014 (table 6.2). Estimates point to 2 per cent of the water being abstracted from underground sources. In the near future, water consumption is expected to grow, as the current population – 8.345 million inhabitants – is growing at a rate of 2.2 per cent per year. Some districts in the dry area of south Tajikistan, which has low precipitation and high temperatures in summer, already experience some periods of water scarcity.

Households

Data on access to water supply and sanitation are presented below based on two sources of information: the Tajikistan demographic and health survey and the United Nations Statistics Division Millennium Development Goals Indicators database. The data from the survey date back to 2012 and are based on a survey of 6,674 households covering the

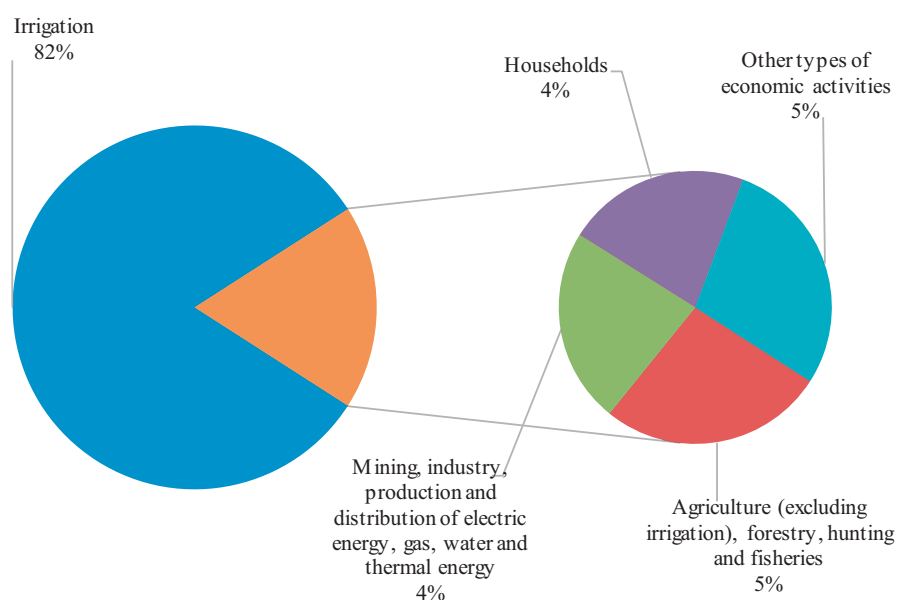
entire country. Comparison is made with the Multiple Indicator Cluster Surveys conducted in 2000 (UNICEF, 2000) and 2005 (State Committee on Statistics, 2007). The data in the United Nations Statistics Division Millennium Development Goals Indicators database cover the period until 2015 and are based on information reported by Tajikistan. The definitions of an improved drinking water source and an improved sanitation facility are essentially the same in these two sources.

2012 Tajikistan demographic and health survey

According to the 2012 Tajikistan demographic and health survey, in 2012, improved drinking water was

provided to 76 per cent of the population (94 per cent of those in urban areas and 71 per cent of those in rural areas) (table 6.3). While the rate of use of improved drinking water had been stable since 2000 in urban areas, the rate in rural areas increased from 47 per cent of the population in 2000 to 71 per cent in 2012. However, less than half (39 per cent) of all households had piped water available in the dwelling, yard or plot and 25 per cent received water from a public tap or standpipe. The most common non-improved water source is surface water, i.e. water from rivers, reservoirs, lakes, ponds or similar sources, which is used by 14 per cent. About 11 per cent of households in Tajikistan spend more than 30 minutes per round trip to obtain water (14 per cent in rural areas).

Figure 6.1: Water use by economic sector, 2014, per cent



Source: Agency of Statistics, Environmental Protection in Republic of Tajikistan, 2015.

Table 6.2: Water use by economic sector, 2000, 2009–2014, million m³

Economic sector	2000	2009	2010	2011	2012	2013	2014
Total	12 609	8 292	8 562	8 197	8 298	8 943	8 844
of which:							
Irrigation	8 459	6 592	6 827	5 851	6 527	6 553	6 826
Agriculture (excluding irrigation), forestry, hunting and fisheries	100	91	78	103	113	113	405
Mining, manufacturing, production and distribution of electric energy, gas, water and heat	341	318	258	283	314	328	350
of which:							
Production and distribution of electric energy	208	250	251	254	258	262	230
Mining, manufacturing, production and transmission of gas, water and heat	133	68	7	29	56	66	120
Households	299	294	210	262	291	298	330
Other types of economic activities	170	202	209	379	422	428	430

Source: Agency of Statistics, Environmental Protection in Republic of Tajikistan, 2015.

Table 6.3: Access to improved drinking water sources, 2000, 2005, 2012, per cent

	2000	2005	2012	Change 2000–2012
Total	57	70	76.2	+ 33.68
Urban	93	93	94.1	+ 1.18
Rural	47	61	70.6	+ 50.21

Source: Multiple Indicator Cluster Survey, 2000 and 2005. Tajikistan demographic and health survey, 2012.

Photo 6: Small Alaudin Lake in Fann Mountains

Urban households are much more likely than rural households to have access to an improved drinking water source (94.6 per cent versus 70.7 per cent) (table 6.4). Access to improved drinking water is also uneven in the regions, and varies from 59 per cent in Gorno-Badakhshan Autonomous Oblast and 63 per cent in Khatlon Oblast to 99 per cent in Dushanbe.

About 84.8 per cent of the population is using appropriate water treatment methods, such as boiling (84.3 per cent), bleach or chlorine addition, straining through cloth, filtering, solar disinfection, etc. This leaves about 15 per cent of the population without appropriate water treatment. The proportion of the population using an appropriate water treatment method is only slightly higher among urban households (87.9 per cent) than rural households (83.5 per cent).

The proportion of people without access to sanitation decreases annually, partly because of the process of internal migration, which has led to a high concentration of the population in large cities. Currently, the widespread use of public toilets in unsatisfactory condition, the existence of unprotected cesspools and the draining of used water directly into yards remains a major obstacle in the fight against diseases associated with poor quality drinking water and lack of sanitation services. About 94.2 per cent of the population use improved, not shared, sanitation facilities, while 2.4 per cent use shared facilities and the remaining 3.3 per cent use non-improved facilities (table 6.4). In urban areas, 45.2 per cent of the population use flush systems to a piped sewerage system while 94.4 per cent of the population in rural areas use pit latrines.

Given the current state of the water supply and sewerage systems, there is a persistent risk of waterborne diseases (figures 14.3, 14.4). These have mainly been occurring in rural areas and small towns, where technical standards of water pipes tend to be largely inadequate. Frequent power outages in winter limit water supply to a few hours per day and the lack of electricity prevents the population from using electrical devices for water purification. Above all, the discontinuous supply causes contamination of water because it does not guarantee pipeline pressurization.

cent in 2000 to 51.1 per cent in 2005 (table 6.5). Under Indicator 7.8 on access to an improved drinking water source, there was a 23.3 per cent improvement in the period 2000–2015, from 60 per cent of the population in 2000 to 74 per cent in 2015. Most of the increased access was in rural areas (an increase of 39.6 per cent). Similarly, the proportion of the population using an improved sanitation facility (Indicator 7.9) increased by 5.6 per cent in the same period, from 90 per cent in 2000 to 95 per cent in 2015, with a 2.2 per cent increase in urban areas and a 6.7 per cent increase in rural areas.

Water-related MDG indicators

Tajikistan reduced the percentage of its total water resources used (MDG Indicator 7.5) from 53.2 per

Gender aspects

Gender aspects are quite pronounced in the drinking water and sanitation sector in Tajikistan (box 6.1).

Table 6.4: Access to drinking water and sanitation facilities, 2012

	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Drinking water						
Source of drinking water						
Improved source	94.6	70.7	78.1	94.1	70.6	76.2
Non-improved source	3.7	28.2	20.7	4.1	28.4	22.5
Other source	1.5	0.8	1.1	1.6	0.9	1.1
Unknown	0.1	0.2	0.2	0.1	0.1	0.1
Sanitation facilities						
Improved, not shared facility	91.8	94.1	93.4	92.9	94.6	94.2
Shared facility	6.4	1.7	3.2	5.2	1.5	2.4
Non-improved facility	1.4	4.0	3.2	1.6	3.8	3.3

Source: Tajikistan demographic and health survey, 2012.

Table 6.5: Water-related MDG indicators, 2000, 2005, 2015, per cent

Indicator	2000	2005	2015	Change 2000–2015
7.5 Proportion of total water resources used	53.2	51.1	..	
7.8 Proportion of population using an improved drinking water source*				
Total	60.0		74.0	23.3
Urban	92.0		93.0	1.1
Rural	48.0		67.0	39.6
7.9 Proportion of population using an improved sanitation facility**				
Total	90.0		95.0	5.6
Urban	92.0		94.0	2.2
Rural	90.0		96.0	6.7

Source: United Nations Statistics Division. Millennium Development Goals Indicators (<http://mdgs.un.org/unsd/mdg/default.aspx>). Accessed April 2016.

Notes: * Percentage of de jure population whose main source of drinking water is a household connection (piped), public tap or standpipe, tubewell or borehole, protected dug well, protected spring, rainwater collection or bottled water.

** Percentage of de jure population whose household has a flush toilet, ventilated improved pit latrine, pit latrine with a slab, or composting toilet and does not share this facility with other households.

Box 6.1: Water supply and sanitation: gender aspects

A gender assessment of the drinking water sector in Tajikistan, commissioned by the Swiss Agency for Development and Cooperation (SDC) in 2013, describes how, in the country's rural setting, fetching water impacts on women's and children's time and effort distribution, as well as their health conditions. In Muminabad and Rudaki districts, women and children under 14 spend an average 4–6 hours daily (in some cases, up to 8 hours daily) on water carrying, which has a significant impact on women's time and on children's school attendance.

Shortage of safe drinking water and sanitation causes multiple diseases in children and adults (especially diarrhoea and hepatitis). Inadequate water supply and sanitation at local health facilities affects the quality of health services for the population in general and particularly for women in relation to maternal care and delivery. Lack of decent sanitation facilities in schools influences school attendance by girls of the age of puberty. Lack of water and sanitation is also affecting women's mobility, as women are reluctant to venture from their own communities due to the lack of safe and secure sanitation facilities in public places, such as market places.

Source: Krylova, L. and Safarova, N. Gender Assessment: SDC Rural Drinking Water Program in Tajikistan, Dushanbe, March 2013.

Energy generation

It is estimated that a total of 30 million–35 million m³ of water was used for energy generation by HPPs in 2014. The use of water in the production and transmission of electricity is quite stable, amounting to 251 million m³ annually, on average, in the period 2009–2014 (table 6.2).

Industry

No data on water abstraction and use in industry have been collected since 2010. There are no data on water losses, nor on the types and concentration of pollutants in effluents of industrial enterprises. The total volume of water used in mining, manufacturing, production and distribution of gas, water and heat decreased from 2000 to 2010 by 70 per cent and has been steadily increasing since then (table 6.2; figure 10.1). In 2014, excluding water used for electricity production, it reached 120 million m³, equal to 1.36 per cent of the total water consumption in the country. Most of the water used by industry is taken from groundwater sources – large enterprises abstract water from the ground or from river intakes, whereas smaller enterprises are supplied through the public water supply systems. There are still a number of large state-owned enterprises that have high demand for water and discharge considerable volumes of polluted water.

Fishery

The average amount of water used by fish ponds is around 90 million–100 million m³ per year (0.8–1.5 per cent of the total water consumption in the country).

Agriculture

Over 90 per cent of water is used in irrigated agriculture and water losses in irrigation are high – at

least 40 per cent. The most common irrigation method is by inundation and there is almost no use of more efficient irrigation techniques, such as drop to drop. Water losses influence the water balance but are not accounted for in the statistics. Due to the absence of metering (only 25 per cent of the measurement equipment is working and 4,000 water meters are to be installed), it is impossible to assess water consumption. Most of the figures are based on estimations and there are doubts about the reliability of the collected data.

The amount of irrigation water (total volume of water abstracted) appears to have stabilized at around 6 million m³ since 2009. More than 300,000 ha of land is simultaneously irrigated and drained, originating more than 3.75 million m³ of drainage water discharged into rivers. Discharges are polluted with a high mineral load and pesticides. Through run-off water and land erosion, manure, fertilizer and polluted soil also reach the rivers.

Impacts of climate change

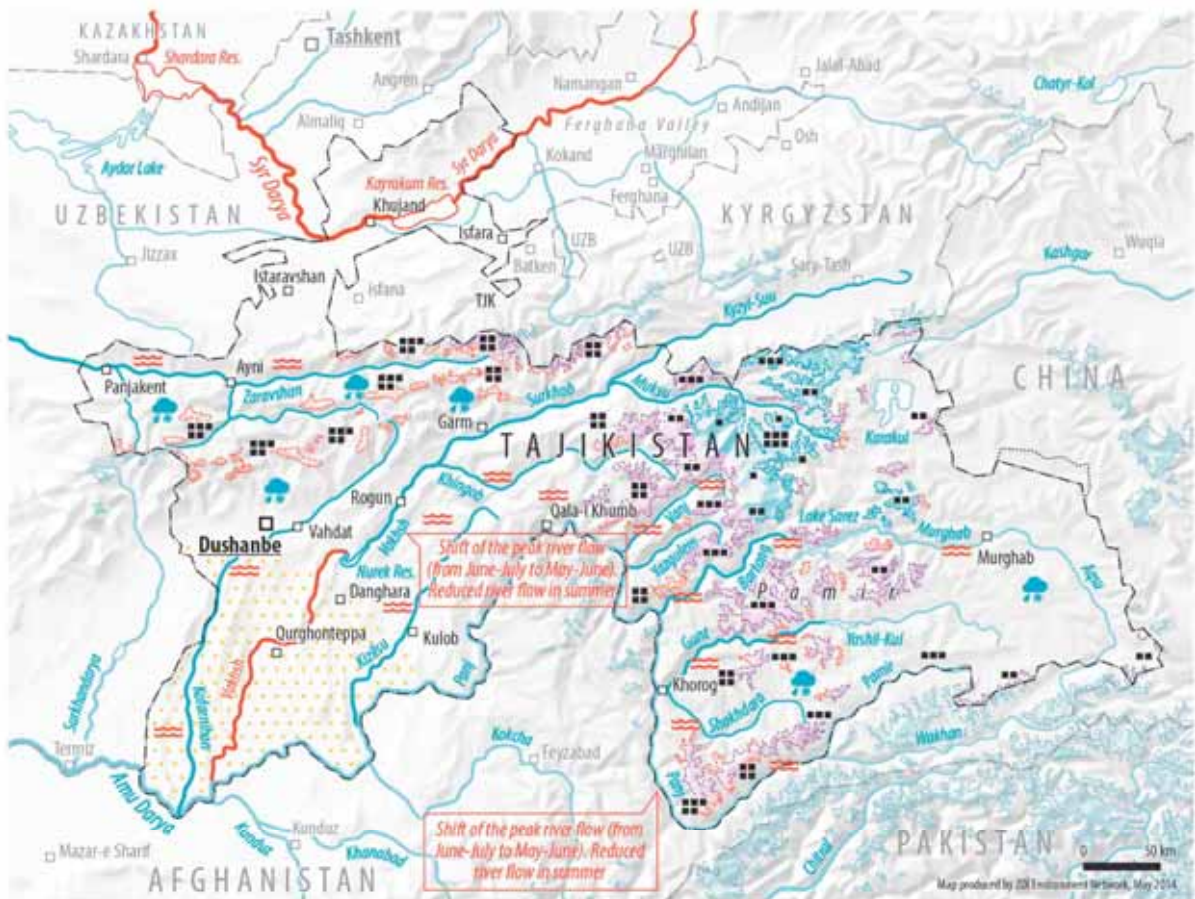
The area covered by glaciers has declined by approximately one third since the 1930s. By the year 2050, the volume of glacial ice is expected to decrease by 25–30 per cent, river run-off to increase by 6–15 per cent and the frequency of droughts to increase by 0.05 droughts per year and to be of greater intensity. The vulnerability of glaciers and other climate change impacts on water resources are shown at map 6.1. It is expected that the peak discharge in non-regulated rivers will shift to earlier months of the year, affecting economic sectors dependent on water supply. It is expected that, by 2050, river discharge will possibly be reduced in summer and in early autumn, the period during which demand for water from agriculture is highest. Active melting and loss of glaciers regulating river flow will impact on the hydrological regime, changing the balance of inputs to river flows, with rain playing a

greater role. In the longer term, this would have detrimental effects on the water reserves.

Climate change is also associated with siltation of the hydropower reservoirs. For example, over the past 45 years, siltation of the Nurek reservoir has reached

more than 100 m or 45 per cent of the total height of the dam. According to experts, the speed of siltation has turned out to be higher than forecast. At the same time, an increase in precipitation of 10 per cent can double the volume of sediments in the Vakhsh River and accelerate the siltation of the reservoir.

Map 6.1: Climate change impacts on glaciers and water resources



Climate change impacts on glaciers and water resources

Vulnerability of glaciers (Tajikistan)

- Generally stable and less vulnerable
- Somewhat vulnerable
- Most vulnerable to melting in the next 50-100 years

- Significant changes in rainfall and snowfall patterns in winter and spring seasons; increase in annual rainfall and decrease in snowfall
- Increasing intensity of rain and risk of flash floods
- Risk of water shortage

- Increased river flow in 1990-2010
- Regulated river flow
- No information or no significant changes

Historical (1960-2010) glacier degradation rates

- 14%
- 12%
- 10%
- 8%
- 5%
- 3%

Source: The map was produced by Zoï Environment Network for 2014 Third National Communication of the Republic of Tajikistan to the UNFCCC.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Due to variation in precipitation patterns, the occurrence of floods is likely to increase as a result of climate change. More than 500 km of road are prone to flash floods or heavy rain. Economic damage related to natural disasters related to floods between 2005 and 2014 were assessed to amount to US\$30 million (table 15.1). However, economic loss calculations focus only on structural damage (chapter 15). Flash floods, as well as mudflows, affect human health and security. The 2010 flood in Kulob, which was accompanied by mudflows, rocks and debris, killed more than 40 people and left more than 300 injured. In the event of floods, loss of agricultural crops and livestock impacts on food security. At the same time, limited access to safe drinking water and sanitation during floods stimulates the spread of waterborne diseases. During the 2010 Kulob event, the efficiency of the local wastewater treatment system dropped by 30 per cent.

More frequent droughts would impact on energy production and agriculture production. The latter will suffer from a decrease in productivity from irrigated arable land, which represents 67 per cent of arable land (chapter 9).

6.3 Status and development of water infrastructure

Most water infrastructure assets were built and put into operation more than 50 years ago. At that time, the system was developed more on the side of water supply, when centralized sewage systems were mostly built for cities and towns. Over recent decades, ageing, limited maintenance and underinvestment led to widespread service inadequacies and the deterioration of infrastructure. Sanitation systems are typically less developed and more neglected than water supply infrastructure, resulting in dire local sanitary conditions.

In recent years, the growth of the population, internal migration to cities and towns and respective changes in behaviour patterns have increased demands on water service companies regarding water delivery and sanitation.

Drinking water supply and treatment

Of 435 wells managed by the SUE "Housing and communal services" (KMK), 177 are not in operation

and need either repair or full rehabilitation (table 6.6). In addition, the distribution network is not maintained. About 27.1 per cent of water supply infrastructure is not working and requires complete reconstruction. More than 60 per cent of water supply infrastructure is in need of maintenance, due to its continuous operation for more than 20–30 years, yet it is not subject to maintenance because of the excessive costs implied. There are recurring power outages, which leave some villages without electricity for five months per year and, more often, some cities without electricity for around three hours per day. Results of observations carried out by water companies show that water losses due to poor technical conditions of the water system are 50–60 per cent. At the same time, the main share of losses takes place in the interior building block, yard and in-house water systems. This is due to the fact that, while apartments are private, the ownership of an intradomestic and in-house networks is not defined, resulting in a lack of maintenance of these systems.

In 2011, KMK started to install water meters to determine the amount of water used and to identify all water users. At the beginning of 2015, 19,603 water meters were installed, representing 12.8 per cent of the total number needed (156,633 water meters). It is estimated that, by the end of 2017, 70 per cent of urban and 50 per cent of rural households would have water meters installed.

In 2014, KMK produced 86.53 million m³ and sold 67.40 million m³ of water (table 6.7). Water losses and unaccounted water consumption reached 22.2 per cent.

KMK is facing various issues that impede its ability to effectively carry out rehabilitation and construction of water supply systems. The real amount of water consumed is not known for all water users. The lack of water meters affects the activities to be carried out in delivery, since it is difficult for water companies to monitor financial and economic performance. The situation in water supply is compounded by the problem of irrational water use. At the same time, the movement of people to towns and cities leads to an increase in construction of new residential buildings and commercial and industrial facilities, which requires an increase in capacity of the water supply network and, therefore, reconstruction of water supply systems.

Table 6.6: KMK infrastructure assessment, 2015

	Urban	Rural
Wells (in operation/needing repair), number	330 (193/137)	105 (65/40)
Reservoirs, number	105	78
Pumping stations (in operation/needing repair), number	46 (24/22)	62 (32/49)
Aqueduct (of which, distribution network), km	2 335/1 600	3 643/843

Source: KMK, 2015.

Table 6.7: Water abstraction, consumption and losses, thousand m³, 2011-2014

	2011	2012	2013	2014
Water production	41 776.70	47 408.10	63 120.00	86 526.50
Water sales	35 859.70	37 934.10	44 596.10	67 392.70
Losses and unaccounted water consumption	5 917.07	9 474.02	18 407.30	19 133.80

Source: KMK, 2015.

Sewerage and wastewater treatment plants

There are 84 wastewater treatment plants (WWTPs) in the country (table 6.8). Based on daily consumption of 120 litres per day, their design capacity should cover about 11.4 million persons. In 2014, the amount of used water treated corresponded to water used by 1.7 million persons. However, this number is theoretical since industrial wastewater is also included, but not measured, as is also water coming from various sources due to the deteriorated state of network. There are other systems in place, such as septic tanks in yards and pit latrines.

Almost entire sewerage infrastructure is in a deteriorated state and requires rehabilitation, with over 70 per cent of existing systems having high wear and tear. According to KMK, about 80 per cent of wastewater treatment facilities (except those in Dushanbe and Khujand) do not meet technical requirements, so wastewater in urban areas undergoes only partial biological or mechanical treatment prior to being discharged directly to water bodies.

In cities, one of the main obstacles in sewerage systems operation is the deteriorated condition of pipes, structures and equipment. In rural areas, systems are almost non-functioning. Operational information on system parameters is available in the water companies, but is not disclosed to media. As in the water supply sector, there are acute organizational problems in sewerage systems in rural areas, which make for a coverage rate of only 0.2 per cent. Of the 62 cities and district centres, only 29 have sewerage systems, and in villages there are virtually no sewerage systems. In rural areas, only 10 per cent of

the existing sewerage systems are working, 5 per cent are partially functioning and 85 per cent are not working. There are issues with the huge amount of surface water entering the sewerage system.

Investments in water supply and sanitation

Funds allocated to rehabilitation of water and sanitation systems in the period up to 2025 amount to an average of US\$28 million per year, and a total of US\$336 million is expected to be invested in 2013–2025. However, the necessary financial resources for rehabilitation, expansion and construction of new systems in order to achieve the water and sanitation objectives and goals provided in the sectoral programmes are estimated to increase to more than US\$2 billion.

Since 2010, no major sewerage systems or WWTPs have been constructed, planned or rehabilitated. Despite some measures taken by the Government, there is no direct public funding for sanitation programmes, nor investments or efforts by international partners focusing on sanitation infrastructure. This results in a significant financing gap for achieving higher sanitation coverage of the population.

Ongoing projects are mainly for urban water supply, and only a very small proportion of funds is allocated to rural water supply. Furthermore, there is more emphasis on water supply than sanitation. Rehabilitation of existing sewerage systems and wastewater treatment facilities, and the creation of new systems and facilities in areas deprived of central sewerage systems, are inadequately financed.

Table 6.8: Wastewater infrastructure

Indicator	Total	KMK
WWTPs, number	84	26
Design capacity of sewerage systems, m ³ /year	498 736.0	112 128.0
Volume of wastewater treated at WWTPs, m ³ /year	77 165.0	20 773.8
of which,		
physical and chemical treatment, m ³ /year	60 118.3	15 257.6
partial treatment, m ³ /year	17 047.0	5 516.2
Length of sewer networks, km	1 363	673

Source: KMK, 2015.

The only information available about new developments in water supply systems (construction, expansion or remodelling) is related to KMK activity. Within the framework of projects financed by international investors in 33 cities, regional centres and villages, KMK is working on the construction and rehabilitation of water and sewerage systems valued at more than US\$168 million. Investment has increased substantially: in 2011, it amounted to 24.9 million somoni (US\$5.4 million); in 2015, it was 2.1 times higher, at 52.4 million somoni (US\$8.5 million).

Dams and reservoirs

Tajikistan has four main reservoirs, with a total volume of 13.96 km³, of which Nurek reservoir represents 71.4 per cent and Tajik Sea (formerly, Kayrakkum reservoir) – 28 per cent. The Kayrakkum Hydropower Rehabilitation Project is underway with EBRD support (box 11.3). Tajikistan expects to build the Rogun dam on the Vakhsh River (box 11.1). The dam is planned to have a total capacity of 13.3 km³ with a surface of 110.7 km². If built, the total water volume in reservoirs will almost double.

Irrigation networks

According to the Agency of Land Reclamation and Irrigation, the irrigation and drainage network comprises: 384 pumping stations of various types and capacities, with 1,482 pump units and 624.67 km of pressurization pipelines; irrigation channels of various sizes with a total length of 29,200 km; 11,400 km of drainage networks, including 2,200 km of networks between farms and 9,100 km of in-farm networks; 7,099 hydrotechnical facilities; 10 reservoirs; over 26 km of irrigation tunnels; and other infrastructure. Annually, the pumping stations use 1.3–1.5 billion kWh of electricity to deliver 5–6 billion m³ of water.

Most installations have been in use for 50 years and are obsolete, due to the lack of adequate repair and

maintenance. Around 30 per cent of pumps have deteriorated and suffer from power failure. The costs for rehabilitation of the entire system are estimated to amount to US\$962 million. In last 15 years over US\$200 million were invested in land reclamation and irrigation as loans, grants and technical assistance from international financial institutions.

6.4 Water quality

There is poor information on the evolution of water quality in measurements points since 2010.

Surface water quality assessment and regulation are based on the specification of the maximum allowable concentration (MAC) of substances. Evaluation of surface-water pollution is based on periodic (monthly) water sampling and analysis in the laboratory. Currently, observations are collected in five river basins at 31 sampling posts (table 4.3). Twenty-eight physical and chemical parameters are being monitored. Some parameters are measured in situ in 11 stations. There are some transboundary posts. Due to a lack of equipment, since 1996 there has been no monitoring of biochemical oxygen demand and total oxygen demand, pesticides and bacteriological parameters, which makes it impossible to evaluate organic pollution. In summary, since 2010, there has been no evolution in the water monitoring network – the number and type of parameters and frequency.

In 2010, the Syr Darya River was suffering from eutrophication, which starts at 0.1 mg/l phosphate. BOD values were also below the MAC of 3 mg/l. As for the oxygen demand of the organic load, the Syr Darya River was in a satisfactory state. The pollution reported was caused by agriculture in upstream agricultural areas. No analysis of chemicals deriving from industry activities was carried out. The information provided by the Hydrometeorology Agency indicates that eutrophication of the Syr Darya River continues, mainly due to the presence of high levels of nitrogen.

Assessment of surface-water pollution is based on the hydrochemical information obtained by periodic sampling for chemical analysis in the laboratory. The monthly reports describe the following parameters: mineral composition or mineralization, pH value and radiation. However, equipment used to measure radiation is obsolete.

According to the Hydrometeorology Agency, the main problems of pollution originate from industry and agriculture and are related to high BOD, salinization and the presence of suspended solids, among other things. Issues with nitrogen have been reported in some parts of the Vakhsh, Syr Darya and Yavansu Rivers, and with mineralization in the Syr Darya and Vakhsh Rivers.

In 2010, other problems of water pollution were also identified, which are still existing. As the communal irrigation systems, which criss-cross small settlements, are misused for discharge of domestic waste and wastewater, organic nutrients and floating litter flow into the rivers. Mass development of algae can occur in hot summer periods, which causes elevated oxygen demand and affects water quality, especially in reservoirs. Due to erosion during flood periods, the level of turbidity of rivers becomes too high.

The Service of State Sanitary and Epidemiological Surveillance conducts the control of drinking water safety parameters and water quality monitoring in centralized and non-centralized systems. Of over 40,000 facilities under its supervision, only 60 per cent are inspected, mostly due to significant constraints, such as the lack of human and financial resources, high transport costs, the lack of specialists, including doctors, and the lack of reagents. There is no public information available on water quality for human consumption and there has not been positive evolution regarding the monitoring of water for human consumption, such as expansion to uncovered areas, an increase in the number of measured parameters and increased frequency of measurement. Drinking water quality assessment is carried out in accordance with regulations, rules and norms developed before 1991.

As monitoring intensity declines, so does the extent of non-compliance. In fact, the results of monitoring indicate an improvement in water quality supplied to the population: today, 66 per cent of water supply

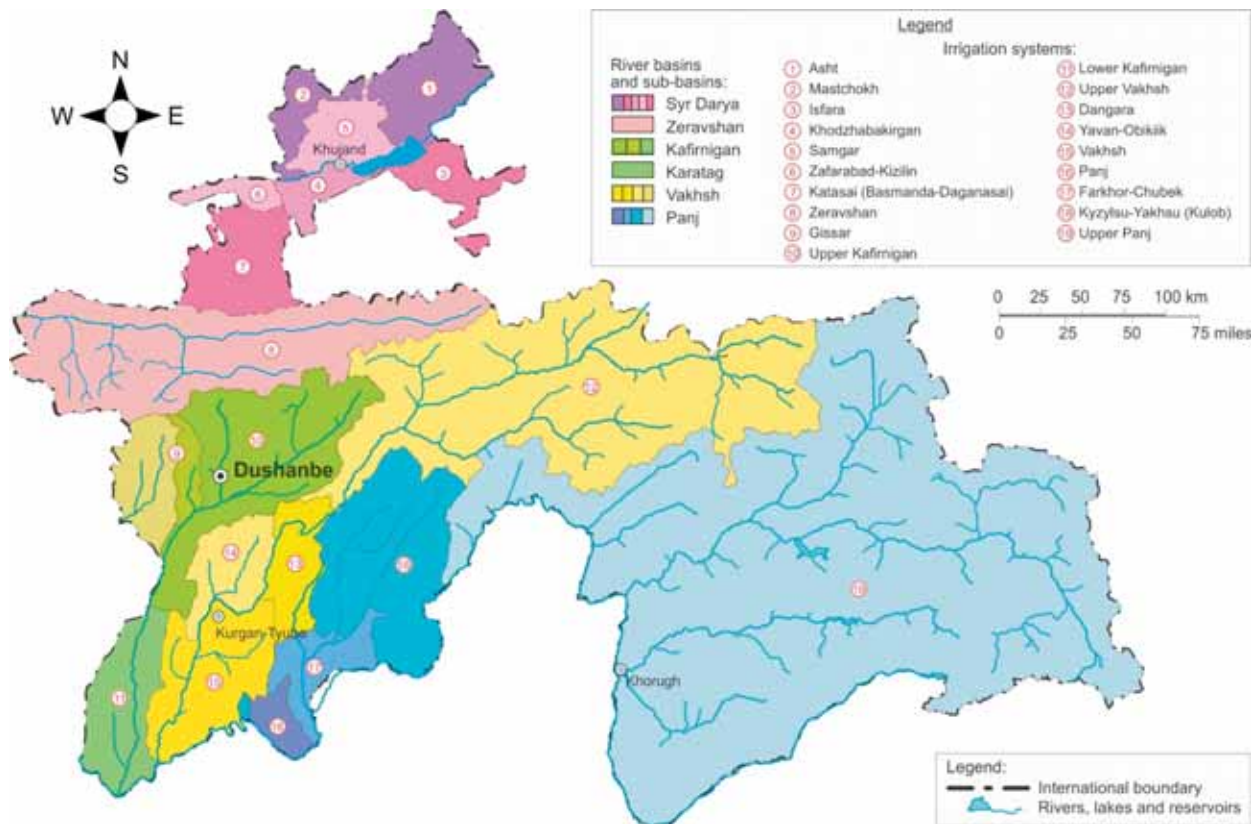
systems are in line with standards; 10 years ago, this value was 30 per cent for centralized systems. Of the 34 per cent of samples that are non-compliant, 12 per cent correspond to microbiological parameters. The main reasons for these situations are discontinuous water supply (about four hours in the morning and four hours in the evening) and lack of sanitation – only 3 per cent of the rural population is provided with sewerage systems, in a country with a more than 70 per cent rural population.

6.5 River basin management

Although amendments were made to the 2000 Water Code in 2012 to enable IWRM and river basin management, these changes were not followed up by the adoption of the subsidiary legislation. Water resources management is still based on the administrative-territorial system. The recently adopted Programme for Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) provides a road map for IWRM implementation, including the transition to water resources management on the basis of hydrographic units such as basins and sub-basins, and irrigation systems. The Programme identifies the criteria for determining the borders of basins and sub-basins for management purposes. The criteria include the geographic boundaries of river basins, accessibility of all parts of the basin, integrity of water infrastructure functioning, and economic development and capacity at the local level. On the basis of these criteria, the Programme names the following basins and sub-basins for future implementation of the river basin management approach (map 6.2):

- Syr Darya River basin (Syr Darya River and its tributaries in the territory of Tajikistan), which will also include, for management purposes, the Zeravshan River basin as a sub-basin;
- Kafirnigan River basin (Kafirnigan River and its tributaries), which will include, in its upper part, the sub-basin of the Karatag River, a transboundary river shared by Tajikistan and Uzbekistan that is part of the Surhandarya River basin;
- Vakhsh River basin (Vakhsh River and its tributaries, except its upstream part located in Kyrgyzstan);
- Panj River basin (Panj River and its tributaries in the territory of Tajikistan).

Map 6.2: Agreed borders for the management of river basins and sub-basins, including main irrigation and drainage systems



Source: Programme for Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791).

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

The reform envisages the creation under the Ministry of Energy and Water Resources of four river basin organizations: Syr Darya River Basin Organization, Kafirnigan River Basin Organization, Vakhsh River Basin Organization and Panj River Basin Organization. It also envisages the establishment, at a later stage, of sub-basin organizations for the Upper Panj sub-basin, Upper Vakhsh sub-basin, Lower Kafirnigan sub-basin and Zeravshan basin. River basin organizations will be responsible for the planning and monitoring of water management, as well as implementation of basin management plans. It is also envisaged to establish river basin councils as bodies to represent the interests of all water users and stakeholders.

The very first river basin management plan in Tajikistan was developed in the period 2012–2014 for the Tajik part of the Isfara River basin (along with a similar plan for the Kyrgyz part of the basin) in the framework of the EU’s Water Management and Basin Organisations in Central Asia (WMBOCA) Project, implemented by GIZ Transboundary Water Management in Central Asia Programme. The plan

was approved in April 2014 by the Small Basin Council for the Isfara River basin created for the Tajik part of the basin in 2013 with the support of GIZ and the Regional Environmental Center for Central Asia (CAREC).

6.6 Legal, policy and institutional framework

Legal framework

In 2012, amendments to the 2000 Water Code: (i) introduced the notions of IWRM and river basin management; (ii) provided for the establishment of an interministerial National Water Council, basin organizations and basin councils, (iii) provided for the development by the National Water Council and adoption by the Government of a national water strategy; and (iv) introduced the mechanism of development and adoption of basin plans for use and protection of water resources. The amendments were not followed up by any subsidiary legislation and very little was implemented in practice. The Programme of Water Sector Reform for the period 2016–2025, adopted in late 2015, indicates the need

for revision of the Water Code and development of a new one in the long term. The Programme also indicates the urgency of revising the still-valid Regulations on delineation of responsibilities of specially authorized state bodies on use and protection of water resources (2002 Resolution of the Government No. 39) in line with the principles and changes in mandates of governmental bodies outlined in the Programme.

The 2010 Law on Drinking Water and Drinking Water Supply regulates the organizational and legal framework for the provision of the population with drinking water. The Law covers centralized, decentralized and autonomous (for a single building or farm) water supply systems and aims to ensure their safety and reliability through measures related to drinking water quality control, protection of drinking water sources (e.g. sanitary protection zones) and uninterrupted drinking water supply in emergency situations. The Law also provides for governmental support to the development of drinking water supply systems through tax and other incentives. Formally, water supply systems can be publicly or privately owned; however, centralized water supply systems shall be managed by governmental authorities. The Law does not cover the tariffs for drinking water supply and mechanisms for activities of the private sector in the water supply sector.

Several governmental resolutions were adopted in furtherance of the Law on Drinking Water and Drinking Water Supply. They approved the rules for use of municipal water supply and sanitation systems (2011 Resolution of the Government No. 234), the procedures for state control and inspection of drinking water supply (2011 Resolution of the Government No. 679), the procedures for accounting/metering in the drinking water supply sector (2011 Resolution of the Government No. 680) and the rules for connection to engineering networks and utility systems (2014 Resolution of the Government No. 354).

The 2006 Law on Water User Associations saw a minor amendment in 2011. The Law regulates the creation and dissolution of water user associations (WUAs), the legal status of WUAs and their members, and management bodies of WUAs. WUAs are mandated to implement equitable distribution of water among their members and other users, pay for delivered water to water management organizations, and settle disputes and differences arising between

their members. The Law does not regulate the creation of federations of WUAs.

Policy framework

National development strategy for the period until 2030

The National development strategy for the period until 2030 (2016 Resolution of Majlisi namoyandagon of the Majlisi Oli No. 636) includes the following tasks related to water and sanitation: development of the legal and policy framework to govern drinking water supply, sanitation and hygiene, with a focus on the needs of women and girls as well as vulnerable persons; development and implementation of investment programmes for financing construction/rehabilitation of water supply and sewerage systems, intra-farm pipeline networks and wells, and enhancement of urban water supply networks; increased international cooperation and support to strengthen the national capacity on water supply and sanitation, and strengthening education on sanitary and hygiene issues. The Strategy does not include quantitative targets in the area of water and sanitation.

Living Standards Improvement Strategy for the period 2013–2015

The Living Standards Improvement Strategy for the period 2013–2015 (2012 Resolution of the Government No. 1030) includes the following targets to be achieved by 2015: access of urban dwellers to clean drinking water – 96.2 per cent; access of rural dwellers to clean drinking water – 56 per cent; access of urban dwellers to basic sanitation – 51 per cent; access of rural dwellers to basic sanitation – 39 per cent. By unofficial assessment, these targets had not been reached as of the end of 2015 (chapter 13).

According to the Foreign Aid Report 2014, foreign aid assistance for implementation of two poverty reduction strategies and the Living Standards Improvement Strategy for the period 2009–2014 in "Water and Sanitation, Housing and Municipal Services" sector amounted to US\$104.89 million. This allowed the implementation of a number of activities, including rehabilitation of 49 hydraulic pumps for potable water supply and wastewater disposal, installation of 3,369 water meters, restoration of eight water wells, and the organization of four training courses and workshops focused on awareness-raising among communities on issues related to water consumption.

Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020

The Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 (2006 Resolution of the Government No. 514) provides for the construction of local water intake facilities for water supply in rural areas, the rehabilitation and expansion of existing centralized water supply systems in towns and rural localities, decreasing water losses in water supply systems, building staff capacity in the sector, public awareness-raising, installation of water meters and other measures. The Programme is being implemented slowly. National experts identify as constraints the lack of financial resources for the Programme's implementation and the changes in the institutional setting of the water sector. The Action Plan of the Programme of Water Sector Reform for the period 2016–2025 envisages the evaluation of implementation of the Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 to be done by KMK and the Ministry of Energy and Water Resources in 2016–2017.

Programme of Water Sector Reform for the period 2016–2025

The Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) has been developed with a view to setting the road map for transition to IWRM in the country. Formally, water sector reform is recognized as part of the agricultural reform, since irrigated agriculture is a major water user. The water sector reform envisages:

- Transition from administrative-territorial water resources management to river basin management;
- Separation of the following functions: policy and legislation, management (planning, administration and regulation) and use (provision of water, maintenance and repair of infrastructure).

This is to be achieved through reforms in the institutional structure and legislative framework. Initial steps towards such separation have already been made, when, in 2013, the policy functions (Ministry of Energy and Water Resources) were separated from irrigation and land reclamation (Agency of Land Reclamation and Irrigation under the Government) and, in 2014, the state energy company Barki Tojik was taken away from the

Ministry of Energy and Water Resources. Further steps include, inter alia:

- Establishment of the National Water Council as the highest advisory body under the Government, through the transformation and expansion of the current Coordination Council on Water and Energy under the Government;
- Establishment of river basin organizations and river basin councils;
- Decentralization of KMK through establishment of its regional and local water companies;
- Creation of stakeholder involvement and public participation mechanisms;
- Establishment of a database and an information system on the water sector.

The Programme includes an Action Plan outlining responsible institutions and annual funding required. Implementation of the Programme is expected to be financed primarily through projects financed by development partners.

While the Programme is a clear step forward for Tajikistan, the risks include:

- Lack of a clear road map for achieving cost recovery tariffs;
- Potential resistance of existing institutions, especially at central level, to changes in mandates;
- Enormous needs in building capacity, especially for river basin organizations;
- High dependence on donor funding and very limited funding from the state budget.

State Programme on Riverbank Protection for the period 2011–2015

The State Programme on Riverbank Protection for the period 2011–2015 (2011 Resolution of the Government No. 112) was aimed at riverbank protection and the construction of hydrotechnical and other facilities for protection of the population and agricultural lands from mudflows and floods. Altogether, 214.6 million somoni (from central and local budgets, donor funding and funds collected for water supply) have been allocated to 90.15 km of riverbank protection measures.

Other policy documents

The draft programme for development of land reclamation and irrigation for the period 2016–2025 aims to further develop the provisions of the Programme of Water Sector Reform for the period 2016–2025 in the land reclamation and irrigation

sector. In particular, it intends to increase the efficiency of irrigation systems, ensure stable financing of the sector and introduce management of irrigation systems at the level of basins, sub-basins and irrigation systems in cooperation with WUAs and WUA federations. The main directions of the draft programme include renewal of the vehicle fleet, rehabilitation of pumping stations and irrigation systems, improvement of the state of reclaimed lands, transfer to basin and sub-basin management, reclamation of new lands, measures on adaptation to climate change, support to WUAs and introduction of differentiated tariffs for water supplied through gravity irrigation and through pump irrigation. The objectives also include development of incentives for introduction of water saving technologies (drip irrigation, drip and furrow irrigation, sprinkling irrigation, automated water distribution systems, etc.), especially in areas with pump irrigation and mechanisms to stimulate farmers invest in improvements of irrigation and drainage networks. The draft programme prioritizes land reclamation of lands suitable for gravity irrigation before lands suitable for pump irrigation. It also recognises the issue of energy efficiency of the pumping irrigation system.

Other relevant strategic documents include the Concept for Reform of the Housing and Utilities Sector for the period 2010–2025 (2010 Resolution of the Government No. 321) and the Programme of Development of the Housing and Utilities Sector for the period 2014–2018 (2014 Resolution of the Government No. 506) (chapter 13).

Institutional framework

Since 2010, the most significant change in the institutional setting was the abolition of the Ministry of Land Reclamation and Water Resources in November 2013 and the creation of the Ministry of Energy and Water Resources and the Agency of Land Reclamation and Irrigation under the Government. Overall policy and regulation responsibilities have been transferred to the Ministry of Energy and Water Resources, whereas irrigation management and operation has been shifted to the Agency.

The Ministry of Energy and Water Resources is the main authority responsible for water issues. It works on state policy development and implementation and legal regulation in the sphere of fuel and energy and water resources, including development of hydropower. The Ministry is also responsible for water cooperation at the international level.

The Agency of Land Reclamation and Irrigation is responsible for the maintenance and operation of irrigation and drainage systems, state policy and regulation in the area of land reclamation and irrigation systems, and use and maintenance of water management facilities. The Agency has five local divisions (for Sughd Oblast, Khatlon Oblast, Gorno-Badakhshan Autonomous Oblast, Dushanbe zone and Hisor zone) and 53 district offices (rayvodkhozy). The agreements established between local divisions and district offices of the Agency and local users (farmers, WUAs, etc.) define the exact amounts of water to be supplied to each user. Since the end of 2014, the Agency has been a specialized state body for regulation of and state support to WUAs.

The SUE "Housing and communal services" (KMK) is in charge of managing drinking water supply and sewerage in urban and rural areas. In 2012, the State Institution "Tajikobdehot", responsible for rural water supply and sewerage, was transferred from the then Ministry of Land Reclamation and Water Resources to KMK. Water supply and sewerage in major cities, such as Dushanbe, Khujand, Nurek and Rogun, and in Faizabad District, are organized under the auspices of the corresponding local authorities; however, they are advised and supported on technical questions by KMK.

Barki Tojik is responsible for the use and maintenance of hydropower facilities. In early 2014, Barki Tojik was withdrawn from the Ministry of Energy and Water Resources as part of the efforts to separate policy development functions from operational activities (chapter 11).

The Committee on Environmental Protection is responsible for environmental inspection. It also issues permits for special water use, which cover both water abstraction and wastewater discharge (chapter 2), upon coordination with various authorities.

The Service of State Surveillance over Safety in Industry and Mining under the Government gives its consent when permits for special water use are issued for mineral and thermal waters.

The Main Administration on Geology (Tajikgeology) gives consent when permits for special water use are issued for groundwater sources. It also conducts groundwater pollution monitoring.

The Hydrometeorology Agency is responsible for monitoring the quality and quantity of surface water.

The Service of State Sanitary and Epidemiological Surveillance under the Ministry of Health and Social Protection of the Population conducts monitoring of drinking and bathing water. It also gives consent for the issuance of permits for special water use.

The Committee on Emergency Situations and Civil Defence under the Government is responsible for prevention of disasters and first-line disaster response.

The Anti-Monopoly Service sets the tariffs for communal services, including water supply and sanitation.

Local authorities do not have substantive competences in the water sector, except in some towns.

Other stakeholders

WUAs are created to distribute water among their members and other users, collect funds for water supply services, and maintain and use on-farm irrigation facilities and other water infrastructure at the farm level. As of early 2016, there are 417 WUAs, which cover 403,840 ha, mostly in areas of gravity irrigation. WUAs are rather unstable due to the fact that they do not have fixed assets on their balance sheets, whereas an assessment of fixed assets is required prior to placing them on the balance sheets of WUAs.

Private sector participation in water management and water supply is very limited.

A number of international NGOs, including Oxfam, Save the Children and ACTED, provide an important contribution to the development of policies, implementation of water resources management and advancement of water supply and sanitation in the country. National NGOs which specialize in water issues are very few.

Coordination platforms

The Coordination Council under the Government on Water and Energy Issues (2009 Resolution of the Government No. 660) is chaired by the Prime Minister and includes as members the heads of ministries and agencies with water-related responsibilities. The composition of the Council was renewed in January 2015. The Programme of Water Sector Reform for the period 2016–2025 prescribes the transformation of this Council into a National Water Council.

Since 2009, the Tajikistan Water Supply and Sanitation Network (TajWSS) has provided a national multi-stakeholder platform for actors from the government, international institutions, donor organizations, academia and NGOs in the water and sanitation subsector. The Network is supported by the TajWSS project implemented by Oxfam in Tajikistan in partnership with UNDP and funded by SDC. The Network holds plenary meetings one or two times a year and has working groups to advance the national drinking water and sanitation agenda. The Network contributed to the passing of the 2010 Law on Drinking Water and Drinking Water Supply and played a crucial role in stakeholder consultations in 2013 to develop draft national targets under the 1999 ECE/WHO Protocol on Water and Health. Other contributions made to national policy and regulations concerned tariffs (e.g. the development of a national methodology to calculate water tariffs), the taxation system, ownership of water supply systems and construction permits.

Since 2011, the Steering Committee of the National Policy Dialogue on IWRM serves as a platform for regular intersectoral discussions on water sector priorities with a focus on IWRM. The National Policy Dialogue is supported by ECE in the framework of the EU Water Initiative. The meetings of the Steering Committee take place one or two times a year and bring together various governmental institutions with water-related competences, international organizations and NGOs. The National Policy Dialogue has working groups, which hold more frequent meetings and are task oriented. The National Policy Dialogue contributed to development of the water sector reform strategy, adopted by the Government as the Programme of Water Sector Reform for the period 2016–2025, and is currently the platform for discussions on the reform in the land reclamation and irrigation subsector.

Regulatory and information measures

Water supply and sewerage tariffs

Tariffs for water supply and sanitation were raised considerably between 2010 and 2015, and also increased in real terms i.e. after deduction of inflation. Tariffs differ considerably among the three customer groups (residential consumers, budget organizations and commercial companies) (table 3.6). The revenues collected from water bills do not allow for recovery of the operating and maintenance costs of water companies. On average, revenues cover only 70 per cent of operational costs (chapter 3). Ineffective tariffs for water supply and sewerage negatively affect the operation and maintenance of

the respective systems, the financial situation of the water companies and the quality of services delivered. As a result, the sector is significantly underfunded: in 2015, service costs were estimated to be 126 million somoni and revenues to be 45 million somoni.

Irrigation tariffs

There have been attempts to establish differentiated fee rates for the two irrigation systems (gravity irrigation and pump irrigation) in order to improve cost recovery. As of late 2015, a unique tariff for irrigation water supply at the level of 1.5 dirams/m³, excluding VAT, was in place. The unique fee rate allows for broadly covering the costs of operation and maintenance for the gravity system but not the corresponding costs for the pump system (chapter 3). This has contributed to the progressive deterioration of the irrigation and drainage network.

Water cadastre

According to the Water Code, planning of water use shall be done in accordance with the state water cadastre. The 2002 Resolution of the Government No. 193 describes the tasks of various institutions related to maintenance of the cadastre. According to the Committee on Environmental Protection, the state water cadastre has not been maintained since 2005.

6.7 Water-related global, regional and bilateral agreements and processes

In the last decade, Tajikistan was an active player on the international water cooperation agenda, including by hosting the High Level International Conference on the Mid-term Comprehensive Review of the Implementation of the International Decade for Action "Water for Life" 2005–2015 (8–10 June 2010, Dushanbe) and the High Level International Conference on the implementation of the International Decade for Action "Water for Life" 2005–2015 (9–11 June 2015, Dushanbe) and actively participating in the discussions on the water goal under the post-2015 development agenda.

In August 2015, the Special Rapporteur on the human right to safe drinking water and sanitation, Mr. Léo Heller, conducted an official country visit to Tajikistan. He noted that Tajikistan is known as a champion of water at the global level but the Government of Tajikistan must become a champion of sanitation and water for its own people. In particular, Tajikistan must not abdicate its responsibilities in dealing with rural water and sanitation issues and must invest in sanitation and

water services to guarantee affordable services for the poor and for marginalized groups.

Tajikistan is not a Party to the 1997 Convention on the Law of the Non-navigational Uses of International Watercourses. It is not a Party to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention). Tajikistan is not a Party to the Water Convention's 1999 Protocol on Water and Health. In 2012–2013, Tajikistan participated in target-setting under the Protocol, facilitated by ECE with support provided by Norway; however, the targets were not endorsed by the Government (chapter 14).

Tajikistan is a Party to several agreements among CIS countries, such as the 1998 Agreement on Basic Principles for the Rational Use and Protection of Transboundary Watercourses in the Member States of the Commonwealth of Independent States, 1992 Agreement on Cooperation in the Field of Hydrometeorology and 2001 Agreement on the Interstate Hydrometeorological Network of the Commonwealth of Independent States.

Tajikistan participates in the cooperation of Central Asian states in the framework of the International Fund for Saving the Aral Sea (IFAS) and its two commissions: the Inter-State Commission for Water Coordination (ICWC) and the Inter-State Commission on Sustainable Development (ICSD). Tajikistan has local offices of the scientific and information centres of the two Commissions and also hosts the secretariat of ICWC, which was moved from Khudjand to Dushanbe in late 2013. Tajikistan is a Party to the 1992 Agreement on Cooperation in Joint Management, Use and Protection of Water Resources of Inter-State Sources; the 1993 Agreement on Joint Action to Address the Problem of the Aral Sea and Surrounding Areas, Environmental Improvement and Ensuring Socio-economic Development of the Aral Sea Region; and the 1998 Intergovernmental Agreement on the Use of Water and Energy Resources in the Syr Darya River Basin. Tajikistan signed the 2006 Framework Convention for the Protection of the Environment for Sustainable Development in Central Asia, which has a number of water-related provisions but is not in force.

Tajikistan has committed to the Third Aral Sea Basin Programme for 2011–2015. Tajikistan has been an active participant in the ECE/GIZ project "Regional Dialogue and Cooperation on Water Resources Management in Central Asia", aimed at institutional and legal strengthening of IFAS, where it advocated

for profound reform of the IFAS institutions, taking into account the interests of all Central Asian countries. The country also participated in the ECE's project on dam safety in Central Asia, which helped Tajikistan to develop the 2010 Law on the Safety of Hydrotechnical Infrastructure and establish the Service for State Surveillance over the Safety of Hydrotechnical Facilities.

In 2010, Tajikistan and Afghanistan concluded the intergovernmental Agreement on Cooperation in Development of Water Resources of the Panj/Amu Darya River Basin. Since then, bilateral cooperation has been strengthened through a series of meetings held with support from ECE and OSCE. In 2014, the two countries signed the "Memorandum of Understanding on exchange of hydrological data and information relating to the Panj–Amu Darya river

basin between the state authorities of the Islamic Republic of Afghanistan and the Republic of Tajikistan for the period of 2015–2017 and prospectively until 2020". In the period 2010–2014, Tajikistan and Kyrgyzstan have been working, with the support of GIZ, on the development of a bilateral framework agreement on transboundary rivers; however, as of early 2016, no agreement had been signed.

International projects

In 2014, 32 external assistance projects financed by 20 donors were implemented in the "Water and Sanitation, Housing and Municipal Services" sector. Selected projects in the water sector supported by development partners in 2014 are reflected in table 6.9.

Table 6.9: Major projects in the water sector supported by development partners in 2014

Development partner	Project title	Duration	Amount
ADB	Khatlon Oblast Flood Risk Management Project	2008–2014	US\$ 28.5 million
	Rural Development Project	2007–2014	US\$ 19.0 million
	Water Resources Management in the Panj River Basin*	2014–2015	US\$ 0.8 million
	Building Climate Resilience in the Panj River Basin	2014–2019	US\$ 13.0 million
EBRD	Khujand Water Supply Improvement Project, Phase II	2009–2014	US\$ 8.9 million
	North Tajikistan Water Rehabilitation Project	2011–2015	US\$ 25.0 million
	Central Tajikistan Water Rehabilitation Project	2013–2015	US\$ 20.5 million
EU	National Policy Dialogue on IWRM in the framework of EU Water Initiative (regional project)	2012–2016	US\$ 0.5 million
GIZ**	Transboundary Water Management in Central Asia (regional project)	2009–2017	€23 million (for the region)
Government of Japan***	Project for Rehabilitation of Drinking Water Supply Systems in Panj District, Khatlon Region	2024–2016	1 586 million Yen
GPSA/Oxfam	Improving Social Accountability in the Water Sector Through the Development of Quality Standards and Citizen Participation in Monitoring in Tajikistan	2013–2018	US\$ 0.9 million
Islamic Development Bank	Dangara Valley Irrigation Project, Phase II	2008–2015	US\$ 30.8 million
	Dangara Valley Irrigation Project, Phase III	2013–2018	US\$ 30.5 million
SDC****	Disaster Risk Reduction and Integrated Watershed Management in Muminabad, Tajikistan	2014–2016	1.2 million Swiss francs
	National Water Resources Management in Tajikistan	2013–2018	7.0 million Swiss francs
	Water Supply and Sanitation Project in Tajikistan	2013–2017	5.1 million Swiss francs
	Rural Water Supply and Sanitation Fergana Valley Project	2014–2017	5.1 million Swiss francs
USAID	Family Farming Program	2010–2015	US\$ 21.2 million
	Regional Transboundary Water Dialogue Support	2012–2016	US\$ 0.21 million
	Local Governance Project, water component	2012–2017	US\$ 2.0 million
World Bank	Second Public Employment for Sustainable Agriculture and Water Resources Management Project	2013–2018	US\$ 45.9 million
	Second Dushanbe Water Supply Project	2011–2018	US\$ 19.0 million
	Ferghana Valley Water Resources Management Project	2006–2014	US\$ 23.8 million
	Municipal Infrastructure Development Project	2006–2016	US\$ 28.5 million
	Environmental Land Management and Rural Livelihoods Project	2013–2018	US\$ 14.8 million
	Hydrometeorology Modernization Project in Tajikistan (regional)	2011–2016	US\$ 13.0 million

Sources: Foreign Aid Report 2014, State Committee on Investments and State Property Management; * www.adb.org/; ** <http://waterca.org/>; *** www.jica.go.jp; **** www.eda.admin.ch.

Box 6.2: External assistance to the water sector

In 2014, donors provided external assistance to the "Water and Sanitation, Housing and Municipal Services" sector in the amount of US\$27.37 million or 7.1 per cent of the total assistance provided to the country. The highest amount, of US\$12.56 million (45.9 per cent), was used for development of the "Water supply subsector (rehabilitation, expansion of the water supply systems)". Assistance for development of the "Sewerage (renovation, expansion of sewerage networks, waste management)" subsector amounted to US\$11.39 million (41.6 per cent) and for the development and support of "Local (municipal) infrastructure", US\$1.80 million (6.6 per cent). In general, aid to the "Water and Sanitation, Housing and Municipal Services" sector tended to grow in the period 2002–2014.

In 2014, of 69 projects implemented in the agriculture and irrigation sector, 19 projects (27.5 per cent) were realized in the irrigation and water resource management subsector. Of US\$36.49 million of foreign aid provided to the agriculture and irrigation sector, the largest amount, US\$11.12 million (30.5 per cent), was used for development of the irrigation and water resources management subsector.

Source: Foreign Aid Report 2014.

In the same year, 69 projects financed by 27 donors were implemented in the agriculture and irrigation sector (box 6.2).

6.8 Conclusions and recommendations

The real condition of the assets of water companies, irrigation and drainage network and intra-farm pipeline network is not well known. Water-related data, including on water quantity and water quality, are spread among various public authorities and organizations. There is no shared platform or system that would provide an overview of the situation in the entire country. The state water cadastre has not been maintained since 2005.

Recommendation 6.1:

The Ministry of Energy and Water Resources, the Ministry of Health and Social Protection of the Population, the Agency of Land Reclamation and Irrigation and the Committee on Environmental Protection, in cooperation with relevant stakeholders, e.g. water companies and water user associations, should:

- (a) *Carry out the inventory of all water infrastructure;*
- (b) *Develop a publicly available water information system based on SEIS principles that would include all water-related information, such as water infrastructure, quantity and quality of water resources, water users and water user permits.*

Ongoing projects focus mainly on urban water supply. A very small portion of funds is allocated to rural water supply. Furthermore, there is more emphasis on water supply than sanitation. This results in a significant financing gap if the goal of achieving higher sanitation coverage of the population is to be met. The financial resources

necessary for rehabilitation, expansion and construction of new systems, in order to achieve the water and sanitation objectives and goals provided in the sectoral programmes, are estimated to be more than US\$2 billion in the period up to 2025.

Recommendation 6.2:

The Government should increase investments and create a favourable environment for attracting investment in water supply and sanitation infrastructure, especially in rural areas, to be able to meet the water and sanitation targets set in the national strategic documents in line with the country's international commitments.

The recently adopted Programme of Water Sector Reform for the period 2016–2025 envisages the transition from administrative-territorial water resources management to river basin management and the separation of various functions in the water sector. The Programme triggers major reforms in the institutional structure (e.g. the establishment of river basin organizations and river basin councils), the legislative framework (e.g. revision of the Water Code and later adoption of a new one) and other areas, including stakeholder participation and collection of data and information. Implementation of the Programme is expected to be financed primarily through projects financed by development partners. While the Programme is a clear step forward for Tajikistan, there are some risks, including potential resistance of existing institutions to changes in mandates, enormous needs in building capacity and high dependence on donor funding. Currently, the Programme enjoys considerable support from the international and donor community; however, in the event that the Programme's implementation is deterred or unreasonably delayed, this may jeopardize the support by the international community in the future.

Recommendation 6.3:

The Government should ensure proper and timely implementation and monitoring of the Programme for Water Sector Reform for the period 2016–2025.

The draft programme for development of land reclamation and irrigation for the period 2016–2025 intends to increase the efficiency of irrigation systems, ensure stable financing of the sector and introduce management of irrigation systems at the level of basins, sub-basins and irrigation systems in cooperation with water user associations (WUAs) and WUA federations. The draft recognises the need for introduction of water saving technologies and improving energy efficiency.

Recommendation 6.4:

The Government should finalize and adopt the programme for development of land reclamation and irrigation with due account to environmental aspects, in particular stimulating the introduction of water saving technologies and improving energy efficiency of irrigation systems, especially for pump irrigation.

See Recommendation 3.4.

The area covered by glaciers has declined by approximately one third since the 1930s. By the year 2050, the volume of glacial ice is expected to decrease by 25–30 per cent and river run-off to increase by 6–15 per cent. It is expected that the peak discharge in non-regulated rivers will shift to earlier months of the year, affecting economic sectors dependent on water supply. It is expected that, by 2050, river discharge will possibly be reduced in summer and in early autumn, the period during which demand for water from agriculture is highest. Active melting and loss of glaciers regulating river flow will impact on the hydrological regime, changing the balance of inputs to river flows, with rain playing a greater role. Due to variation in precipitation

patterns, the occurrence of floods is likely to increase. Limited access to safe drinking water and sanitation during floods stimulates the spread of waterborne diseases. Climate change is also associated with siltation of the hydropower dams.

Recommendation 6.5:

The Government should guarantee the security and safety of water supply to the population during floods and droughts and ensure that climate change concerns are properly reflected in the design of new water supply and sanitation infrastructure and water management infrastructure and addressed during the maintenance of existing ones.

Tajikistan is not a Party to the two international framework conventions on transboundary water cooperation, the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) and the 1997 Convention on the Law of the Non-navigational Uses of International Watercourses. Participation in these agreements would strengthen Tajikistan's position in regional water cooperation and would contribute to the image of the country as a champion of the international water cooperation agenda. Participation in the Water Convention would also allow the country to be actively involved in further development of international water law through the opportunities provided by the institutional platform of the Convention.

Recommendation 6.6:

The Government should accede to:

- (a) *The 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes;*
- (b) *The 1997 Convention on the Law of the Non-navigational Uses of International Watercourses.*

Chapter 7

WASTE MANAGEMENT

7.1 Trends in waste management

Municipal solid waste

National data on collected municipal solid waste (MSW) are reported in m³, but individual operators prefer collecting waste data in tons. Partial data are available on MSW collection in Dushanbe and Khujand only. In 2013 and 2014, Dushanbe generated 220,880 tons and 257,000 tons of MSW, respectively. Khujand generates around 52,000 tons per year.

Collection is provided to 80 per cent of the urban and 15 per cent of the rural population, according to the national census conducted in 2010 (results published in 2013). Collection coverage by regions is shown in Table 7.1. According to the Committee on Environmental Protection, collection is provided to 38.25 per cent of the country's population in 2016.

The 2010 census also provides details on methods of waste accumulation and collection. The majority of MSW is collected from places allocated for waste accumulation, which are mostly equipped by

containers (table 7.2). Often, large volume containers are used and therefore hygienic standards are difficult to maintain. In areas with lower population density, drive-by collection is used, which means that residents bring their waste to the passing collection truck.

Collection coverage is low; modernization of waste services must aim at increasing the share of the serviced population and developing adequate disposal capacity.

Waste chutes are used by only a small percentage of the population in Dushanbe. Although this method is associated with significant hygiene and maintenance risks, Dushanbe authorities have to continue using it as there is no replacement option available.

MSW collection services are provided by enterprises that are part of the State Unitary Enterprise "Housing and communal services" (Khojagii Manziliyu Komunali, KMK) or enterprises subordinated to local executive authorities.

Table 7.1: Collection coverage, 2010, 2016, per cent

	2010	2016
Tajikistan	31.92	38.25
Dushanbe	94.58	..
Towns and districts under republican subordination	20.84	..
Sughd Oblast	31.57	..
Khatlon Oblast	23.41	..
Gorno-Badakhshan Autonomous Oblast	20.83	..

Source: Data for 2010: The Republic of Tajikistan Population and Housing Census 2010. Housing Stock and Housing Conditions of the Population of the Republic of Tajikistan, Volume VIII, Agency of Statistics, 2013. Data for 2016: Committee on Environmental Protection, 2016.

Table 7.2: Methods of MSW accumulation, per cent

Share of population using	Urban	Rural
Container stands	60.42	9.24
Drive-by collection	18.40	5.17
Waste chutes	2.08	0.00
Uncontrolled dumping	19.10	85.59

Source: The Republic of Tajikistan Population and Housing Census 2010. Housing Stock and Housing Conditions of the Population of the Republic of Tajikistan, Volume VIII, Agency of Statistics, 2013.

Nationwide, KMK includes 62 communal services enterprises, which are responsible for waste collection, street cleaning and maintenance, landscaping and park maintenance. KMK is also responsible for the maintenance of disposal sites. Enterprises subordinated to local executive authorities operate in eight cities: Buston (formerly, Chkalovsk), Dushanbe, Guliston (formerly, Kayrakkum), Khujand, Nurek, Rogun, Sarband and Varzob. National statistics on collected waste are available for 2012 and 2014 (table 7.3).

The 2014 figure for household waste indicates annual waste generation of 380 kg per capita. Although the per capita figure is higher than expected (higher than in most Central European countries), the possible reason could be that waste from cattle and construction are disposed of together with household waste and waste separation has not yet commenced in Tajikistan.

Street cleaning waste in Tajikistan represents a significantly larger volume than is common in European countries, as it includes waste from the maintenance and cleaning of open channels for collection of run-off water, which are at the curbside of almost every street.

The volumes of collected waste from street cleaning, market and retail and the transport sector are increasing. This is most probably caused by the improvement of both services and waste statistics.

Collection of MSW in Dushanbe was reorganized under the EBRD's project "Dushanbe Solid Waste Management", implemented in the period 2009–2014. Each of Dushanbe's four districts is served by a specialized collection company and a fifth company operates the Dushanbe landfill. The project resulted in significant improvement in waste collection

services in Dushanbe, introducing 8,000 new containers in 1,688 container stands, and 21 collection trucks. This improvement of technical infrastructure is important for maintaining and expanding collection services, as vehicles used for MSW collection are old – 60 per cent of them have been in operation for more than 15 years and the rest are out of order. Often, collection is covered by other means of transportation (trucks, tractors).

The maintenance of existing infrastructure in Dushanbe has also improved, e.g. 578 waste chutes and 518 container stands were repaired in 2014.

MSW is collected from designated places, which may be equipped with containers. In some cases, waste is dumped on the ground, and a front loader is used to transfer the waste to a collection truck. This mainly happens in areas with apartment blocks. Another option is large containers (skips) located at the entrances to housing areas.

MSW is disposed of to allocated areas, which lack basic measures for avoiding the dispersion of pollution from waste. The Committee on Environmental Protection identified 69 disposal sites in 2016 that are used for municipal waste disposal (table 7.4).

The disposal site in Shah Mansur District of Dushanbe is located in a valley about 10 km from the town centre. The reception area is equipped with a weighbridge. The landfill equipment includes a bulldozer and compactor. A facility for demercuration of fluorescent lamps was established at the landfill, but in late 2015 was still not operating.

Existing disposal sites at regional centres are overfilled and there is an urgent need to start developing a national network of landfills.

Table 7.3: Collected MSW by origin, 2012, 2014, thousand m³

	2012	2014
Total*	1 946.50	3 568.70
Municipal waste not otherwise specified (waste from services and industries, similar to household waste)	770.20	80.30
Mixed municipal waste (household waste)	566.90	1 665.20
Street cleaning residues (street cleaning waste)	465.00	1 501.10
Waste from markets (market and retail waste)	88.50	243.70
Municipal waste not otherwise specified (waste from transport sector, similar to household waste)	55.90	78.40

Source: Environmental Protection in the Republic of Tajikistan, Agency of Statistics, 2013 and 2015.

Note: * Municipal waste (household waste and similar commercial, industrial and institutional waste) including separately collected fractions.

Table 7.4: Municipal disposal sites, 2016

	Number	Area, ha
Total	69	280.49
Dushanbe	1	20.00
Towns and districts under republican subordination	12	37.66
Sughd Oblast	24	130.17
Khatlon Oblast	24	83.86
Gorno-Badakhshan Autonomous Oblast	8	8.80

Source: Committee on Environmental Protection, 2016.

In 2012, the Committee on Environmental Protection, in cooperation with relevant ministries, started a programme for collection of fluorescent lamps. People can bring used lamps to 1,985 collection points, free of charge. The number of collected fluorescent lamps is 2,683,296. The programme envisaged that collected lamps would be treated in the demercuration facility at the Shah Mansur District disposal site in Dushanbe. Collection is still ongoing. The number of collected fluorescent lamps exceeded programme expectations and, due to a lack of funding, lamps are stored in designated places instead of being processed.

Industrial waste

In 2014, industry contributed 12 per cent to GDP. Industrial production is concentrated in a few large enterprises, which dispose of significant amounts of waste inside industrial premises.

Industrial activities are concentrated mainly in the north in Sughd Oblast and in the south in Khatlon Oblast. The main industrial towns are Tursunzade and Dushanbe. Compared with the 1990s, the amount of generated waste has decreased, due to a decrease in industrial output, but lack of modernization results in higher waste generation than in developed countries. The main sources of industrial waste are mining and metallurgy. It is estimated that tailing sludge and poor ores from these industries create 90 per cent of industrial waste. In general, utilization of industrial waste is at a low level, due to a lack of information on types and amounts of waste, which, if available, would allow identification of suitable treatment technology.

The aluminium producer TALCO represents 40 per cent of the industrial output of Tajikistan. TALCO is modernizing its operations. In 2013, it qualified for ISO 14001: Environmental management systems and OHSAS 18001: Occupational health and safety management systems – Requirements, which also has impact on the improvement of waste management. TALCO recovers 1,730 tons of its waste per month, including 350 tons of bauxite, 140 tons of

electrolytes and 400 tons of anodes. The State Research Institute of Metallurgy was established in 2009 to research and develop innovative technologies to enable TALCO to use local raw materials, reduce the negative impact of its industrial waste on the environment and improve its technological processes of aluminium production.

There is little information on industrial waste available in Tajikistan, because regular reporting is not carried out. Although the system of data collection of the Agency of Statistics includes a specific form (2-TP), this is not used. Industrial enterprises and organizations, based on agreement with the road maintenance units, transport their waste to the municipal disposal sites, where it is disposed of together with municipal waste. Enterprises also sell some of their waste to other companies or to individuals for recycling.

The Committee on Environmental Protection has begun to make an inventory of disposal sites used for industrial waste. Table 7.5 presents industrial disposal sites known to the Committee in 2016.

Table 7.5: Industrial disposal sites, 2016

	Number	Area, ha
Toxic waste sites (pesticides)	2	7.40
Industrial waste sites	32	873.61
of which:		
Waste from processing industries	28	..
Waste from other industries	4	..
Sites with radioactive waste	11	251.13
Other processing industries sites	17	1019.57

Source: Committee on Environmental Protection, 2016.

Hazardous waste

Tajikistan has not implemented a hazardous waste management system as is used in Europe, and continues using the system of five hazard classes, which are based on the toxicity of individual substances present in waste. However, the statistical book *Environmental Protection in the Republic of Tajikistan*, published by the Agency of Statistics,

presents MSW statistics according to the European List of Waste. Understanding of hazardous waste is limited to radioactive waste and pesticides. These types of waste are a priority at present and, once their situation has been improved, it is expected that progress will be achieved by defining an approach to waste with other hazardous properties, such as corrosiveness, acidity, alkalinity, chronic toxicity, flammability and risk of emitting toxic or flammable gases.

Medical waste

Medical waste management is improving but old management practices continue. According to the regulations of the Ministry of Health and Social Protection of the Population, infectious waste, including used sharps, must be disinfected by soaking in a 0.5 per cent chlorine solution at the point of generation. After disinfection, the waste is often burned at low temperature on the hospital compound. The method of burning varies from open burning, to locally made small incinerators and units donated by international assistance programmes. However, the operation of advanced incinerators requires auxiliary fuel, which is not always available. Residues from burning are buried in a pit dug near the incinerator.

Pharmaceutical waste from oblasts must be transported once or twice per year to Dushanbe, where it is packed and sent to landfill for disposal in a designated cell. The landfill operator does not have any records of pharmaceutical waste having been received in the last two years. Cytotoxic drugs are co-incinerated in a brick factory. Pathoanatomical waste is buried in cemeteries.

Generation of waste from the health sector is not recorded. No healthcare waste strategy is developed or in place and hospitals do not have allocated budget for managing their waste. Healthcare waste management is not a priority in Tajikistan. This situation is improving under the influence of international donors. Projects aimed at the improvement of health services often include a component for upgrading current waste management practices.

Radioactive waste

A large number of radioactive waste deposits from the treatment and processing of radioactive ore are located in the north of Tajikistan. Production of uranium concentrate started in 1944 on an experimental site in Gafurov. Later, the production of uranium oxides was concentrated in a plant in Chkalovsk (now renamed to Buston), which

processed up to 1 million tons of ore per year in the 1980s. As a result, during 50 years of the plant's operation, more than 55 million tons of radioactive waste with total activity ranging from 6,500 to 7,700 curies [240–285 TBq], was accumulated in 10 tailing ponds. A further 21 dumps of unyielding ores, with a total area of about 2.24 million km², are located within mining and processing enterprises.

Since 1991, Tajik uranium mining and processing has practically ceased operation and the maintenance of uranium tailing ponds has remained a problem until the present day. Table 7.6 provides an overview of accumulated radioactive waste, as identified in 1990. However, due to the current standstill of this industry sector, no changes are expected in the previously published figures.

The Government is actively looking for funding to rehabilitate uranium tailing ponds and reduce their negative impact on the local population. After becoming a member of the International Atomic Energy Agency (IAEA) in 2001, Tajikistan had implemented 16 projects by 2012 and submitted a further four for the 2014–2015 cycle. Tajikistan also participates in more than 40 regional projects, of which 16 have been completed and others are active. Additional projects are implemented in cooperation with UNDP, the United States Nuclear Regulatory Commission, United States Department of Energy, European Commission and Governments of Germany, Norway, Turkey and the United Kingdom.

Mining waste

Mining industries are mainly concentrated in the Sughd Oblast and their activities have resulted in a number of tailing ponds, which contain heavy metals. The Anzob integrated mining and concentrate plant generates antimony- and mercury-polluted waste. The activities of the Adrasman integrated mining and concentrate plant result in lead and zinc pollution. Gold mining in Zeravshan generates cyanide pollution. Yavan electrochemical plant generates waste related to production of caustic soda and chlorine-based bleach. However, mining production has dropped by 80 per cent since 1990; thus, the current generation of mining waste is minimal.

Obsolete pesticides and persistent organic pollutants

The total volume of obsolete pesticides is estimated at 15,000 tons, of which a large part is DDT. The volume of soil polluted by pesticides and requiring treatment is about 40,000 tons.

Table 7.6: Tailing ponds and sites with radioactive waste

Location	Area, ha	Volume, million m ³	Exposure dose rate, μ R/h	Amount, million tons	Curie	Insulation barrier
Digmay pit, 1.5 km south of Gaziyon	90.00	19.40	650-2000	20.80	4 218.0	no cover
Gafurov City, 0.5 km west	4.00	0.24	20-60	0.40	159.4	2.5 m soil cover
Chkalovsk City, 2 km north-west	18.00	2.60	20-60	3.03	779.0	0.5 m soil cover
Istiklol City, 2 km east	24.70	0.99	40-60	1.69	218.0	0.7-1 m soil cover
Istiklol City, 0.5 km east	11.06	0.11	40-60	1.80	232.0	0.7-1 m soil cover
Istiklol City, 1 km east	18.76	2.40	40-60	4.13	510.0	0.7-1 m soil cover
Istiklol City, 3 km east	2.86	0.07	40-60	0.12	152.0	0.7-1 m soil cover
Istiklol City, 4 km east	3.35	1.20	40-100	2.03	253.0	no cover
Adrasman settlement, 1 km north-west	2.50	0.24	50-60	0.40	160.0	1 m
Khujand City, 2 km west	5.90	0.20	60-80	0.35	110.0	0.5 m soil cover
Faizabad Settlement, 7 km east	..	3 400.00	20	..	..	..

Source: Review of Uranium Tailing Dumps in the Republic of Tajikistan: Problems and Ways to Address Them (June 2009), reproduced in the National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 (2014 Resolution of the Government No. 505).

The stock of expired pesticides is concentrated in large underground storage facilities in Vakhsh and Kanibadam. These facilities were upgraded under the project "Demonstrating and Scaling Up Sustainable Alternatives to DDT for the Control of Vector Borne Diseases in Southern Caucasus and Central Asia" in the period 2011–2016, to improve storage conditions and allow the receipt of pesticides from small storage facilities. Additional obsolete pesticides were buried in small storage facilities close to the places where they were previously used.

Vakhsh pesticide burial site is located in Khatlon Oblast, south-west of the regional centre. It receives obsolete and banned pesticides from economic entities in Khatlon Oblast, Gorno-Badakhshan Autonomous Oblast and districts under republican subordination. Vakhsh site was modernized in 2015 by the joint efforts of the Committee on Environmental Protection, GEF, UNDP and OSCE. This modernization included development of water supply to the site, fencing, personnel capacity building and development of an Intermediate Collection Centre, designed to receive obsolete pesticides. Control of the site has also been improved by the hiring of permanent staff and installation of supervision cameras. Pesticides are stored in three underground cells and the Intermediate Collection Centre. The volume of pesticides is estimated at 7,000 tons, including 3,000 tons of DDT.

Kanibadam storage facility is located in Sughd Oblast, seven km south-east of Kanibadam, and occupies about 2 ha of territory. Its underground facility receives banned and obsolete pesticides from Sughd Oblast.

According to the 2007 National Implementation Plan on Realization of the Stockholm Convention on Persistent Organic Pollutants (2007 Resolution of the Government No. 502), during the period 1973–1991, about 7,500 tons of various pesticides were buried in Vakhsh storage facility and about 3,000 tons in Kanibadam storage facility. However, the latest information, from 2010, on the volume of pesticides in Vakhsh storage facility, indicates 4,000 tons. This decrease was explained by the destruction of this storage facility by the local population, who are using and/or selling these pesticides.

A national inventory of obsolete pesticide stocks in Tajikistan, carried out by FAO in 2012, demonstrated that there are many mixed and/or unknown stocks in the country and some of the pesticides already stored require repackaging.

Specific waste streams

Tajikistan generally lacks recycling infrastructure, except for recycling of scrap metals and paper. Collection of waste paper, glass and other recyclables is mainly done by the informal sector; therefore, information on specific waste streams does not exist.

A total of 357,869 vehicles were registered in Tajikistan in 2010. Assuming that a vehicle drives 20,000 km per year, the following waste from car use can be estimated:

- 2 million litres per year of waste oil (assuming that oil is changed every 15,000 km and 4 litres of oil are replaced);

- 5,000 tons per year of used tyres (assuming that tyres are changed every 60,000 km and the average weight of a tyre is 10 kg);
- 2,500 tons per year of used car batteries (assuming that a car battery has to be replaced every three years and the average weight of a car battery is 20 kg).
- Category 1 – Death risk; physical damage to the site may lead directly to loss of life;
- Category 2 – Chronic health effect, due to radiation, radon emission, or leakage of polluted water;
- Category 3 – Loss of environmental, social or economic integrity.

Collection of ferrous and non-ferrous metal is regulated and metallurgy companies receive scrap metal from collectors for reprocessing. Scrap metals are also exported. An overview of the generation and use of scrap metal is presented in table 7.7. The large increase in scrap metal generation in 2011 was caused by major works at TALCO.

7.2 Pressures from waste

Limited quantitative and qualitative information on waste generated by the population and industries allows only general characterization of the pressures from waste on the environment and human health.

Municipal waste disposal sites are not ensuring the insulation of waste from the environment, and uncontrolled dumping is also widespread.

Although scientists and administrative bodies are aware of the significant health risks from radioactive waste and seek support from international donors to improve the situation, the population seems to neglect these risks and this is increasing the potential for negative impacts.

Uranium mines, processing facilities and tailing ponds were not decommissioned after production ceased. These are significant sources of contamination and their rehabilitation will require significant time and funds. Moreover, the local population goes to abandoned facilities in search for scrap metal.

The National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 defines three categories of risk for uranium tailings:

Table 7.8 indicates priorities assigned to individual uranium tailing ponds.

Risks identified at prioritized uranium tailing ponds and facilities include no or insufficient cover layer on deposited waste, no fence around the tailing pond or facility, location of the tailing pond or facility in the vicinity of a river or residential area, land erosion, water erosion, structural damage, radon emissions, radiation, the spread of dust and the transport of waste to the surface by rodents.

Air

Dust from unsecured radioactive waste sites can be transported a great distance by air.

The burning of municipal waste at disposal sites is a common practice (although now banned) and results in the generation of dioxins and other toxic organic substances.

According to the 2014 Third National Communication of the Republic of Tajikistan to the UNFCCC, annual emissions of methane from disposal sites were estimated at 25,000 tons or 15 per cent of total emissions of methane in Tajikistan.

Surface and ground water

There is minimal control over the discharge of water from uranium tailing ponds and ore heaps, which may result in contamination of groundwater and rivers, which are used for drinking water supply and irrigation.

Table 7.7: Generation and use of scrap metal, 2010–2014, tons

	2010	2011	2012	2013	2014
Scrap metal used in metallurgy	9 590	14 477	20 835	16 009	5 209
Total scrap metal generated by industries	2 268	42 231	10 127	7 446	9 398
of which:					
By metallurgy	1 952	2 335	2 659	1 752	1 180
By other industries	316	39 896	7 468	5 694	8 218

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Table 7.8: Ranking of uranium tailing ponds by remediation priority

Rank	Site	Category	Level of physical destruction	Identified risks
1	Istiklol, poor ore plant	1, 2, 3	high	No cover, no fencing, close to river, land erosion, water erosion, structural damage, radon emissions, radiation, dust spreading.
2	Digmay, tailing pond, still used	1, 2, 3	high	No cover, no fencing, 1.5 km from village, close to river, land erosion, structural damage, radon emissions, radiation, dust spreading.
3	Kujand, ore heaps and mining water on the right riverbank of Syr Darya River	2, 3	medium	No fencing, within city limits, water erosion, mining water.
4	Chkalonsk, ponds 1–9	2, 3	medium	No fencing, insufficient cover, in industrial zone of city, radon emissions, rodents transport waste to surface.
5	Istiklol, ponds I–IV	2, 3	medium	No cover, no fencing, close to village, water erosion, close to river and village, radon emissions, mining water.
6	Istiklol, closed plant No.4	2, 3	medium	No fencing, within city limits, water erosion, mining water.
7	Adrasman, pond No. 2	2, 3	medium	No fencing, insufficient cover, close to river and village, radon emissions, drainage water.
8	Istiklol, waste from Sarymsakhlysayo	2, 3	medium	Close to village, no fencing, located in river branch, water erosion, risk for irrigation water, drainage and mining water.
9	Gafurov, pond from experimental plant	3	no	Rodents transport waste to surface, monitoring required.

Source: National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 (2014 Resolution of the Government No. 505).

Uncontrolled disposal of municipal waste allows leachate to enter groundwater layers and affect the quality of drinking water, especially in areas without centralized water supply.

Soil and land

Soil and land are impacted by dust from radioactive waste sites and irrigation by contaminated water.

Landscape

Ore heaps and tailing ponds are under risk of landslides and mudslides caused by erosion of unstable slopes. In 1998 and 2000, near Istiklol, heavy rains caused extensive mudslides, spreading the tailings over a distance of more than three km in the valley. Construction of a dam helped to significantly reduce the impact of a mudslide in 2012.

Human health

Results of a study on gamma and radon carried out in 2012 in Istiklol indicate that the annual gamma dose was in the range 0.2–2.6 mSv. Radon concentrations in private houses in Buston, Gaziyon and Istiklol ranged from 15–330 Bq/m³, compared with the global average indoor radon concentration of 40 Bq/m³ and WHO reference level of 100 Bq/m³. The mean radon concentration in schools and hospitals in Istiklol were 429 Bq/m³ and 560 Bq/m³, respectively.

According to the Programme for Implementation in the period 2016–2024 of the National Concept on

Rehabilitation of Uranium Waste Tailings (2016 Resolution of the Government No. 329), elevated levels of external gamma radiation are observed at some sites. In some parts of tailings without any protective coverage, the equivalent dose reaches 30 mSv/h and more. Some groups of local population are exposed to annual radiation doses of 1 mSv and higher.

According to the Agency of Statistics, in 2015 the number of newly diagnosed cases of cancer in Sughd Oblast (41.8 cases per 100,000 population) exceeded by 16.4 per cent the average number for Tajikistan (35.9 cases per 100,000 population). In the same year, the number of cancer patients registered in health care institutions in Sughd Oblast (248.1 persons per 100,000 population) was 62 per cent higher than the national average (153.1 persons per 100,000 population).

7.3 Legal, policy and institutional framework

Legal framework

The basics for regulation of waste management are stipulated in the 2011 Law on Environmental Protection. The Law bans the import of radioactive waste and materials and their transit through the territory of Tajikistan. The Law also prohibits the dumping of industrial waste and untreated sewage into water bodies, irrigation channels and aquifers, or onto residential areas, forests and agricultural lands. The location of waste storage and disposal sites is to be determined by local executive authorities in consultation with environmental, sanitary and

epidemiological, and geological authorities. The Law bans the disposal of hazardous waste, including radioactive waste, on the territories of human settlements and in the vicinity of human settlements, and in the regions with high population density.

The 2002 Law on Waste from Production and Consumption defines the terms used in waste management, principles of national waste management policy and responsibilities of state institutions on waste management. The Law also defines the financial instruments regulating waste management, requiring payments for the disposal of waste according to its hazard class. In 2011, the notion of abandoned waste was introduced into the Law.

The 2011 Resolution of the Government No. 279 "On the approval of the Procedures, conditions and methods of collection, disposal, decontamination, transportation, storage, and disposal of industrial and domestic solid waste in the Republic of Tajikistan" defined rules, conditions and methods for collection, utilization, neutralization, transport, storage and disposal of industrial and municipal waste. This document introduces rules for the location of containers for municipal waste, bans the burning of waste in container stands, requires written agreements on waste collection and defines the rights of users of waste collection services. Furthermore, this document defines the procedure for selection of waste disposal sites and bans the disposal of waste in towns and other residential areas. It also describes rules for the collection of waste from towns, villages and countryside areas and the responsibility of owners to ensure the cleanliness of territory. It also defines rules for livestock farming in residential areas, for performing disinfection and for the eradication of rats from residential areas. It assigns the responsibility for inspection of enforcement of these rules to the Ministry of Health and Social Protection of the Population and Committee on Environmental Protection.

The legislation also regulates identification and recording of abandoned waste through rules approved by the 2012 Resolution of the Government No. 626.

The 2004 Law on the Licensing of Certain Types of Activities requires licences for radioactive waste management, collection and disposal of hazardous waste, and collection and processing of ferrous and non-ferrous scrap metals. It is supported by the 2007 Resolution of the Government No. 172 on approval of the Regulation on the specifics of the licensing of selected types of activities.

The 1993 Resolution of the Council of Ministers No. 619 describes the procedure for defining payment levels for environmental pollution, including waste disposal.

Radioactive waste is regulated by the 2013 Law on Radioactive Waste Management, which defines the main responsibilities of state authorities and standards and licensing rules for radioactive waste (chapter 1). Legislation on radioactive waste was recently strengthened by the adoption of rules on the movement of radioactive waste across the national border and within Tajikistan (2015 Resolution of the Government No. 362), as well as norms regulating the state cadastre of sites containing radioactive waste (2014 Resolution of the Government No. 507) and the state register of radioactive waste (2014 Resolution of the Government No. 508).

There is no specific law on the management of hazardous waste.

This legislative framework is complemented by a set of technical and sanitary norms. These norms were originally norms of the Russian Federation or, the older ones, from the Soviet Union, adopted into the Tajik legal system. There are differences in approach to waste management in the post-Soviet area and in Europe, which may create implementation problems, e.g. the use of waste chutes, minimum allowed distance of containers from houses and frequency of waste collection.

Although the legal framework is quite extensive, it is not sufficiently implemented nor effectively enforced. The situation could improve with the development of a nationwide network of landfills and by continuously increasing the proportion of the population that has access to waste collection services. This requires large investment funds, which are not available in the national budget of Tajikistan, and progress is achieved only through projects financed by international donors.

Policy framework

Tajikistan does not have a national waste management strategy and action plan for waste management. The Committee on Environmental Protection indicated that a strategy is under preparation but not yet finalized. The strategy should be the key document for gradual modernization of the waste management system. Currently, the 2008 Concept on Environmental Protection formulates the approach to waste management on a national level.

Also, the country lacks waste management plans for regions, municipalities and individual waste generators. Introduction and use of waste management plans would be an effective instrument for implementation of a national waste management strategy and improving information on waste management.

National Development Strategy for the period until 2030

Waste management is present in the National Development Strategy for the period until 2030 only as a component of housing and communal services. Key problems related to waste management identified in the strategy include the need for significant investments in environmental infrastructure in the regions, especially in relation to chemical and radioactive waste. Problems with disposal of municipal waste and insufficient regulation of industrial waste are mentioned. Proposed measures for waste management include improvement of the collection and disposal of municipal waste and strengthening the regulation of industrial waste. Measures for waste management are stated in general terms and further details will be required for their implementation.

Concept on Environmental Protection

The 2008 Concept on Environmental Protection (2008 Resolution of the Government No. 645), gives appropriate attention to the problems of waste management and defines the key problems of waste management as well as the targets that should be achieved in the future. In addition to a specific chapter on waste management, the impact of inadequate waste management is reflected in chapters on environmental safety and public health protection, which indicates an understanding of the importance of waste management in the framework of effective environmental protection.

According to the Concept, the key problems regarding waste management include:

- A lack of information, both quantitative and qualitative, on waste;
- A lack of rules and methodologies for the proper treatment and disposal of waste;
- Insufficient legislation regulating waste management.

The Concept was further developed through the adoption of the Mid-Term Plan for the Implementation of the Concept on Environmental Protection for the period 2010–2012 (2010

Resolution of the Government No. 94) and development of the draft waste management strategy until the year 2015. The Mid-Term Plan defined three tasks in its Section VII, Waste Management:

- Task 11: Improvement of municipal waste management;
- Task 12: Improvement of industrial waste management;
- Task 13: Inventory of waste and development of database of waste types and waste generators.

National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024

The National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 (2014 Resolution of the Government No. 505) describes the current situation regarding uranium tailing ponds and their impact on the environment. It also defines priorities for rehabilitation works on individual tailing ponds. The highest priority is given to rehabilitation of Istiklol tailing pond, followed by Digmay tailing pond and Kujand ore heaps and mining water on the right riverbank of Syr Darya River (table 7.8). The Concept provides a list of relevant legislation, discusses potential sources of financing and emphasizes the importance of public awareness.

Institutional framework

The main responsibilities for formulating waste management policy, strategy and legislation are assigned to the Committee on Environmental Protection. The Committee is responsible for implementation of this framework on the national level, implementation of international treaties and conventions on the environment, and monitoring of the environmental situation. The Committee is also responsible for developing operational rules and standards in waste management.

The Ministry of Health and Social Protection of the Population is responsible for inspection of hygiene and sanitary standards in performing waste collection services.

The Agency for Nuclear and Radiation Safety under the Academy of Sciences is responsible, inter alia, for keeping records on and monitoring radioactive waste, and for the safe operation of disposal and deactivation of radioactive waste.

The responsibility for obsolete pesticides is divided between the Committee on Environmental Protection and the Ministry of Agriculture.

Local executive authorities are responsible for implementation of waste management laws and regulations. Executive authorities have the right to issue local regulation of waste management in the area of their responsibility. Executive authorities directly control collection companies.

Companies collecting municipal waste are municipally owned or are within the structures of housing and utilities companies. Collection companies are also responsible for the operation of disposal sites. Industries are operating their own waste management themselves.

Regulatory, economic and information instruments

Instruments influencing waste management in Tajikistan are limited. Current international practice encourages the introduction of regulatory, economic and fiscal instruments that are oriented towards minimizing waste generation, diversion from landfilling and increasing waste recovery rates. Tajikistan is still in the phase of developing a nationwide waste collection system and basic waste infrastructure, and so the use of these instruments should be carefully assessed. For example, early introduction of a disposal tax often leads to an increase in illegal dumping; encouraging waste separation by setting a higher fee for mixed waste and lower fees for separates without the prior achievement of full cost recovery leads to higher operational costs.

While the legislation provides for sanctions for illegal dumping of waste, this mechanism seems to be not sufficiently effective. For example, of 1,500 environmental inspections in 2014 in Dushanbe, 876 revealed cases of illegal dumping of waste by citizens of Dushanbe and the total sum of penalties imposed was 112,000 somoni (around US\$22,000).

A disposal site is required to be mandated by a decision of the executive authorities of the city and district, and to have a land use certificate, opinion of the Service of State Sanitary and Epidemiological Surveillance, opinion of the Fire Service, opinion of the Main Administration on Geology, conclusion of state ecological expertise (SEE), environmental passport and licence for handling waste. These documents have been issued for landfills since 2003 and earlier, and yet, even though the number of disposal sites with full documentation has increased in recent years, there are disposal sites without, or with incomplete, documentation.

Fees for waste collection are the only economic instruments used in the country. However, their impact is small, as they cover operational expenses only and a social approach (ability to pay) is an important factor in setting waste tariffs for the population. In such a situation, new vehicles and equipment are acquired through the special allocation of budgetary funds or through international donors.

The executive authority of Dushanbe is responsible for setting waste fees and these must be approved by the Anti-Monopoly Service. Waste fees in Dushanbe differ by districts and according to the type of collection system and type of waste generator (table 7.9). There is a small difference between fees, as they also take into account the transportation distance to the disposal site. The population pays on a per capita basis; institutions, commercial and industrial organizations pay per m³.

Information on waste management is limited to information on municipal waste collection in m³. There is no annual information available on industrial or hazardous waste or on treatment or recovery of waste. Data on monitoring the impact of waste management or investments in waste management are also not published. This lack of information is causing problems for decision-making and formulating governmental strategies.

Table 7.9: Waste fees in Dushanbe by district, 2015

	Unit	Ferdowsi	Sino	Shah Mansur
Apartment/house with waste chutes	somoni/cap/month	2.5	2.6	2.4
Apartment/house without waste chutes	somoni/cap/month	2.1	2.2	2.0
Private houses	somoni/cap/month	3.0	3.1	2.9
Barracks	somoni/cap/month	2.8	3.0	2.7
Government budget-funded organizations	somoni/m ³	27.0	31.0	23.0
Commercial enterprises	somoni/m ³	39.0	40.0	27.0

Source: Anti-Monopoly Service, 2015.

Photo 7: Waste container, Dushanbe

7.4 Waste-related global agreements

Tajikistan has been a Party to the 2001 Stockholm Convention on Persistent Organic Pollutants since 2007. Tajikistan submitted its national report in the second round of reporting in June 2010. As of early 2016, its report for the third round, due August 2014, was not yet submitted.

Tajikistan signed the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in 1998, but has not yet ratified this Convention.

Tajikistan became a member of the IAEA in 2001 and acceded to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management in 2008.

Since 2016, Tajikistan is a Party to the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Tajikistan did not sign the 2013 Minamata Convention on Mercury.

7.5 International projects

The rehabilitation of uranium tailings has become a priority in Tajikistan and international donors have

begun to implement programmes and projects aimed at reducing the harmful impacts of radioactive waste mismanagement, covering the area of Central Asia.

In 2015, the EBRD set up a new fund to deal with the legacy of uranium mining and processing in Kyrgyzstan, Tajikistan and Uzbekistan. A new Environmental Remediation Account for Central Asia was established at the request of the European Commission, which is providing an initial €8 million, with additional funding under consideration. The fund will finance projects to rehabilitate high-priority sites in these countries.

In 2015, the Ministry of Industry and New Technologies, in partnership with the European Commission, started working with a consortium led by GEOS Germany to develop a feasibility study and environmental impact assessment for the remediation of the uranium mining and processing legacy sites at Digmay and Istiklol. The project is funded by the EU under the Instrument for Nuclear Safety Cooperation and the overall budget is €2.4 million. The project has a duration of 24 months. The project includes analysis of the current legal and regulatory framework, and investigation of various mining waste and mining facilities and their radioactive and non-radioactive contamination and resulting risks, to be followed by the development of suitable remediation strategies and solutions adapted to the local conditions.

UNEP, UNDP and ECE, in the framework of the Environment and Security Initiative (ENVSEC), are implementing several projects aimed at capacity building and information exchange on radioactive waste management in Central Asia.

The German development bank KfW is financing a health project supporting the rehabilitation of mother-and-child departments in district hospitals in Khatlon Oblast and the Regional Tuberculosis Referral Hospital in Digmay (Sughd Oblast). Healthcare waste management is improved by the delivery of basic equipment, but also through awareness and training.

Greening Hospitals in Tajikistan – Integrated Infrastructure Competence is a project aimed at improving healthcare services through introduction of the principles of green economy. It is also tackling the issue of hazardous hospital waste and was implemented in four pilot hospitals in the period 2013–2015. One of the outputs of this project is a Concept Manual for Improving Infrastructure, which in Section 4 presents best practices for healthcare waste services.

The success of the Dushanbe Solid Waste Management Project, which was implemented in the period 2009–2014 with EBRD financing, initiated similar projects for other cities and towns in Tajikistan. In late 2015, projects aimed at improvement of MSW management were under implementation in Khujand, Kurgan-Tyube and Tursunzade, and in preparation for Kulob, Isfara and Nurek.

These projects aim to achieve application of cost recovery principles within affordability limits through the formation of a new tariff methodology and increased collection rates, together with enhanced transparency and corporate governance.

7.6 Conclusions and recommendations

The management of municipal waste is increasingly under attention and results from the EBRD project completed in Dushanbe were a starting point for replication in other cities of Tajikistan.

A national waste management strategy accompanied by an action plan has been developed but not yet adopted.

The State Unitary Enterprise "Housing and communal services" (KMK) has the potential to help with the implementation of the waste legislation by the development of regional disposal sites. The

enterprise can gain additional experience by cooperation with international donors in future investment projects on waste management.

Waste separation has not yet commenced. Some progress has been made as the collection of fluorescent lamps started. The country generally lacks recycling infrastructure, except for recycling of scrap metals and paper.

Recommendation 7.1:

The Committee on Environmental Protection, in cooperation with local executive authorities and the State Unitary Enterprise "Housing and communal services", should improve the management of municipal solid waste, mainly by:

- (a) *Finalizing the draft national waste management strategy and action plan and promoting their approval;*
- (b) *Introducing a system of waste management plans in national legislation;*
- (c) *Further developing the system of regional disposal sites and ensuring allocation of suitable land;*
- (d) *Further developing the system of separate collection of recyclable waste and improving / creating waste recycling infrastructure for big cities and populated areas.*

The available information on the volumes of municipal and industrial waste is not sufficient for full assessment of the current situation or the evaluation of progress in waste management.

Recommendation 7.2:

The Agency of Statistics, in cooperation with the Committee on Environmental Protection, should review the current system of waste data collection and identify possibilities to increase the quality of information on waste from local authorities and industries.

The state of radioactive waste storage facilities is one of the main problems in waste management in Tajikistan. Development of the National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 and defining priorities has been an important step towards improvement of the situation in radioactive waste management. However, due to the size of the problem, it is hard to expect that this problem will be solved in the foreseeable future.

Recommendation 7.3:

The Government, through the Agency for Nuclear and Radiation Safety under the Academy of Sciences, should continue the implementation of the National

Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 and seek opportunities for financing modernization and remediation measures by involving international donors as well as owners of privatized companies in the mining sector.

Tajikistan has upgraded the two facilities for disposal and long-term storage of obsolete pesticides. This opens up the opportunity to accumulate pesticides from the country's small storage facilities within the central ones and to export pesticides for final disposal.

Recommendation 7.4:

The Committee on Environmental Protection should:

- (a) Approach donors for assistance in accumulating unsecured obsolete pesticides within central storage facilities;*
- (b) Identify opportunities for export of pesticides for final disposal.*

Medical waste management is improving under the influence of donor funded projects conducted in pilot hospitals. However old management practices continue. Experience gained in pilot projects is not evaluated and good practice is not extended to all hospitals. Equipment that was provided to hospitals by foreign donors is not used. No healthcare waste management strategy has been developed to manage this type of waste.

Recommendation 7.5:

The Ministry of Health and Social Protection of the Population, in cooperation with the Committee on

Environmental Protection, should prepare a healthcare waste management strategy, which will:

- (a) Clearly define responsibilities on the national as well as the local level for healthcare waste management;*
- (b) Introduce and enforce monitoring and reporting of healthcare waste;*
- (c) Present appropriate and suitable methods for storage, transport and disposal of healthcare waste.*

Participation in the 1989 Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal to which Tajikistan acceded in 2016 will increase the protection of the country from unregistered import of hazardous waste. Tajikistan will gain better access to information on hazardous waste management and to facilities for disposal of hazardous waste abroad. However Tajikistan does not yet participate in the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the 2013 Minamata Convention on Mercury. Participation in these treaties would increase the capacity of Tajikistan to protect human health and the environment.

Recommendation 7.6:

The Government should:

- (a) Ratify the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;*
- (b) Accede to the 2013 Minamata Convention on Mercury.*

Chapter 8

BIODIVERSITY, BIOSAFETY, FORESTRY AND PROTECTED AREAS

8.1 Current situation and trends in species and ecosystems

Current situation

A biodiversity monitoring system, which would comply with international standards and provide reliable, accurate, comprehensive and regularly updated information on the state of ecosystems, habitats and species of flora and fauna, is still lacking, mainly due to the lack of human, technical and financial capacities. As a result, existing information is often fragmented and outdated; moreover, it is scattered among different sources and not available in digital form. All available data should therefore be perceived as rough estimates, and be interpreted with caution.

Proper assessment of the protective status of different biodiversity components, monitoring of ongoing trends and evaluation of the effectiveness of forest and protected area management are not possible. Proper assessment of the current state of a particular species population, its conservation status and trends is also not possible. This applies to all kinds of flora and fauna species, regardless of whether they are widespread or rare, indigenous or alien.

No significant changes in the spatial distribution and extent of areas occupied by the main natural and anthropogenic ecosystems occurred since 2010. Similarly, no new sources of anthropogenic pressures on ecosystems have been recorded since 2010.

Due to the lack of biodiversity monitoring, the number of animals killed illegally is not assessed, since statistics provide only total numbers and do not provide information on how many animals were hunted with and without the required hunting licence (for Red Book species) or hunting ticket (for other species). For instance, the 2014 Fifth National Report to the Convention on Biological Diversity (CBD) reports on the dynamics of hunting on wild species of animals and illegal hunting for 2012, and data on authorized and unauthorized hunting are presented by one aggregated number for each species.

Reliable information on the actual size of wild fauna and wild flora species populations is quite limited. As a result, the determination of annual quota for hunting game species is based on rough estimates.

Threatened species

The snow leopard (*Uncia uncia*) is listed as Endangered (EN) on the IUCN Red List of Threatened Species. Its population continues to decline, due to habitat and prey base loss, poaching and retributive killing (because, due to declines in the density of wild ungulates, snow leopards then turn to livestock). According to the official statistics, the snow leopard population in Tajikistan in 2012 amounted to some 195 specimens.

The Bukhara urial (*Ovis orientalis bochariensis*) is categorized by IUCN as Vulnerable (VU). Tajikistan is home to its largest population (894 animals in 2012), but the number is reported to be decreasing, mainly due to poaching and competition with livestock.

The population of the Bukharan markhor (*Capra falconeri*), since 1994 categorized as Endangered (EN), recently started to increase; thus, in 2015, this wild goat has been recategorized as Near Threatened (NT). According to the official statistics, its population in Tajikistan in 2012 amounted to 437 specimens. Most of these goats stay in conservancies established and managed by local small family businesses and community-based organizations. Since 1990, the wild population of this species in the Dashti-Djum state nature reserve and adjacent areas has been threatened by illegal trophy hunting and poaching.

The Bukhara deer (*Cervus elaphus yarkandensis*) population seriously decreased as a result of the military conflict in the early 1990s. In 1994, it was categorized by IUCN as Vulnerable (VU). It is listed in the CITES Appendix II. The species is slowly recovering. In 2012, its population in Tajikistan amounted to 184 animals.

The Goitered gazelle (*Gazella subgutturosa*) is categorized by IUCN as Vulnerable (VU), as its population is continuously decreasing at an alarming rate (more than 30 per cent over 10 years), due to heavy poaching and habitat loss. Its population in Tajikistan amounted to only 120 specimens in 2012.

The Marco Polo sheep (*Ovis ammon polii*) is categorized by IUCN as Near Threatened (NT) on the global scale; its population has a decreasing trend, mostly due to overhunting, poaching and habitat loss. The Marco Polo sheep population in the country amounted to 4,935 animals in 2012.

Tajikistan also harbours other ungulates, e.g. the Siberian ibex (*Capra sibirica sakeen*), categorized as Least Concern (LC); its local population was estimated at some 10,207 animals in 2012. Tajikistan is also a refuge for large carnivores, e.g. the brown bear (1,168 specimens in 2012) and wolf (3,118 in 2012).

Red Book

Work on the second edition of the Red Book of animal and plant species, revised in line with IUCN recommendations, started in 2010 (2010 Resolution of the Government No. 387). The second edition of the Red Book was published in October 2015, in the Tajik language. Translations into Russian and English are expected to be available in 2016. The current Red Book follows version 3.1 of the IUCN Red List Categories and Criteria. It lists more species than the previous one, for instance as many as 222 animal species, compared with 162 species in the 1988 edition. This is due to recent methodological corrections, e.g. the inclusion of lichens, and not to the growth in the number of endangered species.

8.2 Current situation and trends in forests

State of forests

The current state of forest and non-forest ecosystems is not sufficiently documented to allow proper assessment. The last forest inventory was carried out before 1991. Some sources report an inventory of 1998; however, this information is not available. Spatial information and cartographic data are either not available or outdated. No systematic monitoring of forest ecosystems has been carried since 1991, and no forest, non-forested areas and forestry database exists.

Assessment of the current state of and trends in forestry, and progress made in recent years, is hardly possible, due to the general non-availability of

reliable, accurate and updated data on forest resources. The situation of forests and their management has neither changed nor improved since 2010. The vast majority of forests have been completely destroyed in recent decades, while the small remnants of forests that have survived until today mostly in remote and sparsely populated areas are gradually decaying, due to the lack of protective measures coupled with growing pressure on their resources.

Forest ecosystem services are not limited to the provision of natural resources, such as timber and firewood (which still remains the most important fuel for rural households and thus for the predominant part of Tajikistan's population) or non-timber forest products important for human subsistence, e.g. meat of game animals, fruits and nuts, wild berries and medicinal plants, oils and honey. Forests perform important environmental functions, e.g. for water balance and climate regulation, soil protection, prevention of wind and water erosion, and slope stabilization.

Forest ecosystems are particularly important for a mountainous country of dry subtropical and semi-arid continental climate like Tajikistan. Removal or thinning of the forest vegetation cover may result in desertification, landslides, mudflows or other natural disasters, limiting the profitability of agricultural practices and threatening human settlements. Mitigation of these adverse effects is not always possible but always very expensive. Therefore, the prudent use of remaining forest resources through proper forest management, the regeneration of forests and the spatial extension of afforested areas can not only prevent the occurrence of such natural disasters but also reduce government expenditures on risk management, protective and emergency measures, thus saving much of the limited state budget funds.

Forestry management in Tajikistan for more than the last 20 years has been based on outdated inventories and rough estimates, not necessarily reflecting the actual situation. Such estimates cannot take into account the rate of ongoing deforestation, in particular the process of decline of the forest canopy cover density, which gradually turns the majority of those forests still remaining closed into sparse forest (with the stand density below 40 per cent), typical of areas of transition from forested to non-forested landscapes. Additionally, data on the forest cover seem to be overestimated, due to the fact that fruit tree plantations and areas covered by shrubs and bushes are also counted as "forests". Similarly, statistics provide information on the size of areas subject to reforestation and afforestation activities,

but are not informative on the results of these measures, e.g. seedling survival rates (the percentage of seedlings that survived the first years after being planted) or the size of areas where reforestation and afforestation had been successful.

Figures published in official statistics for 2014 are slightly inconsistent. For instance, according to the statistical book *Environmental Protection in the Republic of Tajikistan*, the total area covered by forests was 410,000 ha in 2009 and 416,700 ha in 2010–2012. The 2014 Statistical Yearbook indicates different numbers: 412,400 in 2010 and 2011, and 421,200 ha in 2012. Both publications provide very similar values (421,100 and 421,200 ha) for 2013. The state forest fund accounts for 1.8 million ha, including 0.4 million ha of forests and 1.4 million ha of non-forested areas, e.g. pastures.

Types of forests by species

There are 268 forest-forming species overall in Tajikistan – 100 tree species and 168 shrub species. According to 2013 statistical estimates, coniferous forests, predominantly composed of four juniper

species (*Juniperus zeravshanica*, *J. semiglobosa*, *J. turkestanica*, *J. sibirica*) with Turkestan birch (*Betula turkestanica*), Tajik poplar (*Populus tadshikistanica*) and barberry (*Berberis vulgaris*) as admixture species, covered some 150,000 ha (over 35.6 per cent of the total afforested area), accounted for 3.6 million m³ of the total timber stock, and had an average age exceeding 200 years.

Hard-leaved xerophytic light forests are mainly located in southern Tajikistan. They include pistachio and Bukhara almond natural forests and plantations, cover 99,000 ha and represent a timber stock of 475,000 m³. Broad-leaved mesophytic forests include maple and walnut forests of the temperate climatic zone, with an area of 172,000 ha and timber stock of 1.9 million m³ (table 8.1).

Reforestation

The annual rate of deforestation caused by intensive livestock grazing and illegal firewood collection is higher than the natural forest biomass increment and natural forest regeneration ability.

Table 8.1: Forest types and species

Forest	Area, ha	Timber stock, m ³	Average age, years
Coniferous forests			
Coniferous forest (<i>Juniperus zeravshanica</i> , <i>J. semiglobosa</i> , <i>J. turkestanica</i> , <i>J. sibirica</i>) with Turkestan birch (<i>Betula turkestanica</i>), Tajik poplar (<i>Populus tadshikistanica</i>) and barberry (<i>Berberis vulgaris</i>)	150 000	3 600 000	>200
Hard-leaved xerophytic light forests			
Pistachio (<i>Pistacia vera</i>) forests with Bukharian almond (<i>Amygdalus bucharica</i>)	79 000	330 000	80
Bukharian almond with pistachio and cercis	12 000	105 000	40
White saxaul (<i>Haloxylon persicum</i>) and black saxaul (<i>Haloxylon aphyllum</i>)	8 000	40 000	20
Broad-leaved mesophytic forests			
Turkestanian maple (<i>Acer tataricum semenovii</i>) with Tajik poplar (<i>Populus tadshikistanica</i>) admixture	44 000	430 000	40
Persian walnut (<i>Juglans regia</i>) with Tajik poplar (<i>Populus tadshikistanica</i>) admixture	8 000	324 000	120
Small-leaved Asiatic poplar	24 000	710 000	50
Other poplar	7 000	95 000	20
Willow	11 000	80 000	40
Birch	3 000	84 000	40
Sea buckthorn (<i>Hippophae rhamnoides</i>)	2 000	90 000	20
Other (including shrub)	73 000	100 000	30

Source: Salimov T. (ed.) (2012) Forest Genetic Resources of Tajikistan. Irfon. Dushanbe.

Photo 8: Drying of teresken by local people, Savnob village, Bartang valley, GBAO

Reforestation activities have been carried out since 1969. Initially, reforestation measures were applied to some 4,500 ha each year, and the seedling survival rate varied from 72 per cent in the period 1960–1982 to 68 per cent in the period 1982–1994. Beginning from 1993, reforestation decreased to some 3,000–3,500 ha per year (with a seedling survival rate of 78 per cent), and to merely 1,000 ha per year around 2007–2008 and in 2012. Since 2013, reforestation activities are annually applied to some 2,100 ha, and the seedling survival rate is estimated to be between 60 and 70 per cent. Such a low seedling survival rate results not only from the unfavourable soil and climatic conditions but also improper species selection and lack of plantation maintenance. The majority of seedlings planted are of non-native species, fast growing (e.g. sequoia) and/or yielding fruit, but not necessarily best adapted to the local conditions. Simultaneously, according to official statistics, activities aimed at enhancing the natural forest regeneration have been completely abandoned in recent years.

Taking into account the current state of forests in Tajikistan, the optimal area of reforestation activities would be some 4,500 ha per year – twice the average of recent years. This might not yet allow a significant increase in the forest coverage of the country, but could probably offset the current deforestation trend.

A precondition for the success of any reforestation programme is that planted forest tree seedlings and

saplings are well protected, at least throughout the first years, so that their growth is not disturbed by external factors. In general, neither mechanical nor chemical repellents, which could protect young seedlings, are used, as the local forestry institutions can hardly afford the cost of seedlings and planting works, much less their continuous nursing.

8.3 Pressures on forests and biodiversity

The livelihood and subsistence of the vast majority of the rural population is largely dependent on the use of various biodiversity resources and the continuity of provision of their ecosystem services. Traditional uses of natural resources (e.g. fuelwood collection, grazing, hunting, fishing, collection of wild animals for international trade, collection of wild plants for medicinal purposes, collection of wild forest fruit and berries) can easily turn into pressures on biodiversity and natural resources if not adequately regulated by the national legislation, effectively controlled and sustainably managed.

Adequate assessment of the changes in the level of pressures on ecosystems and species diversity since 2010 is not possible, due to data deficiency.

Deforestation and logging

Currently, the most alarming and still growing pressure on both forest and non-forest ecosystems most probably results from unsustainable extensive

livestock grazing practices. This pressure results not only in ongoing and accelerating deforestation, destruction of both forest and non-forest plant communities and the loss of habitats of different wild flora and fauna species but also in intensifying soil erosion processes and desertification. Overgrazing of pastures, in particular winter ones, results in the decline of their regeneration potential, a decrease in the pastures' carrying capacity, and the consequent decrease in the profitability of animal husbandry (chapter 9). It is estimated that, due to logging and intensive cattle grazing, the area of juniper forests declines at the rate of some 2 to 3 per cent per year. Due to intensive livestock grazing in pistachio light forests, their natural regeneration is no longer possible. Uncontrolled livestock grazing in forest areas and illegal logging destroy the effect of the reforestation or afforestation programmes carried out over several years, in just a few hours.

According to different sources, another pressure on forest ecosystems is illegal logging for fuelwood and firewood collection, which has decreased over the last 10 years, due to the growing availability of other energy sources such as domestic coal. Such a desired shift would also be particularly important for limiting the pressure on the collection of teresken (*Ceratoides papposa*) dwarf shrubs in the eastern part of Tajikistan, for use as either fuel or forage. Intensive teresken collection, combined with extensive livestock herding, has reportedly led to the species' disappearance in some regions of the Pamir mountain range.

The total timber stock in 2013 was estimated at nearly 6 million m³ (5,988,000, which is more than the 5.1 million reported in the 2014 Statistical Yearbook). The majority of the rural population (up to 70 per cent, or some 5-6 million inhabitants) still relies on firewood as the main and most available fuel. Thus, the timber stock volume should be compared with the annual demand for firewood. Taking into account the local climatic conditions (in particular in mountain regions), the quality of thermal insulation of houses, and the efficiency of heating and cooking techniques currently in use in Tajikistan, some sources estimate the average annual demand for firewood to be between 3 and 4 m³ per person. Therefore, the total timber standing stock of all forests in Tajikistan would not be enough to meet the national demand for firewood throughout a single year.

The main source of firewood is private household gardens, in particular the larger ones, which allow the local population to plant more woody vegetation in order to meet their firewood needs at no additional

cost. Another commonly used source of firewood, collected free of charge, is the forest shelter belts on irrigated farmland, saxaul protective belts, or strips of woody vegetation along roadsides, field bounds and watercourses in mountain ravines. Furthermore, as most of the agricultural land in Tajikistan is much more suitable for livestock farming than for the production of crops, in some regions, dried dung is more commonly used as fuel than firewood, which is much less accessible in mountain regions, e.g. in Pamir. Some villages are supplied with coal for heating purposes, while the number of mountain settlements where electricity is becoming available is still growing, which also limits the dependency on firewood.

The planting of fruit trees is widely promoted, including by programmes aiming at horticulture and vineyard development in rain-fed degraded areas. Local communities and individual farmers prefer to plant and grow fruit trees rather than forests. As a result, the demand for fruit tree seedlings in the market is much higher than for trees of typical forest-forming species. The obvious reason is that fruit trees yield product and bring profit immediately, in just a few years after being planted, while some forest tree species native to Tajikistan, in particular under harsh mountain climatic conditions, reach the optimal economic maturity for timber harvesting at the age of some 100 to 200 years. Another challenge for forest management is that fruit tree planting successfully competes for available land and funds with forest restoration.

Needless to say, orchards and forests constitute quite different ecosystems and play different ecological functions. Orchards would never yield the same volume and quality of firewood or timber for construction and industrial purposes as forests. The strategic question, of course, could be what might be the desired optimal proportion between land allocated for growing orchards and forests.

A relatively small amount of firewood comes from the state forests; it is either bought directly from state forestry institutions or harvested by the end users, according to the joint forest management approach. Due to their important environmental functions and scarcity, all forests in Tajikistan are classified as protective forests. The amount of firewood that can be purchased from state forestry institutions cannot satisfy the demand. As a result, illegal firewood collection and unauthorized logging are still common.

Due to the lack of forest monitoring, no statistical data on the amount of illegally acquired firewood are

available. Illegal logging is reported to have decreased significantly (even by 90 per cent over the last 10 years), mostly due to the still increasing availability of other energy sources. Nevertheless, establishing fuelwood plantations in areas less favourable for grazing, in the close vicinity of villages, could further limit the adverse effects of the still strong pressure on forest resources.

Some other traditional extractive uses of non-timber forest products (e.g. cutting grass under a loose canopy of salix or populus treestands and processing it into hay for animal forage; collection of wild forest fruits, berries and nuts; honey harvesting) have a comparatively lesser impact on forest ecosystems. According to different sources, collection of medicinal plants growing either in the wild (over 60 plant species) or cultivated in special forestry farms (some 22 species) yields revenue between 2.5 million and 5.6 million somoni per year. However, if immoderate and not effectively controlled, this activity can lead to the extinction of these valuable species (as has happened to at least two rare plant species included in the Red Book).

Hunting

The 2014 Law on Hunting and the Hunting Sector classifies some Red Book animal species as game animals of the "limited species" group. Each year, the Committee on Environmental Protection receives requests submitted by hunting organizations and makes enquiries of the Academy of Sciences for scientific opinion on the number of animals that could possibly be removed without harming the viability of the species population. Thereafter, requests are examined, taking into account the Academy's opinion, and each case is subject to governmental decision on setting quota for a particular year. Finally, the Committee distributes licences among hunting organizations.

Hunting of other game species that are not considered endangered is regulated by the system of permits (hunting tickets) issued by the Forestry Agency. Prices for each species are set on the basis of the 2007 Government Resolution No. 546 "On approval of the charges for the conduct of legally important activities and the payments for the issuing of permits for the use of natural and other available resources". The entire revenue from hunting of "unlimited species" remains in the forestry sector and is used to cover investments and operational costs of the local forestry institutions; however, reportedly, only a tiny amount is collected. Hunting of species from the Red Book yields much higher revenues.

A licence for hunting a species from the Red Book may cost up to US\$50,000 per head. According to the 2006 Law on Other Obligatory Payments to the Budget, the payments are made to a special account of local nature protection authorities of the territory where the animal is hunted. The funds are then distributed according to the Regulation on special nature protection account, approved by the Ministry of Finance. The payments for hunting Red Book species are distributed as follows:

- 15 per cent to the state budget;
- 20 per cent to the Committee on Environmental Protection;
- 20 per cent to the Oblast Division on Environmental Protection for organisation of anti-poaching campaigns, patrolling rounds and purchase of equipment;
- 45 per cent stays with local nature protection authorities to be used for organisation of anti-poaching campaigns, patrolling rounds and purchase of equipment, and also for the purchase of coal to prevent illegal harvesting of teresken which serves as fodder for grazing animals, both wild and domestic.

The 2014 Law on Hunting and the Hunting Sector stipulates the following principles for the distribution of payments for hunting tickets: 40 per cent will go to the local community authority (which may then use it to buy coal to disincentivize illegal logging of firewood, for example), 20 per cent to a special fund for protected areas (but only in the case of hunting carried out in or near protected areas) and the remaining 40 per cent to the Forestry Agency to finance hunting management.

The annual hunting quotas for the 2014–2015 hunting season allowed the hunting of 85 Marco Polo sheep and seven Bukharan markhor (both species are currently categorized by IUCN as Near Threatened), and one Bukhara urial (categorized by IUCN as Vulnerable). Hunts are often restricted to locally based private or community-owned conservancies. Each year, a hunting quota for brown bear is set at the level of 10, in order to provide the necessary safety margin in case some animals become aggressive and dangerous to humans, but this permitted quota is not usually used. Other important game animal species are the Siberian ibex, wild boar (*Sus scrofa*) and chukar partridge (*Alectoris chukar*).

Poaching and illegal fishing

An indefinite number of wild animals, including the snow leopard, Bukhara urial, Bukharan markhor, Turkmen gazelle, Marco Polo sheep, Siberian ibex,

wild boar and chukar partridge, are poached for meat or as trophies. Occasionally, marmots and brown bears are hunted for their fat, meat or gall bladders, which are used in traditional folk medicine.

No data on poaching and illegal trophy hunting are publicly available; the same relates to illegal fishing.

Other pressures

Other non-extractive anthropogenic pressures on biodiversity and ecosystems include conversion of natural ecosystems into agricultural land (the case of Sari-Khosor nature park in 2003), fragmentation, degradation or destruction of habitats and landscape in the course of infrastructural investments, the establishment of barriers to species migrations (HPP dams have no fish elevators), illegal construction of settlements inside protected areas (the case of state nature reserve "Romit" in the 1990s) and the introduction of invasive alien species. Water and water-related ecosystems are influenced by the discharge of wastewaters. Climate change affects almost all ecosystems present in Tajikistan. These pressures are likely to increase in the near future.

8.4 Genetically modified organisms

In the absence of industries producing GMOs, probably the most important strategy would be to prevent both the deliberate import of GMOs and their products and the non-deliberate or illegal transboundary movement of GMOs, both of which could have adverse impacts on biological diversity or ecological balance. Despite the fact that Tajikistan is officially considered to be a GMO-free country, according to some sources, some GMO species are imported from abroad.

No mechanism has been put into practice for taking decisions on the import or domestic use of GMOs, placing of GMOs on the market, monitoring of potential effects of GMOs released into the environment, or application of emergency measures in such an event, despite the relevant provisions in the 2005 Law on Biological Safety. No procedures for the sampling and detection of GMOs exist.

The country has no experience in conducting risk assessments nor in controlling intentional transboundary movements of GMOs, as no such case has been reported to date. Some 50 customs officers received basic training in the identification of GMOs, but have no access to facilities or equipment for their detection. The country has no certified laboratory to identify GMOs.

8.5 Protected areas

In terms of protected area network development, Tajikistan can best be characterized as being relatively advanced in protected area designation. It is, simultaneously, struggling with the challenge to ensure the more effective management of already designated protected areas.

The 2011 Law on Specially Protected Natural Areas lists the following eight categories of protected areas:

- State nature reserves;
- State nature parks;
- Nature preserves;
- State zoological parks;
- State monuments of nature;
- Ecological-ethnographic zones;
- Dendroparks and botanical gardens;
- Natural zones of health resorts, therapeutic and recreational zones.

The first three categories are the most important for effective biodiversity conservation, regardless of their different management regimes. All eight protected area categories are to a certain extent represented in the current system of protected areas.

The protected area system has not changed considerably since 2010. According to the Management Plan for the Tigrovaya Balka state nature reserve for 2012–2016, the area of this reserve, previously encompassing 49,786 ha, was extended in 2011 by an additional 12,462 ha of the Dzhilikulsky, Kabadiyansky and Kumsangirsky districts, and currently amounts to 62,248 ha. No new protected areas have been established. None of the currently available inventories confirms the presence of the two new protected areas, namely, the natural park Medvezhya Roscha (reported to have been established in 2004 with an area of 1,200 ha) and the nature preserve Serdarinsky, which was planned to be established.

Official statistics tend to present rough estimates, based on outdated inventories and information dating back to 1998. Different statistical materials and databases provide different numbers and information on particular areas. The currently available inventories, statistics and other official documents do not yet follow the protected area categorization mentioned in the 2011 Law, and continue to use previously assigned, traditional designations, e.g. national park or historical-natural park instead of state nature park. Simultaneously, official statistics seem to slightly overestimate the total protected area and percentage share of protected areas in the

territory of the country. This is probably caused by the fact that the area of Muzkul nature preserve, entirely located within the boundaries of the Tajik national park, is always counted separately, which adds to the total.

The 20 protected areas, jointly encompassing over three million ha, are the key elements of the protected area network (table 8.2). Other protected area categories occupy much smaller territories, as the total area of five botanic gardens, 13 botanic stations and field nurseries, and three tourist-recreational zones amounts to 731 ha, 10,000 ha, and 15,300 ha, respectively. The area of all 26 state monuments of nature is so small that it is not even indicated in statistics.

The three million ha of protected areas accounts for about 21.58 per cent of the territory of Tajikistan. Such a high proportion of protected area in the overall territory of the country (one of the MDG biodiversity-related indicators for monitoring progress under Goal 7, Target 7.B) is well over the 10 per cent protected area country coverage recommended by the IUCN.

The area of one park, Tajik national park (box 8.1), alone constitutes almost 85 per cent of all protected

areas in the country. Further, 13 nature preserves jointly encompass around a further 10 per cent of all protected areas (table 8.2).

So far, no biosphere reserves have been designated by UNESCO in Tajikistan. As for other international designations, no new wetlands of international importance (Ramsar sites) have recently been designated in Tajikistan. Currently, Tajikistan has five Ramsar sites (table 8.3).

Management

Some protected areas already have a valid five-year management plan, e.g. Almosi nature preserve, adopted in 2010, Shirkent historical and natural park, adopted in 2011, Tigrovaya Balka state nature reserve, adopted in 2011, and Tajik national park, adopted in 2012. Most often, these management plans have been prepared with the assistance of foreign experts, under different projects supported by, e.g. the World Bank/GEF or the Governments of Germany and Norway, and implemented through partnerships between local organizations, stakeholders and protected area administrations and international organizations, e.g. UNDP, UNEP, Fauna and Flora International or WWF.

Table 8.2: State nature parks, state nature reserves and nature preserves

	Year of designation	Area, km ²
State Nature Reserves		
Dashti Djum	1983	197.0
Romit	1959	161.6
Tigrovaya Balka	1938	497.9
Zorkul	1972	877.7
State Nature Parks		
Shirkent historical and natural park	1991	319.0
Tajik National Park*	1999	26 116.7
Sarikhosor natural park	2005	308.5
Nature Preserves		
Oktosh	1977	150.0
Almosi	1983	60.0
Childuhtaron	1970	145.0
Dashti Djum	1972	501.0
Iskanderkul	1969	300.0
Karatav	1972	144.0
Komorow	1970	90.0
Kusavli-Say	1959	198.4
Muzkul	1972	669.2
Nurek	1984	300.0
Sangvor	1972	509.0
Say-Vota	1970	42.0
Zeravshan	1976	23.8

Source: Agency of Statistics, 2015. Figure for Tigrovaya Balka adjusted by ECE Secretariat.

Note: * Tajik state nature park according to the terminology of the 2011 Law on Specially Protected Natural Areas.

Box 8.1: Tajik national park

Tajik national park (Tajik state nature park according to the terminology of the 2011 Law on Specially Protected Natural Areas), established in 1992 and significantly extended in 2001, protects the Pamir Mountains (the third-highest mountain ecosystem in the world, after the Himalaya and Karakorum ecosystems), and encompasses the vast area of 2,611,674 ha, which accounts for more than 18 per cent of the territory of Tajikistan. The spatial functional zonation of the park accommodates both traditional uses by the local population and biodiversity conservation needs.

The applied zonation pattern includes the centrally located core area (strictly protected zone of 2,029,811 ha, which constitutes as much as 77.7 per cent of the park's total area), continuously stretching over the park area and thus having an exceptionally high level of physical integrity. The other zones are: the "traditional use" zone (270,120 ha, or 10.3 per cent), including two areas in the southernmost and far northeastern parts of the park; the "limited commercial use" zone (253,394 ha, or 9.8 per cent), including three areas (two adjacent to the external park boundary and one forming an enclave within the strictly protected zone); and the "recreation zone" (58,349 ha, or 2.2 per cent) in two areas at the northern park boundary (one of them at the state border between Tajikistan and Kyrgyzstan).

Due to the distance to the nearest larger human settlements, there is currently no need to establish any formal buffer zone around the park. In the west, the boundary coincides with the boundaries of Sangvor nature preserve (50,900 ha), filling the gap between the two parallel sections of the park core zone, while the other nature preserve (Muzkul, 66,916 ha) is entirely located within the park boundaries. Both Sangvor and Muzkul nature preserves were designated in 1972, 20 years prior to establishment of the park.

Table 8.3: Internationally designated protected areas

	Year of designation	Area, km ²
Ramsar sites		
Karakul Lake	2001	364.0
Kayrakkum reservoir	2001	520.0
Lower part of Panj River	2001	0.0
Shorkul and Rangkul Lakes	2001	24.0
Zorkul Lake	2001	38.0
World Heritage Site		
Tajik National Park* (Mountains of the Pamirs)	2013	26 116.7
Total		27 062.7

Source: www.protectedplanet.net/, 2015.

Note: * Tajik state nature park according to the terminology of the 2011 Law on Specially Protected Natural Areas.

Tajik national park has a management plan valid for five years, 2012–2016. However, its implementation will largely depend on the availability of funds and operational capacity of the park administration. The total budget required for the plan's implementation amounts to 4.115 million somoni. The state budget has to provide 33 per cent of this amount, while the remaining 67 per cent (2.761 million somoni) is supposed to come from donors.

The management plan of the Tajik national park includes the development of a feasibility study on trophy hunting in the park area. Trophy hunting (which is always a controversial issue if carried out in protected areas of high legal protective status) is planned not exclusively in the "limited commercial use" zone, or in the Muzkul nature preserve managed by forestry authorities. The park zonation map additionally indicates five potential places for trophy hunting in the eastern part of the strictly protected core zone of the park, despite the fact that, according to the park management plan, the objective of the

core zone is conservation "with particular attention to rare and endangered species, without any human interference, except controlled tourism and research". Secondly, the range of species to be commercially hunted includes the same species whose conservation status has always been adversely influenced by poaching and illegal trophy hunting, namely, the Siberian ibex and Marco Polo sheep.

The Tajik national park's operational capacity might not yet be sufficient for the successful implementation of the management plan. In 2011, the park's 54 staff included only 19 rangers; the recruitment of 10 more rangers was planned for 2013. Park rangers are not properly equipped for area patrolling. In 2011, the sum total of equipment at the disposal of the park administration included six cross-country vehicles, two horses, one telephone and 40 mobile phones, four computers, one digital photo camera, one digital video camera, one GPS unit and two sets of binoculars. The first activity in the management plan (to be accomplished by 2013)

reflected the most urgent needs – strengthening the ranger force by increasing staff numbers and providing basic equipment. Nevertheless, taking into account the park area (26,116 km²), it is obvious that law enforcement by 19 or 29 rangers is still not feasible, even if they were properly equipped and assisted by volunteers. However, the remoteness of the park area and the inaccessibility of its core zone, coupled with the high altitude and severe weather conditions, significantly limit human interference, as the number of people penetrating these vast areas is currently negligible (about 1,200 visitors per year).

There are notable differences between the nature reserve and nature preserve categories. The nature reserve category means a strictly protected natural area, serving the effective protection of ecosystems and natural processes, where all economic activities are prohibited and access is restricted solely to scientists and rangers (depending on the country – in some cases, low-impact tourist visitation may be allowed). The protective status of nature reserve is legally granted with no time limitation, and its withdrawal, theoretically possible, is usually subject to complicated procedures, in the event that the natural values have seriously deteriorated or vanished. Thus, nature reserves have much higher legal protective status.

The nature preserve category means an area where economic activities and use of natural resources are regulated and limited by the law, for an indefinite or definite period, in order to achieve the specific nature conservation objective (e.g. to allow the conservation or regeneration of particular habitats or species).

Most nature preserves in Tajikistan are extensive and relatively well-preserved natural areas, where carrying out active management measures on a larger scale is neither necessary nor feasible, and is nonetheless restricted due to budgetary constraints.

A nature preserve in Tajikistan, according to the law, can be designated for either an indefinite period or a period of up to 10 years. Usually, its protective status is repeatedly extended, but not always. For instance, the Sarikhosor nature preserve, established in 1959 and later extended, in 1979, from 40,000 to 196,000 ha, was planned to be partially redesignated as Medvezhya Roscha national park, with an area of 80,000 ha. Instead, the nature preserve was withdrawn in 2003, due to the adverse results of intensive anthropogenic pressure on its broad-leaved forests, and the need for territorial development of a cattle-breeding complex. Currently, the Sarikhosor nature park protects less than 4,000 ha, roughly 2 per cent of the area previously protected in Sarikhosor

nature preserve. Most recently, according to some sources, the protective status of almost all nature preserves in Tajikistan (12 out of 13, the exception being Nurek) expired in 2013, and was not immediately extended. The unclear status of these areas resulted in growing pressures (e.g. for grazing areas) which, in some cases, led to their deterioration. Finally, in late 2015, the legal protective status of 12 nature preserves has been extended, for the next 10 years (until 2025). Therefore, the legal status alone of 13 nature preserves cannot currently be perceived as an effective solution to ensuring their protection, due to the uncertainty of their continued existence in the future.

The management effectiveness of the four nature reserves (Dashti-Djum, Romit, Tigrovaya Balka and Zorkul) is generally higher than that of the nature preserves. This is attributable in large part to the fact that all state nature reserves are legal entities with a stable and clear legal mandate, have valid land use certificates, are managed solely for nature conservation purposes, and receive more attention and support from the Government, foreign donors, international organizations and conservation NGOs.

Several protected areas receive technical support aimed at capacity building of protected area staff, including training and provision of basic equipment. Nevertheless, the successful implementation of existing management plans, and the elaboration of plans for remaining protected areas, depend on the availability of state budget resources and further support by international donors.

Ecological network

The scheme of the ecological network Econet was developed for the whole of Central Asia, including Tajikistan, in the framework of the GEF-UNEP/WWF medium-sized project "Econet Central Asia" (2003–2006). In Tajikistan, this work was followed up with the support of WWF in the framework of the project "Integrated river basin management and nature protection in the Tigrovaya Balka" (2008–2012) which resulted in, among other things, development of a management plan for an Econet cluster that included the Tigrovaya Balka state nature reserve as the core area and the surrounding territories ecologically connected to it. The 2014 Fifth National Report to the CBD mentions that the document "Eco-Nets Development System of the Republic of Tajikistan on the Basis of Econet" was adopted by the Government. However, no information on progress in the implementation of the system is available.

Protected areas expansion

The establishment of an international transboundary nature park in the border area at the borders with Afghanistan, China and Pakistan was planned in the period 2006–2010. The designation of the nature park Sangvor was planned in 2009. According to the Fifth National Report to the CBD, plans for the establishment of new nature parks and expansion of existing ones were already at the stage of implementation in 2014. However, no information on the progress and feasibility of these initiatives and their implementation is available.

Assessment

Improving the management effectiveness (in particular by raising the staff operational capacities for the implementation of management plans, where available) of the existing 20 protected areas is much more urgent than establishing any new protected areas.

The only exception is the designation of small state nature reserves to protect rare or endangered flora species and communities. Currently, such floristic nature reserves are completely lacking in the protected area network, while several species of flora inscribed in the Red Book probably also occur beyond the borders of existing protected areas.

Depending on the species and its habitat location, its conservation can often be achieved by modification of land use, or establishing small private or community-owned and managed nature reserves, upon provision of adequate financial compensation for the necessary limitations on land use, to be paid to landowners or land users. The only obstacle is that such small state nature reserves, to protect the best preserved habitats and most viable populations of these species of "special concern", cannot be designed, delineated and established prior to updating nature inventories and information on their occurrence and spatial distribution of their habitats.

8.6 Legal, policy and institutional framework*Legal framework*

The 2011 Law on Environmental Protection includes provisions on, inter alia, protected areas and conservation of rare and endangered species. In particular, it explicitly prohibits any economic or other use of plants and animals included in the Red Book, and also assigns the management of the protected area system to the national environmental authority.

The 2004 Law on the Protection and Use of Flora describes the principles of protection, use and reproduction of flora, rights and obligations of natural persons and legal entities, competences of governmental authorities, as well as the procedures for introducing prohibitions and limitations for the use of plants.

The 2008 Law on Wildlife addresses the use of fauna, hunting, fauna protection, protection of rare and endangered species, and zoological collections.

The 2011 Law on Specially Protected Natural Areas lists eight categories of protected areas and, for each category, defines objectives, procedures for its designation, its regime, management planning, spatial functional zonation and allowed uses within it. The Law also regulates issues related to the establishment of protected areas of international importance, resulting from international agreements to which Tajikistan is a Party or bilateral agreements. The Law provides for the designation of ecological corridors ensuring ecological connectivity and continuity, by linking natural areas and protecting species migration routes.

The 2011 Forest Code is committed to multipurpose forestry and recognizes the multitude of specific ecosystem services provided by the forests, as well as the importance of involving the rural population in the protection, preservation and management of forests. The joint forest management approach, previously tested under several pilot projects implemented with the support of international donors, is also reflected in the Code.

The 2013 Law on Fishery, Fishing and Protection of Fish Resources (chapter 1) is targeted at ensuring the productivity of resources, and much less at the protection of the diversity of fish species. However, such issues are regulated by the Law on Wildlife.

The 2013 Law on Pastures defines the basic principles of pastures, including key principles such as ensuring effective and integrated use of grazing, and preservation of pastures and the environment (chapter 9).

The 2014 Law on Hunting and the Hunting Sector (chapter 1) regulates the management and planning of the hunting sector, monitoring of game animals, methods and tools of hunting, status of hunters, distribution of hunting fees and inspection. The Law divides game species into unlimited and limited ones. Limited game species include species listed in the Red Book in the category "threatened by extinction".

The 2005 Law on Biological Safety aims at minimizing the risks of adverse impact of GMOs on human health, biological diversity, ecological balance and the environment by regulating GMO production, reproduction, testing, contained use, import and export, and placing on the market, and deliberate or non-deliberate GMO release into the environment. No subsidiary legislation has been put in place to facilitate the implementation of the Law, except for the technical regulations that touch upon GMO labelling of foodstuffs and fodder (2014 Resolutions of the Government No. 29 and No. 811).

The 2014 Resolution of the Government No. 791, which further develops the provisions of the 2011 Law on Environmental Monitoring, includes in the scope of environmental monitoring the specially protected natural areas, fauna, flora and ecosystems. Both the Law and the Resolution are not clear on the inclusion of forests in the scope of environmental monitoring.

The 2010 Resolution of the Government No. 387 addresses the manner of maintaining the Red Book, defines the criteria for inclusion of species in the Red Book and requires that the Book be reissued every 10 years.

Assessment

Some of the recently adopted legal acts contain internal contradictions, or are in obvious contradiction with other laws in force in Tajikistan. Some of the recently adopted laws worsen the conditions for successful biodiversity conservation.

The 2011 Law on Specially Protected Natural Areas does not provide for the continuity of existence of protected areas. Their protective status can be suspended or withdrawn, not only in the event that their natural values seriously deteriorate or completely vanish but also on the expiration of the period for which such protective status had previously been granted and once an urgent public need arises. Nature preserves can be designated for either an unlimited period of time or a period of up to 10 years. The Law has internal inconsistencies and contradictions. For instance, according to art. 4 para. 1, all specially protected natural areas constitute the exclusive property of the State, while, according to art. 30, nature preserves can either be state or private.

Similarly, the Law provides for the nomination of state nature reserves for inclusion in the World Network of Biosphere Reserves, and their functional zonation, following the UNESCO-MaB concept, including the transition zone, where sustainable

economic activities are explicitly allowed. At the same time, according to art. 23 para. 4, human presence in the territory of state nature reserves shall be quite limited, basically restricted to the reserve's personnel and control authorities. So the provisions of art. 23, in a way, exclude the possibility of implementing the concept referred to in art. 45.

As for the contradictions between different legal acts in force, and declining conditions for biodiversity conservation as a result of the recent adoption of new legal acts, the most striking example is the recent changes in legislation concerning the hunting of Red Book animal species. Pursuant to the Regulation on Hunting and Hunting Sector (approved by the 1997 Resolution of the Government No. 324 "On measures to improve hunting management on the territory of the Republic of Tajikistan"), hunting any of the animal species included in the Red Book is explicitly prohibited. Pursuant to the 2008 Law on Fauna, actions that may lead to death or reduction in number of the population of the Red Book animal species threatened by extinction are not allowed. Similarly, pursuant to the 2011 Law on Environmental Protection, any activity that leads to the reduction in number of the Red Book animal species population is prohibited. The 2014 Law on Hunting and the Hunting Sector legitimizes actions that are explicitly prohibited by other previously adopted legal acts, still in force.

Another shortcoming of the legal framework is that almost all recently adopted laws avoid regulating certain issues, by referring to indefinite other laws, with the use of the formulation "in accordance with the legislation". Often, such by-laws are adopted much later than a law that postpones the implementation.

The implementation of the 2005 Law on Biological Safety, which would allow Tajikistan to fulfil its commitments arising from the Cartagena Protocol on Biosafety, has been impeded by the absence of relevant by-laws establishing control and decision-making mechanisms, in addition to the lack of human and technical capacities, equipment and facilities.

Policy framework

No new policy documents on biodiversity, biosafety, forestry or protected areas have been adopted in Tajikistan in the period 2010–2015.

Officially, the 2003 National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity (NBSAP) (2003 Resolution of the Government No. 392) remains the main strategic

planning document for biodiversity conservation and natural resources management in Tajikistan. Since 2010, the NBSAP has much less often been referred to in other documents and strategies, probably due to the fact that the vast majority of specific NBSAP measures were originally planned for implementation in the first years after its adoption (between 2004 and 2006). The main objectives of the NBSAP were not reached, mainly due to limited human and financial capacities. The structure of the NBSAP has been criticized, as the multitude of goals and quite ambitious objectives, as well as the long list of planned measures, were not translated into detailed annual operational plans for implementation. The NBSAP was unclear on the most urgent priorities, while the successful implementation of all proposed measures was simply not feasible.

Due to Tajikistan's international commitments under the CBD, the 2003 NBSAP was revised and updated in 2016, following the decisions of the CBD COP10 in Nagoya in 2010. As of 1 December 2016, the updated NBSAP was approved by the Chair of the Committee on Environmental Protection and was awaiting for approval at the level of the Government. The updated NBSAP builds on data and information dated not later than 2012–2013. It includes unclear information about the rate of implementation of the measures included in the 2003 NBSAP. In one place, the updated NBSAP states that almost 40 per cent of the planned measures of the previous action plan remain not implemented. In another place, it states that 37 per cent of planned measures of the action plan were implemented.

The 2006 National Environmental Action Plan (NEAP) (2006 Resolution of the Government No. 191) includes 14 thematic action plans, including an Action Plan on Biodiversity Conservation. Activities and projects envisaged by the NEAP were planned for the period 2007–2011. According to the NEAP, improvement of the biodiversity monitoring system at local, regional and national levels, organizing systematic monitoring for all forest areas and protected areas, and development of information systems, including modern databases and GIS that could provide information for policymaking and management, were planned for 2007. Carrying out local, regional, and national inventories of flora and fauna, as well as the inventory and assessment of eco-networks were planned for 2007–2008. Expenditures related to biodiversity conservation issues were estimated at US\$9.1 million. However, the existence of the two parallel strategic documents (NBSAP and the NEAP's Action Plan on Biodiversity Conservation) did not provide for clear communication of national priorities to potential

donors. No assessment of the NEAP implementation is available.

The 2009 State Environmental Programme for the period 2009–2019 (2009 Resolution of the Government No. 123) contains a number of planned measures aimed at the protection of flora and fauna, as well as at enhancing the sustainable management of forests. It also planned the extension of protected areas, establishment of the protected area network, improvement of the state of protected areas, designation of new national historical-natural parks, reconsideration of the status of nature reserves and preserves and the possibility of their re-profiling, designation of small nature reserves and preserves, and development of a catalogue of unique natural sites and granting them protective status. However, these activities are absent in the corresponding Action Plan (2009 Resolution of the Government No. 602).

The 2010 Mid-Term Plan for the Implementation of the Concept on Environmental Protection for the period 2010–2012 (2010 Resolution of the Government No. 94) provided for, *inter alia*, such measures as establishment of buffer zones around Dashti-Djum and Zorkul reserves, development of a monitoring system for forest ecosystems with the use of remote sensing techniques, promotion of electrical energy supply to the population in the vicinity of protected areas and rehabilitation of the quarantine service on preservation of forest ecosystems. No information on its implementation was made available.

The 2005 State Programme on Cultivation, Collection and Processing of Medicinal Plants and Production of Medicines from such Plants for the period 2005–2014 (2005 Resolution of the Government No. 170) aims at enhancing the sustainability of exploitation of medicinal and aromatic plant species growing in the wild, promoting more sustainable means of their collection in the wild, as well as their cultivation, in order to prevent the overharvesting and decline of wild populations, as well as implementing the licensing system for their cultivation and collection.

The 2005 State Programme on Development of Specially Protected Natural Areas for the period 2005–2015 (2005 Resolution of Government No. 79) is supported by an action plan containing 28 priority activities, including the establishment of buffer zones, extension of protected area territories and redesignation of nature preserves as state nature reserves or state nature parks. The plan also envisaged the redesignation of the Kusavli-Say

nature preserve as the state nature reserve "Shahristan" in 2005 and the designation of a nature park Medvezhya Roscha. Plans for 2006 included redesignation of the nature preserves Iskanderkul and Zeravshan as nature parks, designation of the new Fann Mountains national park, and a considerable extension of the Shirkent historical-natural park territory from 3,000 ha to 31,000 ha. Designation of a nature preserve "Panj", with an area of 18,000 ha within the boundaries of Tajik national park, was planned for 2007. The plan envisaged the establishment of an international transboundary nature park in the border area at the state borders with Afghanistan, China and Pakistan. The establishment of a database on all protected areas in Tajikistan was also planned. However, none of these planned activities has so far been implemented.

The Programme for the Development of Forestry for the period 2006–2015 (2005 Resolution of the Government No. 396) aimed at forest protection and regeneration, and sustainable use of forest resources. It implied the establishment of some 150,000 ha of industrial forest plantations. If the Programme were successfully implemented, the afforested area in Tajikistan would significantly increase, and the share of forests in the overall territory of the country (currently 2.95 per cent) could extend to 4.0 per cent. Furthermore, the additional 150,000 ha of planted forests could (but no earlier than in the period 2040–2050, for example) easily satisfy the total future domestic demand for timber, in particular for firewood. Some sources criticize the Programme for not formulating the objectives of the forestry policy in a clear manner, and for emphasizing the issues of protection, rehabilitation and sustainable use of forests without explaining the realistic strategies to achieve these aims.

The Programme implementation was generally underfinanced. Only some 30 per cent of required funds were available. Some sources claim that, despite the budgetary constraints, much has in fact been achieved, and refer to the revision of the Forest Code and the adoption of the Law on Hunting and the Hunting Sector, which became the legal basis for the development of numerous subsequent by-laws, currently under interministerial consultation. No other information on the Programme's implementation, outcomes and effectiveness for the preservation, regeneration and sustainable management of forests was provided. The plan to extend the forest area by an additional 150,000 ha over the past 10 years has not been fully implemented.

The Environmental Monitoring Programme for the period 2013–2017 (2012 Resolution of the Government No. 685) does not provide for any measures on the monitoring of forests and biodiversity.

Draft policy documents

A draft of a new State Programme for the Development of Specially Protected Natural Areas is expected to be adopted in late 2016.

The draft Strategy for the Development of the Forestry Sector for the period 2016–2030 and the corresponding draft Action Plan for 2016–2020 have been submitted for adoption by the Government. Reforestation is an essential component of the draft Strategy, which assumes the planting of 10,000 ha of new forests over the next 15 years, which is much less than is currently practised. Expenditures on reforestation-related activities account for some 25 per cent of the planned total budget necessary in the first five years (2016–2020). The Action Plan envisages planting no less than 1,000 ha of forest per year, implementing measures aimed at the rehabilitation of degraded forests on an area of no less than 2,000 ha every year, and enhancing the natural forest regeneration on an area of no less than 8,000 ha annually. The documents do not include measures on fuelwood planting and establishment of energy plantations around villages. The draft Strategy assumes an increase in the number of households contracted for joint forest management (from the current 721 to 3,500). The draft Action Plan includes activities on involvement of the local population in the joint forest management schemes, with the budget for these accounting for 2 per cent of the total. According to the draft Action Plan, the state budget and other sources are currently in a position to ensure up to 14.81 per cent of the required funds, while the sources of the remaining 85.19 per cent of the desired budget are not identified.

Assessment

Several weaknesses of the current policy framework for biodiversity conservation and sustainable forest management can be identified. First, the multitude of different strategic documents of equal status with either the same or, to a large extent, overlapping objectives, all valid for the same period and therefore expected to be simultaneously implemented, resulted in competition for the limited available state budget funding and limited institutional and staff capacities. Similarly, foreign donors have difficulty understanding what the priorities are among several similar and overlapping policy documents. A

situation in which the same objectives or measures appear under several different headings, often with different required budget amounts, does not raise the credibility of these documents in the perception of potential donors. In some cases, substantive contents of the strategic documents are not fully reflected in the corresponding implementation action plans. As a result, some of the catchy objectives, serving as the justification for the formal adoption of the main strategic document, are either left with no actual follow-up or their achievement is postponed for an indefinite period. This applies, in particular, to the State Environmental Programme and its Action Plan.

Strategic documents often contain overambitious objectives to be achieved in a limited amount of time and which are not compatible with the limited institutional and human capacities. In some cases, the planned budget amounts are calculated below any reasonable costs, in order to get the action plan formally adopted. Such underbudgeting practice results in underfunding, which leads to the ultimate failure of the whole document. The ability to provide adequate financing from the state budget is still low, which makes the implementation of strategic documents heavily dependent on the availability of external funding support.

Institutional framework

Following the 2013 Decree of the President No. 12, the Forestry Agency under the Government was established. The State Institution for Forestry and Hunting, the State Institution "Scientific-Research Institute for Forestry" and the State Institution of Specially Protected Natural Areas were taken from the Committee on Environmental Protection towards the Forestry Agency.

Committee on Environmental Protection under the Government

Since late 2013–early 2014, the responsibilities of the Committee on Environmental Protection no longer include forests, forestry and protected areas.

The State Institution "National Biodiversity and Biosafety Centre" (NBBC), subordinated to the Committee, is perceived as the only institution in Tajikistan in possession of comprehensive information on the diversity of species and ecosystems, including forests, in the country. The NBBC currently displays on its website an online database "Flora, fauna and protected areas".

However, the vast majority of the data currently published on the NBBC website comes from the

results of scientific research result carried out and published in the Tajik Soviet Socialist Republic (SSR), namely in 10 volumes of the "Flora of the Tajik SSR" and 20 volumes of "Fauna of Tajik SSR" series. Thus, the information on particular species population numbers is an estimate and spatial distribution of the areas or sites of its occurrence were last researched in, for instance, 1955–1956. This may of course have some historical reference value, but cannot prove the species' continuing existence and distribution in 2015. Information on protected areas does not reflect the changes in the territorial size of protected areas.

Forestry Agency

The Forestry Agency (2014 Resolution of the Government No. 132) is responsible for state policy and regulation on forests, the forest sector, forest resources, hunting and the hunting sector, flora and fauna, and specially protected natural areas. It also carries out the management functions of the system and provides the state control. The organizational structure of the Agency includes the State Forest and Hunting Inspectorate, the State Institution "Scientific-Research Institute for Forestry", 41 state forestry institutions (leskhozoes) conducting forestry management on the territory of the state forest fund, and the State Institution of Specially Protected Natural Areas.

The forestry staff working in the 41 state forestry institutions, 13 nature preserves and 5 state tree nurseries in 2015 totalled 1,145 permanent employees. Their salaries are funded by the state budget, which accounts for some 70 per cent of the budgetary resources at the forestry institutions' disposal. Operational revenues of state forestry institutions (the remaining 30 per cent) allow for the employment of additional forestry personnel, approximately 1,000 people. However, in the busiest forestry work seasons the number of employees of the forestry sector, both permanent staff and seasonal workers, may be around some 8,000 people in total.

The State Institution of Specially Protected Natural Areas manages 2.8 million ha of territory and employs some 400 people in the State Institution of Specially Protected Natural Areas, three state nature parks and four state nature reserves.

Other

Although two laboratories designed for living modified organism (LMO) and GMO identification have recently been provided to the Agency on Standardization, Metrology, Certification and Trade

Inspection under the Government (Tajikstandard), they are not yet operational, due to the lack of by-laws and agreements with other state agencies. The Biotechnology Centre of the Agricultural University lacks staff and modern equipment for monitoring LMOs and GMOs. The Veterinary Institute of the Tajik Academy of Agricultural Sciences does not have equipment necessary for research on the use of LMOs and GMOs in veterinary medicine.

Assessment

Already before 2014, unclear and overcomplicated arrangements on sharing responsibility for parts of the protected area system existed between the former State Institution of Specially Protected Natural Areas and the former State Institution for Forestry and Hunting (both under the Committee on Environmental Protection). The establishment of the Forestry Agency was expected to clarify institutional responsibilities. However, it did not improve the situation. Now under the Forestry Agency, the State Institution of Specially Protected Natural Areas has not been assigned the responsibility for the management of the entire network of state-owned protected areas in a harmonized manner. Instead, the 13 nature preserves are managed by the forestry authorities rather than by the State Institution of Specially Protected Natural Areas.

Fees and revenues

The limited state budget funding for the biodiversity and forestry sector is supplemented by revenues from forestry operations and fees collected for the use of natural resources.

The revenues come from the sales of the firewood (some 10,000 to 11,000 m³ per year, sold at various prices, depending on the region and tree species), hay, wild forest fruit and berries, honey, fruit tree seedlings from state-owned nurseries and medicinal plants cultivated in special forestry farms. The fees are collected from the local population for their use of different natural resources, e.g. firewood (104 somoni per m³, regardless of the species) or medicinal plants. The collection of medicinal plants (more than 60 wild and 22 cultivated species) yields revenue of between 2.5 million and 5.6 million somoni per year.

In addition to the above, pasturage tax is collected for the use of pastures belonging to the state forest fund (chapter 3). This fee is imposed on any sort of livestock grazing in the "forestry" area, per head, e.g. of cattle or horse. Since 2009, the full amount of pasturage tax collected has remained in the forestry

sector. The amount of the pasturage tax is indexed annually by the Tax Committee under the Government, to compensate for inflation. For example, in 2015 this tax was 2.48 somoni per cow per year. The total income from the pasturage tax tends to grow by some 8 to 9 per cent each year, and brings in some 1.5 million to 2 million somoni annually, which is used for the rehabilitation of pastures and forest planting.

The revenue from hunting "unlimited species" is reportedly around 15,000 to 18,000 somoni (some US\$3,000) per year, while hunting "limited species" (listed in the Red Book) brings in much higher profits. According to the 2014 Fifth National Report to the CBD, annual income for the state economy generated from the biodiversity of specially protected natural areas (hunting, in 2012) equals US\$2.9 million.

8.7 Global and regional agreements and processes

World Heritage List

The Tajik national park was inscribed on the World Heritage List in 2013, becoming the first natural World Heritage site, and second World Heritage site, in Tajikistan. Five other natural areas (Dashti-Djum, Tigrovaya Balka and Zorkul, Kusavli-Say, and Fann Mountains, encompassing several other protected areas) are on the Tentative List.

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

The Memorandum of Understanding on the conservation and restoration of the Bukhara deer, signed under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals by four Central Asian countries (Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan), became effective in 2002 and is accompanied by the Bukhara Deer Action Plan. The Bukhara deer is also covered by the Programme of Work of the Central Asian Mammals Initiative under the Convention.

Convention on Biological Diversity

Tajikistan acceded to the Convention on Biological Diversity (CBD) in 2007. The NBSAP was revised and updated in 2016, in line with the global Strategic Plan for Biodiversity 2011–2020, adopted by the 10th meeting of the Conference of the Parties (COP10) held in Nagoya in 2010. As of 1 December 2016, the updated NBSAP was approved by the Chair of the

Committee on Environmental Protection and was awaiting the approval of the Government.

Tajikistan acceded to the Cartagena Protocol on Biosafety in 2004. The role of National Focal Point for the Cartagena Protocol was entrusted to the NBBC. Tajikistan participates in the Biosafety Clearing-House mechanism.

The UNEP/GEF project "Support for the implementation of National Biosafety Framework of the Republic of Tajikistan" was implemented in the period 2011–2015 with the objectives to set up and strengthen necessary institutional and technical structures and finally make the National Biosafety Framework operational. The expected outcomes of this project include the development of a national strategy and corresponding action plan on biosafety, as well as further development of the biosafety legislative framework, through the development of related regulations, guidelines, instructions and procedures. The project activities also include the preparation of specific technical guidelines; training of decision-makers, scientists, administrative and technical staff; setting up and equipment of laboratories for risk assessment and monitoring; setting up and development mechanisms for monitoring and enforcement; strengthening of biosafety-related information exchange; and public awareness-raising and educational campaigns.

Tajikistan has so far submitted three national reports on the implementation of the Cartagena Protocol on Biosafety. According to the Third National Report (2015) covering the period 2011–2015, the biosafety system was still under development. The majority of responses to the report questionnaire are negative, proving that the country still has no capacity to implement the 2005 Law on Biological Safety.

In 2013, Tajikistan ratified the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. The country does not participate in the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

In 2016, Tajikistan acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Some time and effort would still be required to provide necessary training

and increase the operational capacities of agencies responsible for CITES enforcement.

Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)

As of early 2016, Tajikistan has five Ramsar sites (table 8.3). No new sites were designated after 2001. According to the 2014 National Report to the Ramsar Convention, the country plans to submit nominations for six new sites (Iskanderkul, Nurek, Sarez, Syr Darya, Yashilkul and Zeravshan).

Forest-related processes

The Committee on Environmental Protection regularly reports to the FAO Forest Resource Assessment (FRA) programme through the ECE/FAO Forestry and Timber Section. In addition, Tajikistan provided national data to the ECE/FAO Study on trends and challenges in achieving the Global Objectives in Forests (GOF), prepared for the 11th Session of the United Nations Forum on Forests in May 2015.

Selected projects

The five-year project "Integrated river basin management and nature protection in the Tigrovaya Balka, Tajikistan, Amu Darya basin", co-funded by WWF and the Ministry of Foreign Affairs of Norway, was completed in June 2012. The project contributed to halting the degradation of floodplain forests (tugai forests) along the lower Vakhsh River, and restoration of the ecosystems of the tugai forests of Tigrovaya Balka.

In 2014–2015, the Italian NGO CESVI carried out a project, funded by GIZ, supporting the implementation of joint forest management schemes on a forest area of 2,150 ha, and enhanced the operational capacity of the local forestry administration in Khatlon Oblast.

CESVI was also involved in providing consultancy services for technical capacity building of forest administrations in Khatlon Oblast and Gorno-Badakhshan Autonomous Oblast, under the project "Climate adaptation through sustainable forestry in important river catchment areas in Tajikistan" (CAFT), with a budget of €8 million, funded by the German development bank KfW. The project was launched in March 2015 and will be implemented until 2018. The project activities include implementation of participatory forest and pasture management schemes, capacity building for state

forestry institutions and nurseries, training on sustainable use of forests, and direct afforestation and reforestation measures. The first afforestation works under this project started in autumn 2015, and the expected project outputs include some 4,000 ha of either rehabilitated or newly planted forest, with the use of native species well suited for local climatic conditions, to be later sustainably managed by the local population and state forestry institutions.

Another project, jointly funded by GIZ and KfW, is to be implemented in the period 2015–2021, under the Nationally Appropriate Mitigation Actions (NAMA) Facility, with a total budget of €12.8 million. The NAMA Facility is a joint programme of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, the United Kingdom Department of Energy and Climate Change (DECC), the Danish Ministry of Energy, Utilities and Climate (EFKM) and the European Commission. The project is focused on forest rehabilitation, conservation and sustainable management, contributing to climate change mitigation, institutional capacity building for forest management, and resource mobilization. The expected outputs of the project include some 6,000 ha of newly planted forest, and as much as 60,000 ha of rehabilitated forest. The project feasibility study started in October 2015.

Tajikistan is involved in the Central Asian Countries Initiative for Land Management (CACILM). Financing for the 2006–2015 programme amounts to US\$1.4 billion. CACILM addresses current forestry problems in Tajikistan, Kyrgyzstan and Turkmenistan. The project "Sustainable Rehabilitation and Development of Flood Plain Forests in Gorno-Badakhshan", implemented by GIZ under CACILM and the United Nations Convention to Combat Desertification, assisted in the development of joint forestry management schemes between leskhozoes and local villagers in Gorno-Badakhshan Autonomous Oblast.

In the period 2013–2015, the ECE/FAO United Nations Development Account project "Sustainable Forest Management for Greener Economies in the Caucasus and Central Asia" supported the development of a new forestry development strategy in Tajikistan, jointly with FAO Tajikistan and GIZ, and coordinated with a working group of the Forestry Agency. The project provided support in the area of private sector development by analysing the situation of Tajikistan's private sector, including through four local workshops.

8.8 Conclusions and recommendations

The majority of available information on biological diversity, ecosystems and forests is outdated. Neither complex inventories nor systematic monitoring were conducted since 1991. Hence, since 1991, the planning for nature conservation and forest management has been based on outdated inventories and rough estimates, not reflecting the actual situation. Biodiversity and forest monitoring systems that comply with international standards and would provide reliable, accurate, comprehensive and regularly updated information on the state of ecosystems (including forests) and species are still lacking. No central database, no harmonized databases and no unified information system on biological diversity and forest and non-forest ecosystems exist. The lack of reliable data and information on natural resources, including forests, is an obstacle to proper management planning and prioritization of measures to be taken.

Recommendation 8.1:

The Government should ensure that:

- (a) *Comprehensive inventories of the different components of biological diversity and forest and non-forest ecosystems are carried out;*
- (b) *A biodiversity and forest monitoring system is developed and implemented, utilizing efficient contemporary data acquisition, processing and visualization techniques (including geo-information techniques, GIS, remote sensing, aerial photo and satellite image analysis);*
- (c) *Information systems on species and ecosystems, utilizing modern techniques of electronic data storage and retrieval, are designed, established and continuously maintained with the objective to foster information exchange and harmonize datasets in the possession of state agencies, other public institutions (e.g. research institutes) and environmental non-governmental organizations.*

The chances for the effective protection and maintenance of viable populations of rare and endangered flora and fauna species listed in the Red Book largely depend on the protective status granted by the legislation, as well as on timely implementation of relevant conservation measures. Currently, not all Red Book species enjoy relevant protection, regardless of whether they occur inside protected areas or beyond their boundaries. The protection of rare and endangered plant species and plant communities outside currently existing protected areas is not effective, due to the general

absence of e.g. floristic reserves, in spite of the fact that the designation of such is planned in different strategic documents. Some rare and endangered animal species, considered particularly attractive for trophy hunting, are subject to either poaching or legalized "limited hunting", including inside protected areas. The determination of annual quota for hunting game species is based on rough estimates as reliable information on the actual size of species populations is quite limited.

The protection of rare and endangered plant species and plant communities, depending on the species and its habitat location, can also be achieved by the modification of land use, or establishing small private or community-owned and managed nature reserves, upon provision of adequate financial compensation for the necessary limitations on land use, to be paid to landowners or land users.

Recommendation 8.2:

The Government should enforce the effective protection of rare and endangered flora and fauna species listed in the Red Book by:

- (a) *Designating small state nature reserves aiming at the protection of rare and endangered plant species;*
- (b) *Encouraging land users to establish and sustainably manage private or community-owned reserves by the application of sound motivation programmes, including compensation for the necessary modification or limitation of land use;*
- (c) *Ensuring that decisions on quota for the hunting of animals inscribed in the Red Book are always based on accurate and regularly updated species population census, so as to maintain viable populations of such species.*

Currently, the forest cover is estimated at only 2.95 per cent of the total territory of the country. The further decline of forests may result in accelerated desertification, landslides, mudflows and other natural disasters, limiting the profitability of agricultural practices and threatening human settlements. The adverse trends of forest decline and degradation would immediately result in increased government expenditures on risk management, protective and emergency measures.

Currently, the annual rate of deforestation caused by intensive livestock grazing and illegal firewood collection is higher than the natural forest biomass increment and regeneration ability. Mitigating the current pressures on existing forests and intensive reforestation are one of the most urgent challenges

for Tajikistan. Reforestation has to be perceived in the long term, as, due to climate and soil conditions in mountain regions, the success of such activities would require at least several decades of effort and investment.

The draft Strategy for the Development of the Forestry Sector for the period 2016–2030 assumes the planting of 10,000 ha of new forests over the next 15 years, which is far from sufficient, as it would not offset the current deforestation trend. The main objective of the Strategy is to accelerate reforestation and afforestation activities to reach the level of some 4,500 ha annually, coupled with effective measures to be undertaken in existing forests, limiting the pressure posed by unsustainable livestock grazing and enhancing the natural forest regeneration potential, as well as establishing industrial fuelwood plantations in areas less favourable for grazing, in the close vicinity of villages, in order to further limit illegal firewood collection.

Recommendation 8.3:

The Government should:

- (a) *Accelerate the reforestation and afforestation activities to reach the level of some 4,500 ha annually throughout the period 2016–2030, in order to offset the current deforestation trend;*
- (b) *Undertake effective measures in existing forests towards mitigating the pressure posed by unsustainable livestock grazing and enhancing the natural forest regeneration potential;*
- (c) *Establish industrial fuelwood plantations in areas less favourable for grazing, located in the vicinity of villages, in order to further limit illegal firewood collection.*

The provisionally granted legal protective status of nature preserves cannot currently be perceived as an effective solution to ensuring their protection. This is particularly so in the case of the 13 nature preserves, which are traditionally designated for 10 years only, which status is not always prolonged in a timely manner for the subsequent period.

The nature preserves are managed by the state forestry institutions. Since 2014, the State Institution of Specially Protected Natural Areas, responsible for the management of state nature parks and nature reserves, is subordinated to the Forestry Agency.

Recommendation 8.4:

The Government should amend the 2011 Law on Specially Protected Natural Areas so as to grant

permanent legal protective status to all protected areas.

See Recommendation 1.5.

Non-extractive anthropogenic pressures on biodiversity and ecosystems include conversion of natural ecosystems into agricultural land, fragmentation, degradation or destruction of habitats and landscape in the course of infrastructural investments, illegal construction of settlements inside protected areas and the introduction of invasive alien species. Climate change affects almost all ecosystems present in Tajikistan. These pressures are likely to increase in the near future, especially taking into account the nexus between food, energy and biodiversity.

Recommendation 8.5:

The Government should integrate natural capital and ecosystem management in its socioeconomic planning to address climate vulnerability and the nexus between food, energy and biodiversity.

The effective management of the natural resources of Tajikistan requires strengthening human resources, capacity building (e.g. professional staff training) and providing necessary infrastructure and basic equipment. Otherwise, the implementation of state policies and strategies might not be feasible, as, currently, the state institutions and their field services are lacking capacities to ensure their implementation and effective law enforcement.

Recommendation 8.6:

The Government should raise the human and technical capacities of the institutions and agencies involved in the implementation of state policies and strategies aimed at sustainable use of natural resources and biodiversity conservation, in particular by recruiting additional staff and providing professional training, basic infrastructure and equipment.

**PART III: INTEGRATION OF ENVIRONMENT INTO
SELECTED SECTORS/ISSUES**

Chapter 9

AGRICULTURE AND ENVIRONMENT

9.1 Conditions and activities in agriculture

Conditions for agriculture

Mountains and hilly country account for 93 per cent of Tajikistan's territory. Altitude varies between 320 m and 7,495 m, which explains the wide diversity in soil and climate conditions and consequently diverse habitats, flora and fauna. More than half of the territory is at an altitude of more than 3,000 m and, due to its extreme climatic conditions, landscapes with rocks, glaciers and highlands are not suitable for agriculture.

The climate of Tajikistan is strongly continental, with hot summers and mild winters, and ranges from semi-arid to polar in the Pamir mountains. In the valleys of northern and southern Tajikistan, annual precipitation is less than 200 mm, but in the foothills it is greater, up to 400–600 mm. However, the precipitation is not evenly distributed. The largest share falls during winter and early spring. The country's unique climatic conditions are expressed through a decreasing amount of precipitation at increasing elevation. In the eastern Pamir mountains there are high mountainous deserts with annual precipitation of less than 100 mm. Areas below 2,500 m are commonly used for agricultural purposes.

About 4,665,514 ha of Tajikistan's land area is agricultural land, which includes land under

permanent pastures, arable land and land under permanent crops. The largest share of agricultural land, 3.6 million ha, is pasture, most of it natural, which is used for livestock husbandry. The area of pasture has decreased, due to land degradation. Around 40,000 ha of natural grasslands are used as hay fields. The area of arable land increased in the period 2010–2013, then decreased in 2014 to cover only 828,500 ha or 5.8 per cent of the total area of agricultural land. Gardens and vineyards are expanding and 10,000 ha of new orchards were established annually in 2012 and 2013.

Over 67 per cent of arable land is irrigated. In 2014, about 562,000 ha of all arable land was irrigated (table 9.1). The total area of rain-fed land is about 400,000 ha. The area of arable land has declined slightly, due to land degradation and lack of water resources, and some areas have ceased agricultural practices. However, not all arable land is used for cultivation, due to land degradation and lack of access to water and seeds.

As there has been rapid population growth in Tajikistan in recent years, there are increasing needs for agricultural products and food security is one of the key questions in national policy and the agricultural sector. In 2014, the rural population comprised 73.3 per cent of the total population in Tajikistan.

Table 9.1: Agricultural and arable lands, 1991, 2009-2014, ha

	1991	2009	2010	2011	2012	2013	2014
Land used by enterprises and dehqan farms							
Agricultural land	232 877	3 750 612	3 745 989	3 695 161	3 614 663	3 617 515	3 604 616
Irrigated agricultural land	641 169	586 529	587 763	591 863	592 000	591 812	593 811
Arable land	805 829	687 323	673 069	666 077	662 011	658 410	655 643
Irrigated arable land	559 205	477 139	469 230	465 179	461 682	458 289	456 286
Land used by population							
Agricultural land	79 431	206 973	219 286	219 846	229 928	223 356	224 227
Irrigated agricultural land	53 305	134 843	135 954	137 227	138 201	138 533	139 549
Arable land	75 293	166 891	177 403	178 111	180 514	181 231	181 028
Irrigated arable land	53 346	105 278	105 467	106 160	106 385	106 406	106 320

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Photo 9.1: Fertile fields of Hisor Valley

Agriculture remains a key sector of Tajikistan's economy. Agriculture employs about 550,000 people, of whom 52 per cent are women. In 2014, 25 per cent of the total labour force worked in agriculture. Agriculture accounted for 23.5 per cent of GDP in 2014; in the period 2005–2014, it varied between 18.6 per cent (in 2009) and 23.8 per cent (in 2011). There is a ratio of 1.13 ha of arable land or land under permanent crops per person in the economically active population in agriculture.

Tajikistan has many traditional crops (landraces) and their wild relatives, e.g. wild fruits such as pistachio, apricot, pear, apple, almond, walnut, fig and pomegranate grow in the mountain forest ecosystems. The gene pool of grains, pulses and oil-bearing crops equals almost 3,000 varieties, including 510 varieties of wheat, 500 of barley, 500 of chickpea, 234 of corn, 115 of bread-corn, 80 of lentil, 60 of oats, 46 of soy and 8 of peanut.

There are also many wild fruit trees: more than 40 different kinds of wild apple, 38 of apricot, 15 of pear, 14 of peach, 20 of mulberry and various sorts of pine strawberry, raspberry, currant and gooseberry.

Agricultural activities

The country's agricultural sector is based on crop and livestock production. However, crop production has a larger share in the total value of agricultural products

(98.47 per cent in 2014) than does livestock husbandry. Calculated at constant 2000 prices, total production increased from 987 million somoni in 2005 to 1,580 million somoni in 2014, while crop production increased from 888 million somoni in 2005 to 1,556 million somoni in 2014 (figure 9.1). In contrast, animal husbandry decreased from 99 million somoni in 2005 to 12.7 million somoni in 2006, and since then has increased slightly, to reach 24.1 million somoni in 2014. However, the number of cattle has increased during this period (table 9.5).

Crops

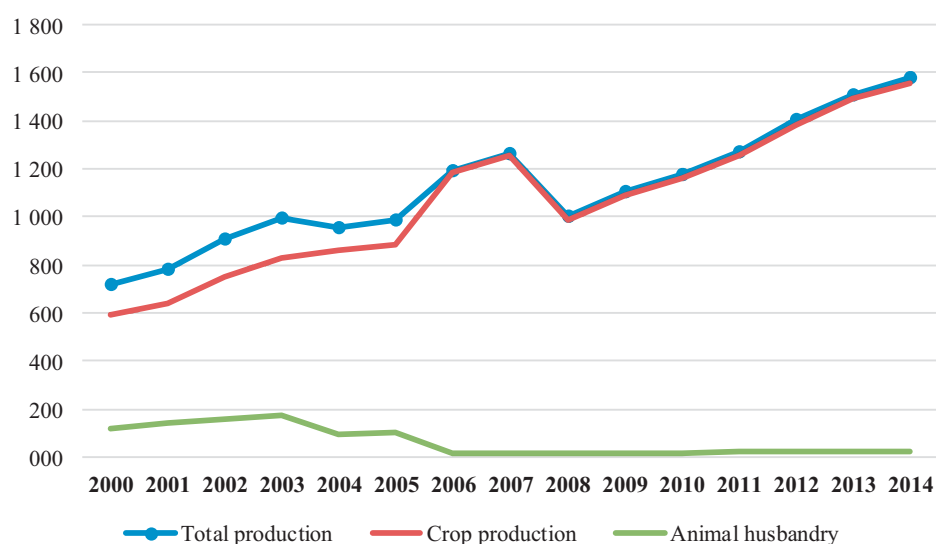
Crop production is based on raw cotton, grain, sweet corn, feed corn, rice, potatoes, vegetables, fruits, grapes and hay. Production of food crops has increased, whereas raw cotton production has decreased. Between 2005 and 2014, production of grain (mainly wheat) increased from 935,000 to 1.318 million tons, of vegetables from 718,000 to 1.550 million tons, of potatoes from 555,000 to 854,000 tons, of feed corn from 339,000 to 1.086 million tons and of hay from 219,000 to 640,000 tons. Production of sweet corn, fruits, grapes and rice has also increased. In contrast, production of raw cotton has decreased from 438,000 to 373,000 tons (table 9.2).

The land area under cotton production has declined since 1991 while, at the same time, the area under

food plant production has increased, which supports food security and meeting the needs of a growing population. The area under cotton production amounted to 298,835 ha in 1991 and had declined to 177,637 ha in 2014 (table 9.3). Currently, 68 per cent

(120,494 ha) of the cotton fields are located in Khatlon Oblast, 29 per cent in Sughd Oblast and 3 per cent in the districts under republican subordination.

Figure 9.1: Agricultural production, 2000–2014, million somoni at constant 2000 prices



Source: Agency of Statistics, website, 2015.

Table 9.2: Crop production, 2005–2014, thousand tons

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Raw cotton	448	438	420	353	296	310	416	417	393	373
Grain	935	773	801	943	1 294	1 261	1 098	1 232	1 393	1 318
Sweet corn	156	139	130	136	143	151	155	175	175	186
Feed corn	339	407	457	662	699	915	794	851	955	1 086
Rice	62	49	51	54	63	77	77	82	78	80
Potatoes	555	574	662	680	691	760	863	991	1 116	854
Vegetables	718	760	835	908	1 047	1 143	1 242	1 342	1 491	1 550
Fruits	148	209	157	262	214	225	263	313	328	342
Grapes	91	107	117	118	139	124	155	167	175	189
Hay	219	231	256	287	397	409	350	642	630	640

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.3: Area under main crops, 1991, 2010–2014, ha

	1991	2010	2011	2012	2013	2014
Grain (mainly wheat)	231 697	459 942	427 178	424 332	437 433	412 626
Pulses (e.g. peas, lentils)	11 843	14 292	16 412	17 759	16 792	16 972
Cotton	298 835	162 428	204 110	199 254	190 925	177 637
Oil-bearing plants (e.g. flax)	5 319	28 299	30 105	29 003	28 210	26 787
Vegetables (e.g. potatoes)	52 686	97 596	100 913	109 295	112 559	103 533
Fodder	26 607	87 710	86 042	94 881	91 823	104 620

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Photo 9.2: Animal husbandary, Bartang valley, GBAO

Khatlon Oblast in the southern part of the country has the largest share of agricultural production, especially of cereals, crops, cotton, vegetables and gourds. Yields of all main crops have increased in the period 2005–2014, e.g. the yield of grain was 1,970 kg/ha in 2005 and 3,194 kg/ha in 2014, and that of vegetables was 18,680 kg/ha in 2005 and 31,938 kg/ha in 2014 (table 9.4). And yet Tajikistan is still not self-sufficient – around 600,000 tons of wheat is imported each year from Kazakhstan.

Animal husbandry

Livestock husbandry uses the natural pastures of alpine ecosystems, including at higher altitudes, for grazing. Most of the pastures are located in Khatlon Oblast and the districts under republican subordination. Most of the livestock is privately owned. About 96 per cent of products, including milk products, are produced by private farmers. Only a few farms use modern technology.

The number of livestock has increased from 4.5 million head in 2005 to about 7.4 million head in 2014 (table 9.5). The number has increased by 64 per cent in the last decade and, due to limited management of pasture lands, it causes overload of the used pastures. If productivity were higher, fewer

livestock would be required to produce the same amount of agricultural products.

The number of milking cows, sheep and goats increased in the period 2005–2014, milking cows from 720,000 to 1,093,000, sheep from 1,893,000 to 3,227,000 and goats from 1,160,000 to 1,830,000. The number of horses increased only slightly, from 75,000 to 78,000. In contrast, the number of pigs decreased from 1,000 to 500 over the period. Meat and milk production still meets only about one third of the need and both are imported in large volumes. Because of its high price, meat consumption per capita remains the lowest among Central Asian countries. However, as meat and processed goods are energy intensive, their low consumption levels contribute to the low carbon footprint of the population in Tajikistan.

Poultry farming

The number of poultry has decreased since independence, from 6.6 million head in 1991 to 3.9 million head in 2009, but has increased since then to 5.25 million head in 2014 (table 9.6). In 2014, most poultry (59.71 per cent) was raised by the population, and the remainder by agricultural enterprises (36 per cent) and dehkan farms (4.24 per cent).

Apiculture

The number of bee families has increased since independence, from 61,543 in 1991 to 140,042 in 2009, and was trending upward to 209,476 in 2014. In 2014, most bee families (87.77 per cent) were

raised by the population; 7.15 per cent were raised by dehkan farms and 5 per cent by agricultural enterprises (table 9.7). Production of honey has doubled since 1991, from 9.7 kg per beehive to 15.4–19.3 kg per beehive in the period 2009–2014 (table 9.8).

Table 9.4: Yield of major agricultural crops, 2005–2014, kg/ha

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Raw cotton	1 560	1 700	1 660	1 560	1 780	1 930	2 041	2 097	2 060	2 100
Grain	1 970	2 060	2 050	2 090	2 520	2 410	2 571	2 905	2 770	3 194
Sweet corn	4 050	3 770	4 010	3 840	3 780	4 060	12 123	12 567	7 660	12 728
Feed corn	12 210	13 760	14 340	12 420	12 640	13 450	35 654	36 853	36 836	50 610
Rice	3 270	3 140	3 050	3 150	3 070	3 440	5 819	6 252	6 260	7 203
Potatoes	19 620	19 850	21 840	22 690	22 310	22 970	23 504	23 744	24 730	24 027
Vegetables	18 680	18 690	19 020	19 880	20 800	20 580	26 491	27 398	24 030	31 938
Fruits	2 430	3 110	2 250	3 530	2 920	3 040	3 395	3 990	3 960	4 000
Grapes	2 880	3 310	3 560	3 690	4 410	4 080	4 956	5 285	5 490	6 117
Hay	1 380	1 400	1 440	1 480	1 800	2 189	2 661	4 879	3 138	6 117

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.5: Animal husbandry, 2005–2014, thousand head

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	4 501	4 661	5 580	6 024	6 106	6 369	6 092	6 855	7 100	7 397
Beef cattle	652	666	838	866	878	912	978	995	1 023	1 169
Milking cows	720	757	864	933	952	985	1 033	1 049	1 076	1 093
Pigs	1	1	1	1	1	1	1	1	1	1
Sheep	1 893	1 952	2 374	2 579	2 617	2 729	2 288	2 960	3 097	3 227
Goats	1 160	1 209	1 424	1 568	1 583	1 666	1 715	1 773	1 826	1 830
Horses	75	76	79	77	76	76	77	77	77	78

Source: Agency of Statistics, website, 2015.

Table 9.6: Poultry, 1991, 2009–2014, head

	1991	2009	2010	2011	2012	2013	2014
Total	6 586 398	3 938 517	4 402 688	4 655 924	4 851 120	5 020 482	5 247 986
Agricultural enterprises	5 864 798	1 095 283	1 431 243	1 539 199	1 679 001	1 732 827	1 891 128
Population	721 600	2 659 151	2 774 249	2 884 098	2 983 594	3 055 825	3 133 885
Dehkan farms	..	184 083	197 196	232 627	188 525	231 830	222 973

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.7: Bee families, 1991, 2009–2014, number

	1991	2009	2010	2011	2012	2013	2014
Total	61 543	140 042	180 657	190 210	195 539	202 089	209 476
Agricultural enterprises	61 543	7 764	8 048	8 964	8 902	10 056	10 631
Population	..	118 942	161 117	169 361	174 716	178 715	183 869
Dehkan farms	..	13 336	11 492	11 885	11 921	13 318	14 976

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.8: Honey production, 1991, 2009–2014, kg/bee hive

	1991	2009	2010	2011	2012	2013	2014
Total	9.7	19.3	16.6	15.4	16.8	17.4	17.7
Agricultural enterprises	9.7	7.9	8.1	8.7	8.9	9.3	9.0
Population	..	19.9	16.9	16.0	17.1	17.8	18.3
Dehkan farms	-	21.0	15.5	12.7	19.1	18.2	17.2

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Photo 9.3: Cows grazing in the pasture in Ayni District, Sughd Oblast

Fishery

Fishery plays a minor role in Tajikistan, contributing less than 0.1 per cent to GDP in recent years. However, it has the potential to become important in developing rural societies and the national economy. The size of the fisheries sector decreased from 4,000 tons in 1991 to 214 tons in 2006. However, it has since increased close to 700 tons in 2010. In 2013, the total amount of caught fish was 1,724 tons. This decreased in 2014 to 1,682 tons, of which 667 tons were caught by public farms and 1016 tons by dehkan farms. In 2013, the total amount of raised fish was 4.13 million specimens; in 2014, this increased to 4.62 million specimens, of which 2.64 million were raised by public farms and 1,981 by dehkan farms (table 9.9). According to FAO, the long-term plan is to increase the production of fish and other aquatic products to 14,000 tons.

Productivity

The yield of crops depends on the soil condition, appropriate sowing time, temperature, use of fertilizers and pesticides, availability of water and energy supply and irrigation systems, quality of seeds, agricultural practices, land use rights, the material and technical base of dehkan farms, access to finance and available extension/support services.

Production per capita has generally increased despite the increasing population (table 9.10). Production of vegetables, grains, gourds, fruits and berries has increased since 2010. From 1991 to 2014, production of both grain and potatoes increased threefold, and gourds production doubled between 1991 and 2010. Production of meat, milk and eggs decreased from 1991 to 2010, and since then meat and milk production have recovered almost to 1991 levels.

Production of eggs per capita is still only half that of 1991.

per cent of the fodder they need and in very cold winters mortality can increase.

Productivity is very low. One cow lactates 1–2 kg per day and 100 cows produce 64 calves annually. Fodder production is inadequate and the growing amount of livestock, together with the limited feed supply, produces strong and growing pressure on the pastures. In winter, livestock may be given only 50

Gross agricultural production in 2014 prices increased in the period 2010–2014 by 34 per cent: by 30 per cent for crops and by 44 per cent for livestock (table 9.11). Gross agricultural production per 100 ha increased in the period 2010–2014 for all products by 58 per cent (figure 9.2).

Table 9.9: Fishery, 2013–2014

	2014			2013	percentage change
	Public farms	Dehkan farms	Total	Total	
Raised, thousand	2 636.5	1 981.2	4 617.7	4 129.4	111.8
Caught, tons	666.6	1 016.3	1 682.9	1 724.6	97.6

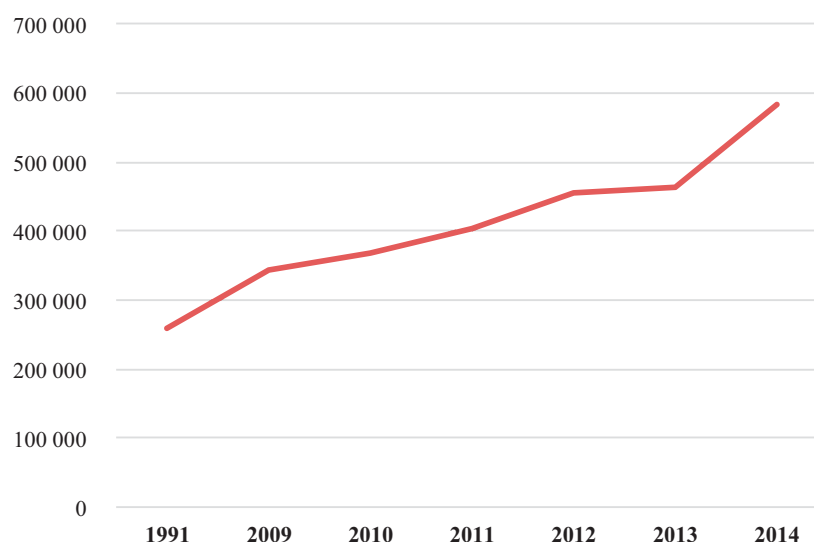
Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.10: Agricultural production, 1991, 2010–2014, kg/capita

	1991	2010	2011	2012	2013	2014
Grain	54.3	165.7	142.8	154.1	172.5	159.6
Potatoes	32.3	100.9	113.3	123.9	138.2	103.4
Vegetables	112.1	151.7	163.1	167.8	184.6	187.6
Gourds	31.2	64.1	55.6	58.1	61.3	66.1
Fruits and berries	31.6	29.9	34.1	39.2	40.7	41.3
Grapes	21.6	16.5	20.3	20.9	21.7	22.9
Meat	13.4	9.5	9.9	10.1	10.7	12.0
Milk	104.9	87.8	91.4	97.3	102.6	103.5
Eggs, piece/cap.	81.1	30.8	33.4	36.5	42.6	42.4

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Figure 9.2: Gross agricultural production per 100 ha of agricultural land (in 2014 prices), 1991, 2009–2014, somoni



Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Table 9.11: Gross agricultural production in 2014 prices, 1991, 2009–2014, million somoni

	1991	2009	2010	2011	2012	2013	2014
Total	12 779.4	14 695.4	15 694.7	16 934.6	18 695.8	20 116.7	21 021.9
Crops	8 273.6	10 512.9	11 185.7	12 102.9	13 385.8	14 403.2	14 532.8
Livestock	4 505.8	4 182.5	4 509.0	4 831.7	5 310.0	5 713.5	6 489.1
Public sector, total	9 921.9	1 047.5	1 074.7	1 119.8	1 209.4	1 259.0	1 265.3
Crops	6 949.5	889.8	890.7	930.7	999.6	1 028.6	1 031.7
Livestock	2 972.4	157.7	184.0	189.1	209.8	230.4	233.6
Population, total	2 857.5	9 614.6	10 296.3	11 045.8	11 997.2	12 786.7	13 327.4
Crops	1 324.1	5 730.5	6 114.3	6 560.9	7 064.8	7 489.1	7 268.4
Livestock	1 533.4	3 884.1	4 182.0	4 484.9	4 932.4	5 297.6	6 059.0
Dekhan farms, total	-	4 033.3	4 323.7	4 769.0	5 489.2	6 071.0	6 429.2
Crops	-	3 892.6	4 180.7	4 611.3	5 321.4	5 885.5	6 232.7
Livestock	-	140.7	143.0	157.7	167.8	185.5	196.5

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Agricultural exports

In 2014, the main exported agricultural product was cotton fibre (86,700 tons). The value of exports of cotton fibre varied in the period 2005–2014 between US\$100 million in 2009 and US\$223 million in 2012. Other main exported agricultural products are dried fruits and dried onions. Cotton is the main crop that brings important revenues to Tajikistan.

The export of products by local producers is difficult, due to trade- and customs-related barriers, including lengthy and complicated border-crossing procedures. Some projects have helped local producers find markets for export, e.g. for organic products.

Organizational types of agricultural production units, including ownership

According to the Land Code, the land is owned by the State. In the land privatization process, private persons and organizations obtained state registration and became permanent users of certain land areas. However, there are still some unsolved issues, such as a lack of clarity on rights and responsibilities, which makes agricultural activity difficult, as farmers do not know where their cattle are able to graze and who is responsible for maintaining irrigation infrastructure, for example.

Land privatization has indirectly affected the irrigation and drainage infrastructure. Before privatization, responsibility for maintenance of secondary canals for irrigation inside the farms was with the kolkhoz and sovkhoz farms. While the Agency of Land Reclamation and Irrigation is responsible for irrigation systems outside the farm domains, the lack of clarity around responsibility for irrigation systems inside the farms has resulted in the situation that land-use right holders have not

maintained them. This has increased salinization of arable land and caused reduction in crop yields, particularly for cotton.

In 2014, there were 108,035 privately owned dekhkan farms, which managed around 80 per cent of the arable land (table 9.12). In 2014, dekhkan farms produced 90 per cent of agricultural products. According to the Ministry of Agriculture, about half the dekhkan farms are managed by professionals and the other half by unqualified people with no experience in agriculture. Agriculture is mainly in the hands of smallholders.

Selling a land share certificate to other users has been problematic. Enabling the selling of land share certificates would be the next step for the Government to take. Before 2011, farm ownership included three variations: state and collective farms, newly formed private collective and individual family dekhkan farms, and labour-intensive household plots that the government granted to all households. Since 2011, there are no more state and collective farms.

Another issue with the functioning of the dekhkan farms has been the lack of freedom to select agricultural crops to grow, and thus opportunities to cultivate additional or second crops. The Concept of Agrarian Policy (2008 Resolution of the Government No. 658) requested some former cotton farms in Sughd Oblast, Khatlon Oblast and the Kurgan-Tyube area to switch to production of foodstuffs. It also addressed cotton farm debts and encouraged measures to ensure that the debts of the cotton sector are fully paid off (e.g. legal training of farmers on how to pay off cotton debts, strengthening the regulatory framework for recovery of unpaid loans). The 2009 Law on Dekhan Farms (since replaced) prescribed that public authorities should not intervene

in the activities of dehkan farms, unless otherwise indicated by the legislation. It is reported, however, that local government authorities used to put pressure on farmers to grow certain crops. This can limit possibilities to start organic farming, as organic farming requires crop rotation and therefore other crops also to be grown.

Gender aspects

In 2009, the number of dehkan farms headed by women was 4,237 or almost 11.2 per cent of the 37,958 dehkan farms. In 2014, the number of farms headed by women was 14,014 or 13 per cent of 108,035 dehkan farms. The total agricultural area cultivated by all dehkan farms was 509,016 ha, of which the agricultural area cultivated by dehkan farms headed by women was 32,499 ha or 6.4 per cent. The share of women in the agricultural labour force was 52.15 per cent in 2014. As men migrate in large numbers, the labour force in rural areas is

mainly composed of young people, women and the elderly.

Prevailing agricultural practices

Use of fertilizers and pesticides

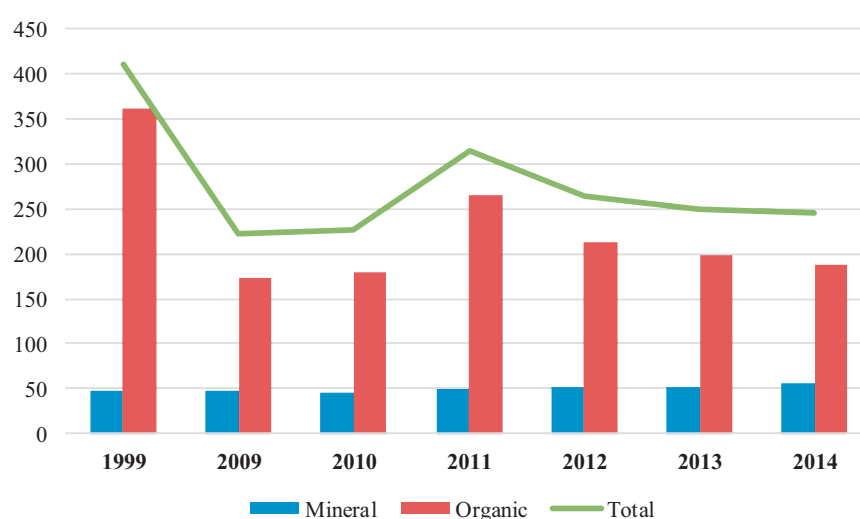
According to the Agency of Statistics, the overall consumption of fertilizers has decreased by 60 per cent, from 410,200 tons in 1999 to 245,300 tons in 2014 (figure 9.3). The amount of mineral fertilizers used annually in the period 2010–2014 was 141–182 kg/ha, but there is no strong trend of this increasing. In 2014, the most intensive application of mineral fertilizers was on industrial crops (31,500 tons), followed by cereals (14,600 tons). At the same time, the use of organic fertilizers decreased from 1999 to 2009, increased from 2009 to 2011 and has decreased again since then. Potatoes account for the major share (44 per cent) of the organic fertilizers applied, followed by cereals (35 per cent).

Table 9.12: Farm structure, 2009–2014, number

	2009	2010	2011	2012	2013	2014
Collective farms (kolkhoz)	1	1	-	-	-	-
State farms (sovkhoz)	5	5	-	-	-	-
Dehkan farms	37 966	51 372	58 313	73 806	87 594	108 035
Intereconomic agricultural companies	..	..	..	..	..	17
Other agricultural enterprises	2 272	2 895	1 996	2 170	2 108	2 013

Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Figure 9.3: Use of fertilizers, 1999, 2009–2014, thousand tons



Source: Agriculture in the Republic of Tajikistan, Statistical book, Agency of Statistics, 2015.

Photo 9.4: Dry dung used as energy source in households, Hisor District

The manure of cattle that graze near villages is collected and dried, and used mainly (up to 90 per cent) as fuel. Fifteen per cent of all energy used in households is dry dung. A very small share is used as fertilizer in agricultural production. No studies on different manure storage practices and cultivation practices to minimize GHG emissions are being made, so no guidance to farmers is provided.

The use of pesticides and other chemicals in agriculture has caused toxic and chemical pollution of 30,000 ha of soil in the southern and northern part of Tajikistan.

International organizations report that official statistics show only about 20 per cent of fertilizers and pesticides that are used in Tajikistan.

Use of genetically modified organisms

International organizations report that non-registered GMO seeds are used in agriculture in Tajikistan.

Water use, irrigation and drainage

In 2014, agriculture consumed over 81.76 per cent of total water use, including for irrigation (77 per cent of the total water use). The average annual intake by agriculture and irrigation in the period 2009–2014 was 6.68 km³ of water (table 6.2). Approximately 80 per cent of agricultural output is produced from irrigated areas. Irrigation and drainage systems do not work properly.

As of 1 January 2015, approximately 33,500 ha of arable land, including 16,800 ha of irrigated land, has been taken out of agricultural production, while another 31,000 ha of land is currently not used for agriculture. The quality of another 49,000 ha of irrigated land is considered unsatisfactory.

In 2012, of about 730,000 ha of irrigated land, approximately 400,000 ha are served by gravity irrigation. More than 50 per cent of the canal networks are seriously degraded. The irrigation area served by pumping stations was about 350,000 ha in 2012. Irrigation systems have an efficiency of 40–50 per cent. These problems limit farmers' access to the required amount of water and have a negative impact on crop yields.

Water providers often do not get payments from farmers; delayed payments increase the water providers' debts for electricity and make it impossible to implement necessary improvements. Each year, over 60,000 ha of irrigated land is not used for agriculture. Furrow irrigation is the method used on 98 per cent of the irrigated land.

Pressures on agriculture

The agricultural sector is currently facing a number of challenges, including the unmaintained existing irrigation and drainage infrastructure; increasing areas of irrigated land having unsatisfactory irrigation or degradation, which leads to their withdrawal from agricultural production; erosion of irrigated lands; dysfunctional pump stations; a shortage of equipment

and machinery; and the lack of an adequate water measuring system.

Tajikistan has large water resources and high moisture in some areas; conversely, some areas, such as the Pamir mountains, include dry desert conditions. Natural desertification exists in Tajikistan in many natural zones, which are connected with the large deserts – the Gobi, Kara Kum, Kyzyl Kum and Taklamakan. The basic driving factors of desertification are climate change, forest logging, wrong methods of irrigation, overexploitation of agricultural lands and overgrazing. The low level of income among the population causes increasingly negative consequences of land degradation and desertification.

In the flat lands of Fergana, Hisor, Vahasha and Kabodina, a large part of the agricultural land is located on the hills and in small ravines and dales. In the sloping cotton fields, crops in some areas may suffer from low amounts of irrigation while crops in other areas may suffer from an oversupply of water. Both these conditions are negative for productivity in terms of cotton yields.

Practically all pastures in Tajikistan suffer heavily from erosion. About 89 per cent of the summer pastures and 97 per cent of the winter pastures suffer from a medium to strong level of erosion. In the south, there are less than 8,000 ha of desert saxaul forests, which are used as pastures during spring and autumn. These forests play an important role in soil protection against erosion.

Growing economic activity in recent years has caused increasing erosion and land degradation. Unsustainable use of land resources is widespread. Land degradation remains an economic, social and environmental problem, increasing the sensitivity of agriculture to impacts of climate change. In particular, pastures, meadows, natural forests and areas along roads and water canals are estimated to be heavily degraded over 60 per cent of their area. Agroforestry systems are considered the least degraded, with heavy degradation occurring on 22 per cent of their area.

Agriculture is vulnerable to the effects of climate change, e.g. rainstorms, droughts, floods, continuous high and low temperatures, and frost. According to the Second National Communication to the UNFCCC, the drought of 2001–2002 caused a drop in crop yields by 30–40 per cent in the driest farming areas. The 2008 drought, which was followed by a compound water and energy crisis, led to the decline of agricultural crops by 40 per cent. So far, there is

no national policy to adapt agriculture to changing climate. The application of relevant technologies related to water (irrigation) and sustainable land management, and maintaining energy consumption at a low level, are lacking.

Changes in hydrology and the state of the glaciers are expected to have negative consequences on society and the economy, primarily in agriculture. Reduction of water in the country's main rivers is unlikely up to 2050, but some seasonal changes, such as reduction in water flows, may happen during summers. Any expected water decrease would impact on hydropower energy production. For example, in 2010, because of unreliable power supply, about one third of light industry (cotton processing and agriculture production) was not able to work under normal conditions.

9.2 Pressures from agriculture on the environment

Air emissions

The agricultural sector in Tajikistan is the largest source (accounting for around 80 per cent) of NH₃ emissions. Animal husbandry and mineral fertilizers are the main contributors to NH₃ emissions.

In 2010, the agricultural sector contributed 69.75 per cent of total national GHG emissions in CO₂ equivalent. Emissions are caused from activities related to livestock breeding (anaerobic decomposition in the process of an animal's digestion and waste), rice cultivation, the burning of agricultural waste in the fields, and emissions from the nitrogen cycle in agricultural soil. According to FAO, 91 per cent of agricultural CH₄ emissions was formed by enteric fermentation. The largest share of emissions is methane emissions from livestock. Still, because of the low level of mechanization, underfeeding of livestock and limited amount of fertilizers used, GHG emissions from agriculture remain low. Emissions from agriculture increased from 5.1 million tons in 1990 to 5.5 million tons in 2010, although there was some decrease in the middle of this period. As total GHG emissions decreased between 1991 and 2010 by 33.84 per cent, the share of agriculture in GHG emissions overall increased from 20.15 per cent in 1991 to 69.75 per cent in 2010.

According to the Agency of Statistics, GHG emissions from methane (CH₄) in 2013 were 93 Gg or 2.325 million tons of CO₂ equivalent, which is 76.2 per cent of total methane emissions. According to the World Bank, methane emissions from

agriculture increased between 2005 and 2010 from 2.671 million to 3.620 million tons of CO₂ equivalent, or from 68.8 per cent to 73.2 per cent of total methane emissions.

A large share of GHG emissions is formed in soil cultivation. Nitrous oxide (N₂O) emissions are mainly formed by manure left on pastures, manure applied to soil, synthetic fertilizers and manure management. The share of agriculture in total N₂O emissions is about 88 per cent, including emissions produced through fertilizer use (inorganic and animal manure), animal waste management, agricultural waste burning (non-energy, on-site), and savannah burning. According to the World Bank, agricultural N₂O emissions increased between 2005 and 2010 from 1.2 million to 1.5 million tons of CO₂ equivalent, or from 86.7 per cent to 88.3 per cent of total N₂O emissions in Tajikistan. According to the Agency of Statistics, N₂O emissions from agriculture in 2013 were 7 Gg or 2.09 million tons of CO₂ equivalent.

Biodiversity

Many landraces and their wild relatives were lost due to changes in agricultural practices and loss of natural habitats; pistachio woodlands, for example, are almost absent nowadays. Up to 80 per cent of the area previously occupied by pistachio woodland communities is now overgrown with shrubs. During recent decades, there have been losses in agricultural biodiversity due to the introduction of major cultivated crops such as wheat, rice, cotton and vegetables. Uncontrolled grazing has caused changes in the diversity of plants and productivity of pastures and the extinction of wild plant species. A large proportion of forests has been given over for long-term use as pasture. However, grazing in the forests has had a negative impact on the diversity and quality of forests, and natural regeneration of forests has practically stopped because of the presence of livestock.

Soil

Desert, semi-desert low-hill terrain, and major river valleys are largely cultivated and are impacted upon by anthropogenic activities. There are 3.6 million ha of pastures, of which 2.02 million ha are summer pastures, usually located higher in the mountains. These pastures can be used on a maximum of 100 days a year. About 700,000 ha of summer pastures are not used due to lack of access to them, as a consequence of broken bridges and their own remoteness, which places pressure on the pastures that are more easily reached.

According to estimations, 82.3 per cent of the total land area and 97.9 per cent of agricultural land suffers from erosion, and more than 15 per cent of irrigated land is affected by salinization and swamping. Erosion processes are active, especially in the foothill regions. Two of the main processes of soil degradation in Tajikistan are water and gully erosion. Human activity plays a significant role in accelerating the erosion processes, with intensive development of agriculture on sloping lands and unsustainable agricultural practices. Soil in the steep slopes is washed out, and the growth of ravines decreases the area of arable land. Ploughing of steeply sloping land and other land that is not suitable for agriculture, logging of forests and shrubs, and heavy overgrazing of pastures near settlements have increased land degradation. One reason for overgrazing is lactating cattle, which need to be kept close to the settlements.

The greatly increased number of livestock and uncontrolled overgrazing of pastures causes land degradation and erosion. In the mountainous regions, the area of pastures is limited. A large proportion of the forests is also used as pastures, but forests cover only 2.95 per cent of the territory of Tajikistan. Cotton farmers often do not use crop rotation, also causing land degradation.

The main forms of land degradation currently experienced in agricultural lands in Tajikistan include: (i) erosion, salinization and water-logging; (ii) deteriorating fertility of pastures; (iii) decreased fertility of the arable drylands of the steppes; (iv) decreased area and productivity of forests.

In the eastern Pamir mountains, the condition of the teresken pastures has become critical, as people lack fuel for energy production and started massive uprooting of teresken, which is an important animal fodder, causing desertification of highland pastures.

The intensive use of pesticides and other chemicals have caused toxic and chemical pollution of about 40,000 ha of soil. Obsolete and banned pesticides have been found in the Vakhsh and Kanibadam landfills (chapter 7). Increased prices for pesticides have pushed local people to illegally dig the landfills to extract pesticides. Another issue is that these chemicals are not included in official statistics.

Water

Agriculture has an impact on water quality due to the large amount of livestock in the pastures and fertilizers and pesticides being used in cultivation. Cotton production uses a large amount of chemicals

and therefore forms a significant risk of pollution to freshwater ecosystems. Run-off from the fields carries pesticides, fertilizers and salts to rivers, lakes and wetlands. Livestock cause microbiological impact on waters and direct hygienic risk to drinking water in the rural areas, if water is used without disinfection. In addition to its use of fertilizers and pesticides, cotton production requires large amounts of water.

9.3 Legal, policy and institutional framework

Legal framework

The 2003 Law on Production and Safe Use of Pesticides and Agrochemicals establishes the legal framework for pesticide management in order to protect human health and the environment. According to the Law, pesticides and agrochemicals must be officially registered and accepted for use in the territory of the country. The Law regulates testing, registration, certification, storage, transportation, sale, import and disposal of pesticides and agrochemicals. Vendors are obliged to ensure that every single unit containing pesticides or agrochemicals includes recommendations on their use, transportation and storage. Disposal of obsolete or banned pesticides can only be done by persons with special training. In 2012, the Law was amended to include provisions on the protection of confidential information on pesticides and agrochemicals.

The 2004 Law on State Regulation of Protection of Soil Fertility of Agricultural Land defines the state policy towards the promotion of soil fertility, including through standards and regulations on agrotechnical, agrochemical, irrigation and drainage activities. The Law requires land users to report on the use of agrochemicals and pesticides and to comply with the standards and rules for conducting agrotechnical, agrochemical, land reclamation, phytosanitary and anti-erosion measures.

The 2005 Law on Biological Safety regulates the development, testing, production, import, export, placing on the market and release into the environment of GMOs. It is aimed at reducing the risk of adverse effects of GMOs on human health, biodiversity, ecological balance and the environment. The Law is based on the international commitments of Tajikistan, in particular under the Cartagena Protocol on Biosafety. However, there is still no subsidiary legislation to ensure implementation of the Law.

The 2006 Law on Water User Associations (WUAs) defines that non-profit WUAs are created with the

purpose of management of on-farm irrigation systems in joint and individual use, fair, effective and timely distribution of water among their members and other water users, and collecting payments for water supply. The main tasks of WUAs include environmental priorities, such as water saving and prevention of water pollution, protection of land, and provision of training to members and other water users with regard to water-saving irrigation methods and the use of new techniques in irrigation. As of early 2016, 417 WUAs have been established.

The 2007 Law on State Support to the Agro-industrial Complex defines the procedures for receipt of state subsidies and includes the list of branches/areas of the sector eligible for state subsidies.

The 2016 Law on Dehkan Farms, adopted in place of the 2009 Law on the same subject, provides the legal basis for the creation and activities of the dehkan private farms. Whereas, according to the 2009 Law, dehkan farms were economic entities carrying out their activities without forming a legal entity, the new Law allows dehkan farms to achieve the status of legal entities. It also clarifies and strengthens land use rights for dehkan farm members. The Law improves the management of dehkan farms and defines the rights and responsibilities of shareholders. It permits farmers to legally construct field camps on land as temporary construction, which allows for greater productivity during the peak farming seasons. The Law requires that dehkan farms take measures to increase soil fertility and improve the environmental status of lands, make timely payments for the use of water and electricity, and submit statistical information to public authorities.

The 2009 Law on Soil Protection includes requirements for soil protection during design and construction activities and operation of economic facilities. The Law requires land users to take measures for restoration of soil fertility, prevention of the drying out of soils and restoration of degraded soils. The Methodological guidelines for soil assessment and economic evaluation of lands were approved in 2003 by the then State Committee on Land Management. The Law provides for soil monitoring as part of environmental monitoring.

The 2010 Law on Veterinary Medicine regulates the protection of the population against epizootics, including prevention and response, and describes measures to ensure the safety of foodstuffs of animal and plant origin, and the safety of veterinary medicines, fodder and fodder additives.

The 2010 Law on Food Security places an emphasis on competitively allocated state support to national producers of agricultural goods as part of the state policy to ensure food security.

The 2012 Law on Collection, Preservation and Rational Use of Genetic Resources of Cultivated Plants establishes the legal framework of the state policy on genetic resources of cultivated plants and their wild relatives, and regulates their collection, conservation and sustainable use in agriculture and food production.

The 2013 Law on Biological Farming and Production establishes the legal basis for biological (organic) farming, including production, processing, storage, import and export, transportation, packaging, labelling and sale of organic products, i.e. those produced without using GMOs or chemical and synthetic substances, and with rational use of water in production. The Law establishes the framework for standards and certification of organic products.

The 2013 Law on Pastures defines the main principles for using pastures, including protection of pastures and the environment and the attraction of investment for more effective use and protection of pastures. The Law states the powers of local administrations to control the ecological safety and use of pastures according to state regulations and standards. The Law prohibits a number of activities on pasture lands, such as logging of trees and bushes, construction of roads, use of pasture lands for purposes other than pasturing, pollution of the environment with waste, and pasturing animals in excess of allowed numbers. The Law demands that users ensure effective use of pastures, including protection of pastures from degradation and pollution. It provides for geobotanical research on pastures for the estimation of their natural abilities for animal fodder production.

The 2013 Law on Fishery, Fishing and Protection of Fish Resources regulates commercial and recreational fishery, fish stocking, fishing, restrictions on fishing and measures to protect fish resources (chapter 1).

Policy framework

The main directions of the Concept of Agrarian Policy (2008 Resolution of the Government No. 658) included further developing land reform, improving land management (e.g. supporting individual dehqan farms to establish cooperatives or associations with support services, and marketing, as there is a lack of access to sufficient agricultural input supplies such as

seeds, fertilizers, chemicals, veterinary and extension services), developing internal markets for agricultural products and enhancing export. The Concept did not prioritize environmental aspects but mentioned some, such as continued soil erosion and land degradation, the absence of appropriate pasture management and the need for rational use of water resources in agriculture.

In furtherance of the Concept and as part of the agrarian reform, the Government approved the Programme for Reforming the Agricultural Sector in the Republic of Tajikistan for 2012–2020 (2012 Resolution of the Government No. 383) with an Action Plan including 22 actions. The Programme aims to achieve high income- and export-oriented agriculture, with the general objective to increase the living standards of the rural population and achieve food security in the country, as well as to strengthen its regional labour market. One of two overall goals of the Programme is to develop productive and profitable agriculture on the basis of sustainable utilization and management of natural resources, which means that ecological sustainability of agriculture has high priority in the Programme. Some of the activities in the Action Plan have already been implemented, e.g. the development and adoption of the Law on Pastures, and many activities are under implementation through different projects. In some cases, activities are implemented in the form of pilot projects, but their results are not applied more widely and mainstreaming is not implemented systematically.

The Programme for Development of Pastures for the period 2016–2020 (2015 Resolution of the Government No. 724) followed the Programme on Improvement and Rational Use of Pastures for the period 2009–2015 (2008 Resolution of the Government No. 481). These Programmes include similar descriptions of the situation regarding degradation of pastures and resulting consequences for agriculture, so the impact of the 2009–2015 Programme is unclear. Both Programmes aim to increase the pasture forages, therefore promoting an increase in the number of livestock and meat and milk production. The Programme for 2009–2015 provided for such activities as clearing pastures of rocks and bushes; purchasing grass seed for sowing; the use of technology and equipment for the sowing season; the purchase of fuel and lubricants; protection of cultivated plot pastures; and the construction of bridges and repair of roads to facilitate the use of previously unused pastures. The Programme for 2016–2020 additionally provides for the purchase of mineral fertilizers and improving the

quality of pasture lands by mechanical and non-mechanical methods.

The Programme for Development of the Cotton Production Sector in the Republic of Tajikistan for the period 2010–2014 (2009 Resolution of the Government No. 586) provides for increased crop rotation and increased local production of mineral fertilizers to ensure their availability to cotton producers.

The Programme for Development of Apiculture in the Republic of Tajikistan for the period 2011–2016 (2010 Resolution of the Government No. 418) includes information on the implementation of the Programme for Restoration and Further Development of Apiculture for the period 2006–2010 (2005 Resolution of the Government No. 338). The earlier Programme resulted in an increase in the number of bee families, from 49,000 to 140,000 (i.e. a 2.8 times increase) and increase in the production of honey, from 1,200 tons to 2,700 tons annually. At the same time, the productivity of a bee family remains low, so the new Programme provides for research and selection works to increase such productivity.

In late 2015, the Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) was approved. Considering the important role of water for the agriculture sector, the transition to IWRM and river basin management, in particular, will play a significant role for implementation of agricultural reform.

The State Programme to Implement the Concept of Forecast Development of Legislation in Agriculture and Environmental Protection for 2012–2015 (2012 Resolution of the Government No. 94) provides for only two measures to improve agricultural legislation: amending the 2009 Law on Dehkan Farms and amending the 2004 Law on State Regulation to Ensure the Fertility of Agricultural Land. A new Law on Dehkan Farms was adopted in early 2016. The Law on State Regulation to Ensure the Fertility of Agricultural Land was amended in 2014 and 2016.

The Action Plan for the National Strategy to Promote the Active Role of Women for the period 2015–2020 (2015 Resolution of the Government No. 548) provides for measures aimed at increasing the competitiveness of women in the labour market, in particular for women entrepreneurs and women heading dehkan farms. Such measures include training for rural women and women heading dehkan farms on technological developments and access to credit, training for civil servants dealing with

entrepreneurship, and organization of awareness-raising activities to popularize the state registration of marriage and conclusion of marriage contracts, with a view to ensuring the property rights of women, including land property rights.

Other relevant policy documents include the Concept of Innovative Development in the Agro-industrial Sector (2014 Resolution of the Government No. 144), the Programme on Fighting Pests and Diseases in Gardens and Vineyards for the period 2011–2015 (2010 Resolution of the Government No. 625), the Programme on Fighting Locusts for the period 2011–2015 (2010 Resolution of the Government No. 573), the Programme for Development of Seed Production for the period 2010–2014 (2009 Resolution of the Government No. 297) and the Programme for Development of Poultry Farming for the period 2007–2015 (2006 Resolution of the Government No. 451).

Institutional framework

The Ministry of Agriculture is the central executive authority that carries out development and implementation of integrated governmental policy in the agricultural sector. At the strategic level it guides the efficient use of water in agriculture, such as on irrigated lands and in fishery. It is also responsible for coordination with institutions responsible for environmental protection at national, regional and local levels.

The Academy of Agricultural Sciences, subordinated to the Ministry, works on developing methods for maintaining cultivation plants and animal breeds for more effective and productive management, as well as for cultivating species with improved adaptation to climate change, pests and diseases. In recent years, several international expeditions were organized for the purpose of compiling the seeds of wild species. Seeds of genetic resources are kept in the Academy's laboratories, departments of research and development institutes. Seeds are also stored in St. Petersburg in the Russian Federation and Spitsbergen in Norway. Within the Academy of Agricultural Sciences, the Republican National Genetic Resource Centre has the national mandate for the conservation, evaluation and distribution of germ plasm.

The Ministry of Energy and Water Resources is responsible for policy issues on the management of water and energy resources.

The Committee on Environmental Protection has the overall responsibility for environmental issues. The competences of the Committee most relevant for

agricultural issues include inspections on the use of natural resources and the issuance of some licences and permits. The Hydrometeorology Agency under the Committee is the main governmental body responsible for climate-change-related issues.

The Agency of Land Reclamation and Irrigation under the Government is responsible for the management of irrigation and drainage infrastructure and delivery of water to farms, as well as for support to WUAs.

As the agricultural sector forms an important share of the economy, the Ministry of Economic Development and Trade, through its Unit of Agriculture and Ecology Development, works in cooperation with the Ministry of Agriculture on state policies in the agricultural sector and on food security.

The State Committee on Land Management and Geodesy is responsible for the management of land resources, including land privatization, land titles, land registration and certificates, controlling land use and carrying out inventories.

WUA is a voluntary non-profit entity managed by a group of farmers. Its aim is to combine farmers' financial, material and technical means in order to improve the operation and maintenance of a water system (irrigation) and the productivity of farms through equitable distribution and efficient use of water. The 417 existing WUAs are still not fully functioning. WUAs should be created throughout Tajikistan to support private farms to work more effectively.

Application of extension services

The World Bank and GIZ are implementing big projects for the provision of extension services for farmers. They include, for example, providing good quality seeds, assistance with developing markets and advising on good agricultural practices (such as use of fertilizers, pesticides and water, and crop rotation). HELVETAS Swiss Intercooperation is providing advisory services for farmers on organic production (e.g. methods and practices), and also providing practical assistance, e.g. with developing markets. Markets exist for organic cotton, wheat and onions. There is no known market for organic alfalfa, but it is used as a rotation crop for organic cotton. However, all these projects reach only some farmers. No extension services are systematically provided by the Government.

9.4 Global and regional agreements

Rotterdam Convention

Tajikistan signed the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade in 1998 but has not yet ratified it. In 2015, Tajikistan participated in a capacity-building workshop for Central Asian countries on the Rotterdam Convention.

Cartagena Protocol on Biosafety

Tajikistan acceded to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity in 2004 (chapter 8).

United Nations Convention to Combat Desertification

Tajikistan acceded to the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD), in 1997. The responsible institution for UNCCD implementation is the Committee on Environmental Protection. The latest National Report to the UNCCD (2014) describes impressive efforts in awareness-raising on Convention issues. The National Action Programme to Combat Desertification in the Republic of Tajikistan (2001 Resolution of the Government No. 598) deals with environmental degradation and unsustainable use of land resources and serves as an implementation tool for the Convention.

United Nations Framework Convention on Climate Change

Tajikistan acceded to the United Nations Framework Convention on Climate Change (UNFCCC) in 1998. Tajikistan is facing the effects of climate change, especially in agriculture, and climate change adaptation is key for future development. The Third National Communication to the UNFCCC, submitted in 2014, proposes a number of measures for climate change adaptation in the agricultural sector, including:

- Protection of crops from natural hydro-meteorological events, as well as from pests and diseases;
- Introduction of new cultivation technologies (including passive greenhouses) with greater resilience to climate change and less water and energy intensiveness;

- Improved water collection and storage for household needs and for irrigation;
- Enhancing opportunities for organic farming;
- Protection of agro-biodiversity and genetic resources;
- Agroforestry measures for the control of soil erosion and improvement of soil fertility.

Selected international projects

In recent years, many international projects have been implemented related to agriculture, and almost all of them have had goals and activities related to environmental aspects. Several donor-funded projects promoted sustainable farming practices, such as enhancing soil fertility through the increased use of natural and sustainably produced nutrient inputs, and diversified crop rotations; reducing soil erosion; and improving the efficiency of water use by applying minimum tillage and cover crop cultivation techniques.

The Pilot Programme for Climate Resilience (PPCR), approved in 2009 and implemented since 2010, is the biggest project focusing on climate change in Tajikistan. It includes as one of its main themes agriculture and sustainable land management. The activities include promotion of crop rotation. Crop diversification, i.e. farming not only cotton, secures farms' income. The PPCR also promotes the introduction of no-till machinery for rain-fed wheat cultivation, which is also expected to decrease erosion. The envisaged introduction of a sustainable land planning approach at community level would prevent overuse of agricultural and pasture land and therefore also strengthen climate resilience.

The Better Cotton Initiative, an international initiative promoting a holistic approach to sustainable cotton production, has recently come to Tajikistan. In 2014, 360 Tajik farmers had a Better Cotton licence. These farmers used 73 per cent less pesticide, 28 per cent more synthetic fertilizer, and 230 per cent more organic fertilizer (mainly cattle manure, supplemented with sheep and chicken manure), following more closely the recommendations of agronomists. The work under the Initiative in Tajikistan has been coordinated by GIZ. In 2014, GIZ formally handed over its responsibility to Sarob, a Tajik cooperative of agronomists.

The Central Asian Countries Initiative for Land Management (CACILM) is a multi-donor programme promoting sustainable land management to restore, maintain and enhance the productivity of drylands and improve rural livelihoods across Central Asia. Tajikistan participated in regional partnership

initiatives under CACILM and had two major national projects. The outcomes of the Rural Development Project (2007–2015, ADB Full Size Project, GEF: US\$3.5 million) include developments in the legislation on pastures, establishment of pasture user groups and development of pasture plans in selected areas, and establishment of four advisory centres providing farm and rural business advisory services. The Demonstrating Local Responses to Combating Land Degradation and Improving Sustainable Land Management in Southwest Tajikistan Project (2006–2011, UNDP Medium Size Project, GEF: US\$1 million) promoted sustainable land management, including sustainable utilization of forest resources and community forestry initiatives, the repair of key parts of the infrastructure system, crop diversification, appropriate and sustainable technologies such as bio-drainage and shelterbelts, reducing pressure on resources through fuel efficiency, and other measures.

9.5 Conclusions and recommendations

Agriculture has an important role in Tajikistan for securing food, providing employment and providing input to GDP. In recent years, food crop yields and livestock numbers have increased; however, productivity and profitability remain low. An increasing population requires an increasing amount of agricultural production. Currently, agricultural practices are not implemented in an environmentally friendly way; land and water management, especially, need to be improved.

The Programme for Reforming the Agricultural Sector for the period 2012–2020 forms a comprehensive and ambitious programme for large structural changes in agriculture, including crop diversification; sustainable water and land management; establishment of cooperatives to support small farms; reform of the authorities; ensuring financing for developing high-income and profitable agricultural production with rational use and sustainable management of natural resources; and ensuring food security for the increased population. As sustainable land and water management is one of the main objectives of the Programme, its systematic implementation would have a positive impact on the state of the environment, especially on land and water.

Recommendation 9.1:

The Ministry of Agriculture should implement the agricultural reform using the research based information and experience gained in various projects, by:

- (a) *Promoting crop diversification in order to increase food crops and agro-biodiversity and improve soil quality;*
- (b) *Securing the freedom of dehkan farms to select and grow agricultural crops in accordance with sustainable agricultural practices;*
- (c) *Allowing dehkan farms to join cooperatives, which could ensure advice on agricultural practices with rational and sustainable use of water resources and land management, access to markets, access to machinery, fertilizers and pesticides, and extension services, including education and awareness-raising on environmentally and socially sustainable farming;*
- (d) *Promoting agricultural practices for sustainable management of water and land, and energy saving technologies.*

The agricultural sector is vulnerable to the impacts of climate change, including increased and more severe floods, droughts, storms, mudslides, changing availability of water resources, increasing temperature and lowering and more erratic rainfall. Climate change adaptation measures play a key role in the future development of agriculture. The Pilot Programme for Climate Resilience has gained good experience in adaptation to climate change; however, this experience is not widely communicated and applied.

Recommendation 9.2:

The Ministry of Agriculture, in cooperation with relevant stakeholders, should:

- (a) *Prepare an action plan on adaptation to climate change in the agricultural sector taking into consideration the different agro-ecological conditions of Tajikistan and focusing on sustainable land and water management in changing climate conditions, and involving local rural communities;*
- (b) *Promote the implementation of the action plan at all levels and by the population involved in agriculture.*

Pastures are a source of direct rural income as well as providing much of the country's meat and milk requirements. The increased number of livestock and unsustainable management of pastures form a challenge for livestock feed supply. Due to overgrazing, most pastures suffer from land degradation and erosion. Pastures are not managed in a sustainable way that is economically viable, socially acceptable and environmentally responsible. Sustainable productivity and limiting the number of

livestock are not taken into account when developing livestock husbandry, and neither is managing the pasture lands to decrease current pressures.

In 2013, Tajikistan adopted the Law on Pastures and the country has recently adopted the Programme for Development of Pastures for the period 2016–2020, which includes concrete activities for sustainable use of pastures to avoid the further degradation of, and rehabilitate, pastures.

Recommendation 9.3:

The Ministry of Agriculture and regional authorities should ensure implementation of the 2013 Law on Pastures and the 2015 Programme for Development of Pastures for the period 2016–2020, in particular by:

- (a) *Encouraging pasture user unions to be organized and ensuring that all farmers have the possibility of joining them;*
- (b) *Ensuring sustainable pasture management throughout the whole country by preparing pasture management plans and securing the rotation in the use of pastures.*

Around half of the dehkan farmers have not been educated in farming. In general, farmers lack information on how to optimize the use of fertilizers, pesticides and water. Extension services for learning about the rational and sustainable use of agricultural practices are provided by some international projects but are not provided on a systematic basis by the Government. The best practices that are developed in several pilot projects are not transferred to all farmers. Establishing cooperatives in accordance with the agricultural reform could serve this process.

Recommendation 9.4:

The Ministry of Agriculture should:

- (a) *Ensure the systematic provision of extension services that would reach all farmers;*
- (b) *Develop comprehensive guidance on sustainable agriculture based on international best practices and promote it among all farmers.*

Tajikistan has high potential for organic farming, which is not actively promoted. As there is a lack of fertilizers and pesticides, organic farming would provide a good alternative, together with crop rotation and other sustainable practices. There have been pilot projects that have gained good results and have shown the availability of markets for organic production abroad.

However, the accumulated best practices and knowledge are not communicated to farmers and there is no support provided to farmers to start organic farming.

Recommendation 9.5:

The Ministry of the Agriculture should develop measures to support organic production.

Chapter 10

INDUSTRY AND ENVIRONMENT

10.1 Trends in industry development

In 2010, Tajikistan's industrial production accounted for 22.4 per cent of GDP and increased over the course of the year by 7.5 per cent. In 2010, Tajikistan exported 338,000 million tons of aluminium or 96.9 per cent of all the aluminium the country produced. The export revenue from aluminium was US\$735.7 million or 56.4 per cent of all national export revenues. The increase in the price of aluminium on the world market was an important contributor to revenue growth. Even though aluminium production decreased from 2009 by almost 3 per cent, the market value of aluminium produced in the country increased by 27 per cent (from US\$559.3 million in 2009 to US\$761 million in 2010).

In 2011, Tajikistan's industrial production accounted for 30.7 per cent of GDP, even though production decreased over the course of the year by 4 per cent. Mining and quarrying made up 29.7 per cent of the value of industrial production, chemical production contributed 14.7 per cent and production of hydrocarbons contributed 9.7 per cent.

In 2012, Tajikistan's industrial production accounted for 22.8 per cent of GDP; in nominal terms, industrial production increased by 10.4 per cent compared with that of 2011. In 2012, the country's revenue from exports amounted to US\$1.36 billion, far less than the US\$3.78 billion Tajikistan spent on imports. The main categories of exported commodities were, in order of their contribution to export revenue: basic metals, which accounted for 40.9 per cent of total exports; mineral products (22.4 per cent); textiles and products made from them (19.5 per cent); and vehicles, machinery and equipment (6.2 per cent). A single export category (aluminium) contributed 39.5 per cent of the total export revenue. Overall, Tajikistan's export revenue became more diversified compared with that of 2011; the share of aluminium was reduced to 39.5 per cent from 54.6 per cent in 2011, and the share of cotton increased to 16.5 per cent from 15.7 per cent in 2011. In 2012, industrial output in Tajikistan expanded by 10.4 per cent, due to continued growth in mining and light processing. Textiles grew by 30 per cent, as weak external demand and lower international prices for cotton prompted firms to focus on local processing. Aluminium production decreased by 2 per cent

compared with output in 2011, constrained by aging technology and a reduced supply of natural gas from Uzbekistan, and discouraged by lower international prices.

In 2014, Tajikistan produced more than 10.5 billion somoni (some US\$2 billion) worth of industrial goods. Compared with 2013, the index of the volume of production of industrial goods amounted to 105.1 per cent. The processing industry accounted for 66.1 per cent of the overall volume of industrial goods produced, enterprises producing and distributing electrical power, natural gas and water accounted for 20.6 per cent and the mining industry accounted for 13.3 per cent.

In 2014, some 40 per cent of precious metals produced in Tajikistan were sold outside the country and the remainder sold on the domestic market. In 2014, the total value of precious metals sold was 1.3 billion somoni, of which 1 billion somoni was exported. Over the first 11 months of 2014, Tajik mining enterprises reportedly produced a total of 1.675 billion somoni worth of goods, 182.9 million somoni more than in the same period of 2013.

In the period January–November 2014, a total of 456.3 million somoni (US\$97.1 million) was invested in Tajikistan's mining industry, 46.3 million somoni more than in 2013. Of this amount, 263.2 million somoni (US\$56 million) was invested in modernization of the Tajik–Chinese joint gold mining enterprise, Zeravshan Gold Company (ZGC).

Over the first nine months of 2015, Tajikistan produced a total of more than 8.3 billion somoni (US\$1.2 billion) worth of industrial goods. Compared with the same period of 2014, the index of the volume of production of industrial goods amounted to 112.8 per cent.

The number of industrial enterprises steadily increased from 1,320 in 2007 to 2,150 in 2014 (table 10.1). However, not all registered enterprises are in operation. For example, over the first three quarters (January–September) of 2015, of 2,012 industrial enterprises registered in the country, 339 enterprises (17 per cent) were not in operation due to a lack of raw materials and seasonal work.

Table 10.1: Main indicators of industry, 2007–2014

	2007	2008	2009	2010	2011	2012	2013	2014
Industrial enterprises (with full sets of accounts), number	1 320	1 293	1 331	1 347	1 460	1 570	1 795	2 150
Industrial output, in 2014 prices, million somoni*	8 236	7 948	7 558	8 253	8 724	9 666	10 033	10 535
Industrial output as a percentage of the previous year	110	97	94	109	106	111	104	105
Industrial production personnel, thousand,	80.4	74.2	68.5	69.5	75.4	79.6	76.3	81.7
of which:								
in extraction industry and quarrying	..	..	..	..	20.2	11.2	12.0	10.6
in manufacturing industry	..	..	..	..	52.2	64.2	65.7	65.6

Source: Tajikistan in figures, 2013, 2015.

Note: *2007 and 2008 in 2012 prices.

Coal production has reportedly increased, due to the transfer of the country's industrial enterprises from more expensive natural gas and electricity to more economical coal for heating and other needs. Since 2007, more than 210 industrial enterprises in Tajikistan have transferred to coal. However, for the reasons cited above, only 160 of those enterprises are now in operation.

10.2 Developments in main industrial branches

Mining and metallurgical industry

Tajikistan has deposits of gold, silver, zinc, lead, mercury, tin, uranium, oil, gas, precious stones and other minerals. It has one of the largest silver deposits in the world, the Bolshoi Konimansour deposit. Foreign companies are increasingly prospecting for oil and gas and have reported considerable oil and gas finds. Important legal, fiscal and institutional reforms are under way with a view to boosting competitiveness and investment in the extractive sector.

Aluminium

Tajikistan does not mine but imports alumina. In 2010, aluminium production fell short of its target of 442,000 tons and was only 348,850 tons (table 10.2), which was a 3 per cent decrease compared with that of 2009. In 2011, aluminium production was only 278,000 tons, which constituted a 20.3 per cent decrease compared with that of 2010. In 2012, Tajikistan produced 272,500 tons and in 2013, 220,000 tons.

In 2014–2015, the country continued to reduce production. In 2014 it produced about 125,000 tons of primary aluminium, and in 2015 – 139,100 tons. It has produced about 102,900 tons of primary

aluminium over the nine months of 2016, which is almost 3.1 per cent more than in the same period of 2015.

The declining trend in production is linked to another in exporting. In 2012, for example, Tajikistan exported 265,000 tons of primary aluminium of a total value of US\$536 million and, in 2013, 200,000 tons of a total value of US\$370 million, which was 25 per cent lower than in 2012. In 2014, Tajikistan managed to export only a little more than 125,000 tons, primarily of aluminium, of a total value of US\$234 million, which was 37.2 per cent lower than in 2013. Over the first quarter of 2015, the country exported 61,200 tons of primary aluminium, which was 3.6 per cent more than in the same period of 2014 (60,000 tons of primary aluminium). In recent years, the major trading partners for Tajik aluminium were China, Iran, the Russian Federation and Turkey.

Gold

Tajikistan has 28 known gold deposits containing an estimated 429,300 kg of gold. Since independence, the largest amount of gold was produced in Tajikistan in 1998 – 3,000 kg. Three large gold mining companies now operate in Tajikistan.

In 2010, Tajikistan produced 2,049 kg of gold (table 10.2), an increase of more than 50 per cent on 2009. In 2011, Tajikistan produced 2,240 kg of gold, an increase of 9.3 per cent on 2010. In 2012, Tajikistan produced 2,401 kg of gold, an increase of 7.2 per cent on 2011. In 2013, the country produced 2,674.4 kg of gold, an increase of 11.4 per cent on 2012.

Tajikistan has produced nearly twice as much gold in the first half of 2015 compared with the same period of 2014 (some 2,280 kg). In the period January–June 2014, Tajikistan produced 1,141.1 kg of gold, an increase of 5.3 per cent on the same period of 2013.

Table 10.2: Production of mineral commodities, 2006–2012

Commodity ¹	2006	2007	2008	2009	2010 ^e	2011	2012
Metal							
Aluminum, primary	413 800	419 060	339 450	359 385	348 850 ²	278 000	272 500
Antimony, Sb content ^e	3 480 ²	2 000	2 000	2 000	2 000	4 500 ^r	4 700
Gold, kg	1 920	2 000	1 672	1 361	2 049 ²	2 240	2 401
Lead, Pb content ^e	800	800	800	800	800	800	840
Mercury, Hg content ^e	30	30	30	30	30	30	32
Silver, Ag content ^e (kg)	3 110 ^r	3 110 ^r	3 110 ^r	3 110 ^r	3 110	1 764 ^r	1 767
Industrial mineral							
Cement	281 500	313 100	190 400	195 000 ^r	288 200 ²	299 400 ^r	232 400
Fluorspar ^e	8 500	8 500	8 500	8 500	8 500	16 000 ^e	16 000
Gypsum	8 500	8 500 ^e	8 500 ^e	26 400 ^r	14 600	.. ..	..
Nitrogen, N content of ammonia	32 300 ^r	24 500 ^r	23 000 ^r	.. ^r	..	27 000 ^r	27 954
Salt ^e	52 459 ²	52 000	52 000	52 000	52 000	.. ..	..

Source: U.S. Department of the Interior, U.S. Geological Survey. 2010 Minerals Yearbook Tajikistan. October 2012; U.S. Department of the Interior, U.S. Geological Survey. 2011 Minerals Yearbook Tajikistan [Advance Release]. May 2013; U.S. Department of the Interior, U.S. Geological Survey. 2012 Minerals Yearbook Tajikistan [Advance Release]. December 2013.

Notes:

^e Estimated.

^r Revised.

¹ In addition to the commodities listed, Tajikistan had produced a number of other mineral commodities in the past, but available information is inadequate for determining whether production was still taking place.

² Reported figure.

Silver

In 2011, Tajikistan produced an estimated 2,700 kg of silver, an increase of 1.8 per cent on 2010. In 2012, Tajikistan produced 1,767 kg of silver. Some 600 kg of silver was produced in Tajikistan in the period January–November 2014, 20 kg more than in the same period of 2013.

In 2010, the Government announced an international tender for the right to develop the Koni Mansuri Kalon [Big Konimansur] polymetallic deposit. This is one of the largest silver deposits in the world, which had been prospected in the 1970s. The deposit contained about 1 Mt of ore with silver content of 49 grams per ton, lead content of 0.49 per cent and zinc content of 0.38 per cent. Total reserves of silver in Koni Mansur Kalon were estimated to be 70,000 tons. Production from the deposit could continue for 30 to 40 years.

Construction materials

Tajikistan is not a leading cement producer. However, the country increased production of cement from 50,000 tons in 2000 to 288,200 tons in 2010 and 1.4 million tons in 2015.

In 2014, Tajikistan produced 1.15 million tons of cement (table 10.3), 766,000 tons more than in 2013. This has become possible due to the operation of two

large cement plants. The first has produced 760,000 tons of cement and the second has produced 178,200 tons of cement in 2014.

Thirteen cement plants now operate in Tajikistan with the total production capacity of 4.8 million tons per year. Tajikistan's annual requirements in cement have sharply increased in connection with construction of the Rogun HPP, highways and other facilities. Tajikistan's current annual requirements in cement are 2 million tons. Cement shortages are covered by imports. Nevertheless, Tajikistan has started to export cement to the neighbouring countries. It was exported 162,000 tons of cement over the nine months of 2016.

Steel

Construction of a metallurgical plant in the Hisor district is near completion. Construction of the plant began in 2011 and, to date, 95 per cent of construction and assembly works have been fulfilled. The plant, which will produce reinforcing steel, iron sheets, beams and angel bars as well as channel girders, wires and iron pipes, is expected to come into operation in 2016. It will produce 120,000 tons of steel products per year and create 500 new jobs at the initial stage. Gradually, the plant's annual capacity will be raised to 400,000 tons and the total number of workers will be brought to 2,000.

Table 10.3: Industrial production, 2007–2014

	Unit	2007	2008	2009	2010	2011	2012	2013	2014
Benzene	tons	773.0	455.0	414.0	557.0	398.0	889.0	768.0	628.0
Diesel fuel	1 000 tons	3.1	3.2	2.7	3.4	2.9	3.3	3.5	3.7
Mazout	1 000 tons	8.3	10.2	9.1	11.7	9.6	10.9	8.4	7.8
Cable products on weight of copper	1 000 tons	3.6	3.6	0.4	..	..	..	..	..
House wiring cable	1 000 km	9.6	7.6	1.7	3.2	4.0	0.0	0.2	0.5
Buses	number	3.0	2.0	..	..	..	..	..	..
Cement	1 000 tons	313.0	190.0	195.0	288.0	299.0	251.0	384.0	1 150.0
Asbestos-cement sheets (slate)	million standard slabs	2.7	2.8	2.8	0.3	0.6	0.1	..	..
Building bricks	millions	49.3	49.4	54.7	70.9	57.2	52.6	79.5	92.5
Cotton fibre	1 000 tons	153.0	116.0	92.0	95.0	103.0	135.0	112.0	105.0
Cotton fabric	million m ²	26.2	27.7	36.6	25.6	21.4	22.6	18.1	18.2
Carpets and carpet covering	million m ²	0.9	0.8	0.5	0.6	0.7	0.9	1.4	4.8
Hosiery	million pairs	6.2	5.5	5.7	5.7	6.1	6.6	1.0	1.7
Leather footwear	1 000 pairs	38.4	37.5	30.8	34.8	65.9	61.9	85.7	97.9
Animal butter	tons	5.4	7.5	18.5	20.9	16.5	15.5	25.6	30.6
Whole dairy products (in milk equivalent)	1 000 tons	5.1	3.9	4.0	4.1	4.4	4.8	5.8	8.2
Canned products	million standard cans	67.2	76.4	83.0	51.0	60.2	39.9	69.9	31.4
Vegetable oil	1 000 tons	23.7	17.3	13.1	14.1	15.1	19.3	14.1	13.0

Source: Tajikistan in figures, 2013, 2015.

Chemical industry

There has been no chemicals production in Tajikistan since 2008 due to the lack of natural gas supplies.

Light industry

Tajikistan is a good base for textile companies as it offers low production costs due to low electricity charges and cheap labour. There are a few huge textile operations in the country, along with many small-scale operations. The global demand for cotton is 22 million tonnes per year, and Tajikistan produces 130,000 tonnes of cotton fibre annually, all of it for export. So there is demand and room for growth. The main challenges for textile companies in Tajikistan are the difficulty of obtaining loans and the high interest rates and transportation costs (which constitute around 20 per cent of production costs). However, the country hopes that the ongoing infrastructure development will reduce transport costs in the future.

In 2013, a new, modern spinning mill was opened in the suburbs of Khujand. It is equipped to international standards and uses state-of-the-art technology. Its capacity is 5,000 tonnes of high quality cotton yarn annually. In its first year of operation, it produced 4,200 tonnes of yarn. The company received a preferential tax regime: by government resolution, it is exempt from income tax, VAT and customs duties on imported equipment and spare parts, VAT on domestic sales of finished

products and VAT on exports for 12 years. In 2014/2015, the company was exempt from paying VAT and customs duties for delivery of imported loom. The total cost of 2014 loom was €965,500. Introduction of both looms into operation is expected to create more than 40 new jobs and annual receipts from the enterprise directed to the national budget will increase by more than 4 million somoni.

A new ginnery was opened in 2013 in Kulob, with an annual capacity to process 20,000 tons of cotton. The ginnery produces eight different types of cotton products and employs nearly 110 people of the region. Thanks to the new equipment, the plant consumes three times less power for production purposes than do other plants in the region.

The 100 per cent privately owned company operates a spinning mill equipped with the highest quality European equipment and technologies in the industrial zone of Yavan, Khatlon Oblast. The company's spinning facility, which began operating in 2010, uses 4,000 tonnes of cotton fibre and produces 2,000–2,300 tonnes of combed cotton yarn (from NE 12 to NE 40) each year, all of which the company exports, mainly to Italy but also to Turkey. The company's second plant, opened in March 2013, dyes yarn and also produces finished textile products, including socks and loop towels, employing equipment imported from Italy.

Originally exporting only raw materials, the company changed its focus in response to two government

programmes: the Cotton-Fibre Processing Programme for the period 2007–2015 and the Light-Industry Development Programme for the period 2006–2015 (2005 Resolution of the Government No. 422). The first Programme seeks to increase the production and complete processing of cotton fibre within Tajikistan, with the goal of providing sources for light industry. The government has also adopted new legislation which benefits the textile industry, including a 12-year VAT holiday and duty-free imports of equipment. Among other measures, the second Programme envisaged modernization and technical re-equipment of light industry enterprises, construction of new enterprises and creation of a system of incentives to support producers.

In September 2015, a privately owned garment factory was opened in Dushanbe. It was built on the basis of Production Association "Tajik Textiles" for US\$500,000 and employs 350 people. It has an annual capacity of 24,000 suits for boys and 60,000 outfits for girls.

In December 2014, construction of a textile enterprise started in Danghara, Khatlon province. It will consist of four factories – a spinning mill, weaving mill, dyeing factory and clothing factory. This enterprise is being built at the expense of foreign investors (at a total cost of more than 1.5 billion somoni). Its manufacturing capacity will be more than 150 million m² of fabric per year.

Food and beverage industry

The food and beverage industry forms a modest part of Tajikistan's economy. The food processing sector in Tajikistan has 21 subsectors, including flour, pasta, canned vegetables, canned fruit, fresh and dried fruit, meat and dairy processing, feed and confectionary production, and tobacco and alcohol production. The meat and dairy sectors are underdeveloped. Food and beverage industry performance has been unstable over time in terms of output and employment share.

Tajikistan is an import-dependent country in terms of food and beverage products. The trade balance of processed food and beverage products experienced a negative balance of US\$330 million in 2011, higher than in any previous year. Food and agricultural exports and imports together accounted for 8.6 per cent and 12.4 per cent of total merchandise exports and imports, respectively, in Tajikistan in 2011. In 2011, processed food and beverage products accounted for US\$3.2 million or 0.35 per cent of total

merchandise exports and US\$333.4 million or 8.6 per cent of total merchandise imports.

197 new enterprises have been established as a result of the implementation of the Programme on the Development of Agro-processing Industry. The total number of agro-processing enterprises reached 798 by 2015.

A new state-of-the-art soft drink bottling plant will produce up to 100 million litres of beverages per year. The new plant in Dushanbe will be the first production facility of an international company in the entire agribusiness sector in Tajikistan.

10.3 Environmental pressures

Air emissions

Air emissions of the big industrial enterprises in the country are shown in table 10.4. JSC "Tajikcement" is one of the biggest emitters of SO₂, NO₂ and CO₂. JC "Tochik azot" until 2008, and JC "Anzob" until 2009, were also among the large polluters. As TALCO is not subordinated to the Ministry of Industry and New Technologies, the company does not report to the Ministry on its air emissions.

Industrial air emissions of most pollutants did not show any specific trend during the period 2004–2011 (table 10.5). The only clear exception is carbon monoxide, emission of which decreased dramatically from 2004 to 2010. The decreasing trend reversed in 2011.

Greenhouse gas emissions

Average GHG emissions from the "Industrial processes" sector in 2005–2010 amounted to 9.25 per cent of total national emissions. In 2005–2010, the highest volume of emissions was observed in 2007 (table 10.6). Due to the lack of natural gas supply in the period 2009–2010, ammonia production was discontinued and cement production reduced.

A review of CO emissions from the "Industrial processes" sector showed that metal production contributed 80 per cent of CO₂ emissions in 2010. Metal production is followed by nonmetallic minerals (cement, lime), which contributed 20 per cent in 2010.

Aluminium production contributes considerably to industrial GHG emissions.

Table 10.4: Air emissions from big industrial enterprises, 2004–2011, thousand tons

Enterprise	Pollutant	2004	2005	2006	2007	2008	2009	2010	2011
JSC "Tajikcement"	CO ₂	286.0	601.0	675.8	842.2	583.9	480.0	836.7	762.0
	NO ₂	92.0	100.0	112.0	140.0	97.3	80.5	139.0	127.0
	SO ₂	53.6	73.6	73.6	86.6	51.8	54.3	72.7	67.6
JSC "Nasochitochik"	CO	0.03	0.03	..	0.03	0.03	0.03	2.79	2.79
	NO ₂	0.01	0.02	..	0.03	0.03	0.02	0.15	0.13
	SO ₂	..	..	..	..	..	..	..	..
JC "Anzob"	CO ₂	..	..	48.30	47.30	78.40	57.40	..	..
	N ₂ O	..	..	18.80	18.10	14.70	20.80	..	..
	SO ₂	..	..	26.10	54.03	132.20	104.00	..	..
JSC "Nafisa"	CO ₂	4.06	4.14	4.26	4.19	3.23	3.25	3.23	3.25
	N ₂ O	1.06	1.03	1.11	1.10	0.84	0.84	0.85	0.85
	SO ₂	11.60	11.90	12.20	12.10	9.31	9.27	9.31	9.34
JSC "Dushanbe Thermal Power Plant"	CO	179.0	180.0	177.0	388.0	323.0	258.0	60.0	120.0
	NO ₂	38.2	39.1	41.3	100.0	86.0	63.0	31.0	15.0
	SO ₂	176.0	185.0	212.0	327.0	388.0	593.0	189.0	210.0
JSC "Chemical plant"	CO	31.1	30.6	30.1	24.3	4.3	0.2	..	..
	NO ₂	10.4	9.2	9.1	7.5	..	..	0.16	0.08
	SO ₂	113.0	110.0	110.0	79.1	..	..	..	..
State enterprise "Vostokredmet"	CH ₄	3.56	0.07	0.07	..	2.22	0.07	0.55	0.42
	CO	1.52	1.19	1.34	0.42	1.81	0.47	0.91	0.77
	CO ₂	..	..	..	..	..	..	..	..
	NO _x	0.27	0.35	0.21	1.15	0.32	1.15	0.19	0.18
	SO ₂	0.05	0.07	1.87	1.45	2.51	1.45	0.40	0.18
JC "Tochik azot"	CO	1 665.0	476.0	446.0	271.6	263.6	..	..	..
	NO	88.1	78.9	73.8	44.7	43.6	..	..	..
	NH ₃	178.1	121.0	101.2	76.5	108.7	..	..	..
"Lavoni" Ltd	CO	0.025	0.020	0.018	0.017	0.017	0.010	0.010	0.140
	NO _x	0.004	0.000	0.006	0.005	0.005	0.000	0.003	0.010
	SO ₂	0.003	0.000	0.011	0.015	0.017	0.020	0.018	0.050
JSC "Kolinhoi Kayrakkum"	CO	..	..	..	..	6.0	4.9	2.4	3.4
	NO _x	..	..	..	..	0.14	0.01	0.00	0.21
	SO ₂	..	..	..	..	0.11	..	..	1.08

Source: Ministry of Industry and New Technologies, 2015.

Table 10.5: Industrial air emissions, 2004–2011, thousand tons

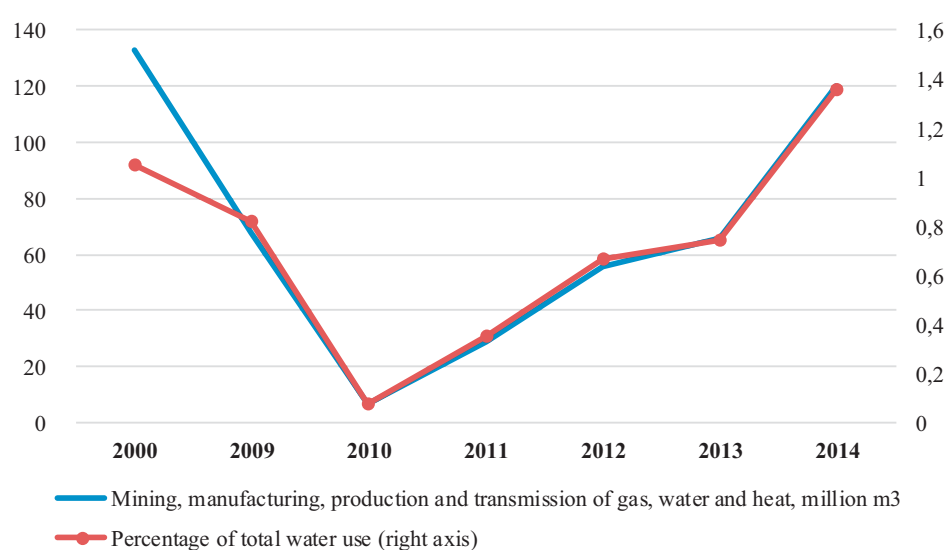
Pollutant	2004	2005	2006	2007	2008	2009	2010	2011
CH ₄	3.56	0.07	0.07	..	2.22	0.07	0.55	0.42
CO	1876.7	687.84	654.46	684.37	598.77	263.57	66.27	127.18
CO ₂	290.06	605.14	728.36	893.69	665.53	540.65	839.93	765.25
NH ₃	178.1	121	101.2	76.46	108.7	..	..	..
NO	88.11	78.9	73.78	44.72	43.62	..	..	..
NO ₂	140.61	148.35	162.38	247.56	183.33	143.52	170.15	142.13
NO _x	0.27	0.35	0.22	1.16	0.47	1.16	0.2	0.4
N ₂ O	1.06	1.03	19.91	19.2	15.54	21.64	0.85	0.85
SO ₂	354.25	380.57	435.78	560.3	583.95	762.04	271.43	288.25

Source: Ministry of Industry and New Technologies, 2015.

Table 10.6: GHG emissions from industrial processes, 2005–2010, thousand tons

	2005	2006	2007	2008	2009	2010
CO ₂	789	811	814	735	633	656
CH ₄	..	..	..	..	..	..
N ₂ O	..	..	..	..	..	..
NO _x	1	1	1	1	1	1
CO	204	222	224	214	193	192
NMVOCS	7	8	10	19	25	24
SO _x	6	6	6	6	5	5

Source: Third National Communication of the Republic of Tajikistan under the United Nations Framework Convention on Climate Change, 2014.

Figure 10.1: Water use in mining, manufacturing, production and transmission of gas, water and heat, 2000, 2009–2014

Source: Environmental Protection in the Republic of Tajikistan, Agency of Statistics, 2015.

Water abstraction and use

There are no data on water abstraction and use in industry. The total volume of water used in mining, manufacturing, production and transmission of gas, water and heat halved between 2000 and 2009 and has been fluctuating since then (table 6.2). Its share of the total water used is negligible (figure 10.1), in average 0.67 per cent in the period 2009–2014.

Wastewater discharges

Information was not made available on the quantitative and qualitative parameters of the wastewater discharged by industrial enterprises.

Land uptake and degradation

Information was not made available on land uptake

by industrial enterprises and land degradation caused by industrial activities.

Soil contamination

Information was not made available on soil contamination caused by industrial activities.

Waste

As the mining industry has been developing over the last five years, waste generation has increased elevenfold, from 111,400 tons in 2010 to 1,267,646 tons in 2014 (table 10.7). The amount of waste generated by light industry skyrocketed from 10,301 tons in 2010 to 1,107,549 tons in 2014. Such an increase can be partly explained by better data collection.

Noise and vibration

Information was not made available on noise and vibration from industrial activities.

Energy resources used by industry

The amount of electricity used by industry has been quite stable since 2003: 6,675 million kWh in 2003 and 6,150 million kWh in 2012 (table 10.8). It then declined to 5,251 million kWh in 2013 and 3,935 million kWh in 2014. There is no clear trend in respect of oil products consumption (table 10.9). The share of oil products consumed by industrial enterprises fluctuated from 7 per cent of total oil products consumption in 2010 to 31 per cent in 2011. The share of coal consumed by industry dropped tenfold, from 20 per cent in 2003 to 2 per cent in 2014. However, these statistics are misleading as they cover only state-owned industrial enterprises. Newly built cement plants rely on coal as their main fuel and they are privately owned.

10.4 Legal, policy and institutional framework

Legal framework

The 2011 Law on Environmental Protection introduced the environmental status review of legal entities during their privatization, bankruptcy or liquidation. Article 40 of the Law states that privatization of enterprises and other facilities shall

be based on the results of verification of their environmental status review. The authorized state body on environmental protection is responsible for checking the environmental condition of an enterprise before its privatization. The Law envisages that all the necessary environmental measures, including clean-up activities, are to be funded either by the State and (or) by the new owner. Another provision of the Law relates to environmental certification. However, this and other environmental compliance promotion activities remain sporadic. Only two companies in the country are ISO 14001 certified, including one industrial enterprise: the TALCO aluminium plant.

The 2011 Law on Environmental Audit provides for mandatory and voluntary environmental audit to be performed by licensed environmental audit organizations (chapter 1). However, practical implementation of environmental audit has not yet commenced (chapter 2).

In 2012, the 2003 Law on Ecological Expertise was replaced with a new one. The 2012 Law on Ecological Expertise streamlined the mechanism of environmental assessment of projects. The EIA procedures have been differentiated in relation to the project risk. Until 2013, only 14 types of facilities were subject to EIA. The list of facilities and types of activity subject to EIA was revised and extended and a new list was adopted by the 2013 Resolution of the Government No. 253 (chapter 2).

Table 10.7: Industrial waste generation, 2010–2014

	2010	2011	2012	2013	2014
Industry, tons	..	..	..	..	..
Mining, tons	111 400	532 955	978 066	1 195 797	1 267 646
Colour metallurgy, tons	119 612	63 010	65 430	84 035	69 583
Chemicals, tons	..	..	..	..	..
Light industry, tons	10 301	400 475	78 428	1 003 081	1 107 549
Machine building and metal processing, tons	57	56	58	60	61
Construction materials, tons	270	390	312	257	510
Food, tons	..	..	..	..	..
Coal, m ³	566 308	502 609	860 356	707 902	869 462

Source: Ministry of Industry and New Technologies, 2015.

Table 10.8: Electricity consumption, 2003, 2009–2014, million kWh

	2003	2009	2010	2011	2012	2013	2014
Total electricity use, million kWh	16 518	16 160	16 581	13 113	16 313	16 171	15 160
of which:							
by industry	6 675	7 007	7 344	6 335	6 150	5 251	3 935
by industry as percentage of total electricity consumption	40.41	43.36	44.29	48.31	37.70	32.47	25.96

Source: Environmental Protection in the Republic of Tajikistan, Agency of Statistics, 2015.

Table 10.9: Oil products and coal consumption, 2009–2014, tons

	2009	2010	2011	2012	2013	2014
Total oil product use, tons	661 979	646 961	462 487	390 885	392 289	597 700
of which:						
by industry	78 588	42 113	143 354	79 180	80 867	100 513
by industry as percentage from the total oil products use	11.87	6.51	31.00	20.26	20.61	16.82
Total coal use, tons	179 821	208 862	238 677	435 866	525 319	890 556
of which:						
by industry	36 025	7 467	8 792	15 183	15 105	20 324
by industry as percentage from the total coal use	20.03	3.58	3.68	3.48	2.88	2.28

Source: Environmental Protection in the Republic of Tajikistan, Agency of Statistics, 2015.

The 2012 Law on the Protection of Atmospheric Air introduced the concept of best available techniques (BAT). It stipulated that the newly established national technological standards and newly developed design documentation are to be based on BAT (chapter 2).

The 2010 Law on the Technology Park regulates the legal and organizational activities of the technology park, defines the main objectives and aspects of its activities and is aimed at implementing the results of scientific, technological and innovative research into production. Since its coming into force, only one technology park has been established.

Three laws contain provisions on various compliance assurance mechanisms: the 2015 Law on Inspections of Business Entities, the 2009 Law on the Moratorium on Inspection of Small and Medium Business Entities and the 2012 Law on the Moratorium on Inspection of Business Entities Engaged in Production (chapter 2).

Policy framework

Textile and Clothing Export Development Strategy for the period 2010–2013

In 2009, the International Trade Centre (ITC) assisted Tajikistan to elaborate its Textile and Clothing Export Development Strategy for the period 2010–2013. It is not clear whether this Strategy was officially adopted. The Ministry of Industry and New Technologies evaluates the Strategy's results as successful, underlines the high implementation rate achieved and notes the necessity to build on this experience and draw lessons for the next five-year period. As a result of the Strategy, Tajikistan improved quality management systems, raised Tajik specialists' awareness of modern market requirements and developed new markets and suppliers, as well as improving its market presence and reputation.

In January 2015, the Ministry of Industry and New Technologies and ITC jointly started a series of stakeholders' consultations to develop a new five-year Textile and Clothing Strategy for the country. This initiative is funded by the Government of Switzerland within its Trade Cooperation Programme in Tajikistan.

Strategy of Innovative Development until 2020

The Strategy of Innovative Development until 2020 (2015 Resolution of the Government No. 354) states that Tajik industry is in a difficult situation and requires innovative reformation. Two of the Strategy's six performance indicators directly target industry:

- Increase the share of industrial enterprises engaged in technological innovation in the total number of industrial production enterprises to 5–8 per cent by 2020;
- Increase the share of innovative products in the total volume of industrial production by 2020.

The Strategy envisages the use of appropriate instruments to encourage enterprises to improve production technology and implement innovations. It also calls for the formation of a system of incentives for the development of priority technologies and sectors of the economy based on stricter environmental regulations and technical regulation requirements.

Action Plans on Establishment of Industrial Enterprises

The Action Plan on Establishment of Industrial Enterprises in the Republic of Tajikistan for 2012–2013 (2012 Resolution of the Government No. 175) lists 324 industrial enterprises to be established during 2012–2013.

The implementation of the Action Plan on Establishment of Industrial Enterprises in the

Republic of Tajikistan for 2015 (2015 Resolution of the Government No. 108) resulted in establishing 468 industrial enterprises.

The Action Plan on Establishment of Industrial Enterprises in the Republic of Tajikistan for 2016 (2016 Resolution of the Government No. 147) lists 161 industrial enterprises to be established in 2016.

All three action plans do not envisage any specific environmental requirements for the new enterprises.

Programme of Silkworm Breeding and Silkworm Processing Sphere Development in the Republic of Tajikistan for the period 2012–2020

The Programme of Silkworm Breeding and Silkworm Processing Sphere Development for the period 2012–2020 (2011 Resolution of the Government No. 409) is aimed at developing the sericulture industry, increasing production of silkworm cocoons and their complete processing.

As of early 2016, four enterprises for the processing of cocoons and one plant for the production of fabric remained in the country. The Programme envisages:

- Modernizing the existing production capacity of the industrial enterprises;
- Building new enterprises for the processing of raw materials in the areas of cultivation of cocoons.

Programme of Application of Scientific-Technical Achievements in Industrial Production of the Republic of Tajikistan for the period 2010–2015

The Programme of Application of Scientific-Technical Achievements in Industrial Production for the period 2010–2015 (2009 Resolution of the Government No. 574) expired in 2015. The Programme did not include any explicit environmental or green economy provisions. However, it is not clear whether an implementation report has been prepared or any follow-up activities are envisaged.

Programme of Construction Materials Production Development for the period until 2015

The Programme of Construction Materials Production Development for the period until 2015 (2009 Resolution of the Government No. 601) also expired in 2015 with no implementation report

available and no follow-up activities envisaged. The Programme did not include any explicit environmental or green economy provisions.

Programme of Production of Materials for Children in the Republic of Tajikistan for the period until 2015

The overall aim of the Programme of Production of Materials for Children for the period until 2015 (2009 Resolution of the Government No. 683) was to meet 91.3 per cent of domestic demand by domestic production by 2015. The total value of production of children's products was expected to reach 467.3 million somoni in the same year. The Programme did not include any explicit environmental or green economy provisions. Similarly to the two programmes mentioned above, this Programme expired in 2015 with no implementation report available and no follow-up activities envisaged.

Programme of Complete Processing of Livestock Raw Materials (Skin and Wool) for the period until 2015

The Programme of Complete Processing of Livestock Raw Materials (Skin and Wool) for the period until 2015 (2008 Resolution of the Government No. 663) has as its main objective to create favourable conditions for full processing of domestically produced raw materials from livestock (skin and wool) in the period to 2015 and to increase the efficiency of industrial production. The Programme did not include any explicit environmental or green economy provisions. No implementation report and/or list of follow-up activities was available for the review team.

Programme of Processing and Production of Final Products from Primary Aluminium for the period 2007–2015

The main objective of the Programme of Processing and Production of Final Products from Primary Aluminium for the period 2007–2015 (2007 Resolution of the Government No. 648) is to create conditions and prerequisites for increasing the processing of primary aluminium in industrial enterprises in Tajikistan, in order to produce competitive products. The Programme envisages a twelvefold increase in the primary processing of aluminium and production of finished products between 2005 and 2015. The Programme did not include any explicit environmental or green economy provisions.

*Institutional framework*Ministry of Industry and New Technologies

Until 2013, the Ministry of Energy and Industry was responsible for implementation of state policy and regulation in the sphere of energy resources, industry, the defence industry, engineering and technology, production of construction materials, food and work processes.

The Ministry of Industry and New Technologies was established according to the 2013 Decree of the President No. 12. All the tasks related to industry were withdrawn from the Ministry of Energy and Industry and transferred to the Ministry of Industry and New Technologies. Since 2013, the latter Ministry is also the authorized body in the field of innovation (2013 Resolution of the Government No. 38).

The current structure of the Ministry does not include a dedicated environmental unit. The Department of New Technologies is also responsible for environmental issues.

Ministry of Economic Development and Trade

Under the Ministry of Economic Development and Trade, the National Patent Information Centre (www.ncpi.tj/index2.php) was established in 2012 to provide information on innovation activities in all CIS countries.

Chamber of Commerce and Industry

The legal background for the Chamber of Commerce and Industry is the 1998 Law on the Chamber of Commerce and Industry of the Republic of Tajikistan, which has defined the legal status of the Chamber. The Regulations of the Chamber were developed and approved at the 4th Meeting of the Chamber of Commerce and Industry in October 2003.

At present, over 520 large organizations and enterprises in Tajikistan, with different forms of property, are the acting members of the Chamber. In the last decade, the Chamber has implemented a number of activities and participated in many events. No explicit activities on environmental protection were reported.

Academy of Sciences

The State Scientific Institution "Centre of innovative development of science and technology" of the

Academy of Sciences was established in 2011. Its overall objectives are to organize and conduct scientific research works and applied research in development and implementation of innovative projects and new technologies. In particular, it should stimulate scientific-technical and innovation activities and strengthen links between science and industry in order to implement scientific-technical and innovative projects and commercialize outcomes of related activities.

Scientific and Technical Coordination Council

In 2010, the Scientific and Technical Coordination Council under the Government was established as a collegial advisory body in science, technology and innovation (2010 Resolution of Government No. 90). The Council works on a voluntary basis. Its main purpose is to coordinate the activities of scientific and educational institutions, enterprises, state executive bodies and local governments.

Extractive Industries Transparency Initiative

In 2015, Tajikistan has prepared its first Extractive Industries Transparency Initiative (EITI)¹ report. The international EITI Board approved Tajikistan's application for EITI Candidate status at its meeting in Oslo in 2013. As an EITI Candidate country, Tajikistan has to disclose payments from its extractives sector, and meet all the requirements in the EITI standard within 2.5 years to become EITI Compliant. Tajikistan has also agreed to participate in the beneficial ownership pilot project, and is planning to collect information on beneficial ownership through the EITI reporting process.

10.5 Conclusions and recommendations

Tajikistan does not have policies for greening the industry and promoting sustainable production, although some strategies were adopted by the Government. This important policy gap hampers the development and implementation of measures towards more efficient and green industry.

Recommendation 10.1:

The Ministry of Industry and New Technologies should:

¹ The Extractive Industries Transparency Initiative (EITI) is an international organization that maintains a standard, assessing the levels of transparency around countries' oil, gas and mineral resources. The EITI standard is implemented in 46 countries.

- (a) *Promote the change of production patterns with a view to greening industry by supporting activities related to eco-design and clean production, and eco-labelling in the textile industry;*
- (b) *Create the conditions for the transfer of know-how related to industry, in particular best available techniques, product standards, and technology and innovation platforms.*

Little information is available on the pressures that industry places on the environment in Tajikistan. Neither data nor estimates are available of industrial wastewater discharges and associated surface and groundwater pollution. There is no information on land uptake by industrial facilities and land degradation and soil contamination caused by

industrial activities. Noise and vibration from industrial installations are not measured.

Recommendation 10.2:

The Agency of Statistics, together with the Ministry of Industry and New Technologies and in cooperation with the Committee on Environmental Protection, should ensure regular environment-related data collection from the industrial enterprises.

Recommendation 10.3:

The Committee on Environmental Protection, together with the Ministry of Industry and New Technologies and in cooperation with the Agency of Statistics, should undertake an assessment of the impact of industry on the environment.

Chapter 11

ENERGY AND ENVIRONMENT

11.1 Introduction

The energy resources of Tajikistan are represented by natural gas, petroleum products and very significant resources of hydropower. The country is also endowed with substantial coal resources, but exploration of coalfields is not organized on an industrial scale, due to their location in mountainous remote places. The national economy depends on imports for the bulk of its primary energy requirements, due to the low level of mining and processing of gas and oil resources. It is not foreseen that other non-conventional sources of energy, such as wind, solar and geothermal power, will significantly contribute to the energy balance in the future. The energy system in Tajikistan consists of six large hydropower plants (HPPs), several thermal power plants (TPPs), and many small, mini- and micro-HPPs.

Hydropower is the main available energy resource and the major source of electricity in Tajikistan, with around 98 per cent of the generated electricity coming from HPPs in 2014. The general potential of hydropower resources in the country allows the generation of approximately 527 billion kWh of energy per year, of which technical hydro potential is 317.82 billion kWh per year, or 61.3 per cent, with only 5 per cent of that resource having been used so far. The main hydropower potential is concentrated in the basins of the Vakhsh and Panj Rivers.

The energy sector faces numerous challenges, with winter power cuts continuing in much of the country. The dissolution of the Central Asia Power System, limited gas supplies and an underdeveloped coal sector have left Tajikistan almost solely reliant on hydropower generation, which remains insufficient in the winter. An estimated one million people spend much of the winter without access to reliable electricity supplies. Therefore, the country faces challenges that will require increased energy

efficiency, climate resilience actions and support for energy security.

11.2 Trends in energy balance

According to the International Energy Agency (IEA), the total primary energy supply (TPES) increased from 2,340 ktoe in 2005 to 2,455.7 ktoe in 2013 (table 11.1). The share of imported oil and natural gas in the TPES was 67 per cent in 2005 and increased to 98 per cent in 2013. The supply of coal saw an increase by a factor of five, from 44.3 ktoe in 2005 to 230.2 ktoe in 2013, with a trend for continuing growth in 2014 and 2015. Oil products followed the same trend, with a consumption increase from 275.94 ktoe in 2005 to 582.50 ktoe in 2013. Energy supply of natural gas fluctuated in the period 2005–2013, equating to 536.82 ktoe in 2005, 160.70 ktoe in 2010 and 252.92 ktoe in 2013. In 2013, the supply of gas was mostly liquefied natural gas (LNG), imported from Kazakhstan and Russian Federation.

However, according to the data provided by the Agency of Statistics, imports of natural gas to Tajikistan completely ceased in 2013 and no references to LNG imports were given in the country's energy balance, showing some discrepancy in the statistical data collected by two agencies.

The total final consumption was 2,218.36 ktoe in 2013; 37 per cent constitutes oil and gas, representing an increase from 29 per cent in 2005; 52 per cent of energy comes from electricity produced by HPPs, while 10 per cent of consumption is of energy generated from coal.

Some inconsistency has been observed between energy-related data, in particular, data on import of gas and data on renewable energy sources (RES), in particular with regards to the volume of the geothermal energy potential.

Table 11.1: Energy balance, 2013, ktoe on a net calorific value basis

	Coal	Crude, NGL and feedstocks	Oil products	Natural gas	Hydro	Electricity	Heat	Total	Memo: Renewables	Memo: Coal, peat and oil shale	Memo: Primary and secondary oil	Memo: Geotherm, solar, wind, heat, elec, etc.
Production	225.8	27.1	0.0	3.1	1 468.1	0.0	0.0	1 724.1	1 468.1	225.8	27.1	0.0
Imports	4.4	0.0	618.4	249.8	0.0	10.1	0.0	882.8	0.0	4.4	618.4	10.1
Exports	0.0	-4.0	-20.0	0.0	0.0	-91.2	0.0	-115.2	0.0	0.0	-24.0	-91.2
International aviation bunkers	0.0	0.0	-35.9	0.0	0.0	0.0	0.0	-35.9	0.0	0.0	-35.9	0.0
Total primary energy supply	230.2	23.1	562.5	252.9	1 468.1	-81.2	0.0	2 455.7	1 468.1	230.2	585.6	-81.2
Statistical differences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Main activity producer electricity plants	0.0	0.0	0.0	0.0	-1 468.1	1 468.1	0.0	0.0	-1 468.1	0.0	0.0	1 468.1
Main activity producer CHP plants	0.0	0.0	0.0	-16.9	0.0	3.8	9.7	-3.4	0.0	0.0	0.0	13.5
Oil refineries	0.0	-23.1	20.0	0.0	0.0	0.0	0.0	-3.1	0.0	0.0	-3.1	0.0
Energy industry own use	0.0	0.0	0.0	0.0	0.0	-13.4	0.0	-13.4	0.0	0.0	0.0	-13.4
Losses	0.0	0.0	0.0	0.0	0.0	-217.4	0.0	-217.4	0.0	0.0	0.0	-217.4
Total final consumption	230.2	0.0	582.5	236.0	0.0	1 159.9	9.7	2 218.4	0.0	230.2	582.5	1 169.6
Industry	0.0	0.0	0.0	0.0	0.0	472.7	0.0	472.7	0.0	0.0	0.0	472.7
Chemical and petrochemical	0.0	0.0	0.0	0.0	0.0	12.0	0.0	12.0	0.0	0.0	0.0	12.0
Non-ferrous metals	0.0	0.0	0.0	0.0	0.0	430.2	0.0	430.2	0.0	0.0	0.0	430.2
Machinery	0.0	0.0	0.0	0.0	0.0	2.8	0.0	2.8	0.0	0.0	0.0	2.8
Food and tobacco	0.0	0.0	0.0	0.0	0.0	6.5	0.0	6.5	0.0	0.0	0.0	6.5
Wood and wood products	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Construction	0.0	0.0	0.0	0.0	0.0	4.7	0.0	4.7	0.0	0.0	0.0	4.7
Textile and leather	0.0	0.0	0.0	0.0	0.0	16.4	0.0	16.4	0.0	0.0	0.0	16.4
Transport	0.0	0.0	103.0	11.4	0.0	3.3	0.0	117.6	0.0	0.0	103.0	3.3
Road	0.0	0.0	103.0	11.4	0.0	0.0	0.0	114.4	0.0	0.0	103.0	0.0
Rail	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	0.0	0.0	0.0	3.3
Non-specified (transport)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	230.2	0.0	478.6	224.6	0.0	684.0	9.7	1 627.1	0.0	230.2	478.6	693.7
Residential	0.0	0.0	0.0	0.0	0.0	249.7	0.0	249.7	0.0	0.0	0.0	249.7
Commerce and public services	0.0	0.0	0.0	0.0	0.0	81.4	0.0	81.4	0.0	0.0	0.0	81.4
Agriculture/forestry	0.0	0.0	0.0	0.0	0.0	352.9	0.0	352.9	0.0	0.0	0.0	352.9
Non-specified (other)	230.2	0.0	478.6	224.6	0.0	0.0	9.7	943.2	0.0	230.2	478.6	9.7
Non-energy use	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.9	0.0
Non-energy use in other	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.9	0.0
Electricity output in GWh	0.0	0.0	0.0	44.0	17 071.0	0.0	0.0	17 115.0	17 071.0	0.0	0.0	0.0
Electricity output - main activity producer electricity plants	0.0	0.0	0.0	0.0	17 071.0	0.0	0.0	17 071.0	17 071.0	0.0	0.0	0.0
Electricity output - main activity producer CHP plants	0.0	0.0	0.0	44.0	0.0	0.0	0.0	44.0	0.0	0.0	0.0	0.0
Heat output - main activity producer CHP plants	0.0	0.0	0.0	408.0	0.0	0.0	0.0	408.0	0.0	0.0	0.0	0.0
Heat output in TJ	0.0	0.0	0.0	408.0	0.0	0.0	0.0	408.0	0.0	0.0	0.0	0.0

Source: www.ica.org/statistics/statisticssearch/report/?country=TAJIKISTAN&product=balances&year. Accessed 28 November 2015.

Hydrocarbons

Reserves and production

Total coal reserves in Tajikistan are quite significant and made up of 0.2 million tons of lignite and 42 million tons of anthracite. Their full exploitation cannot be organized on an industrial scale. Deposits are usually in mountainous areas where there is no space for the construction of large TPPs and where transportation infrastructure is lacking.

There are at least three coal mines that could be used for fuel supply in the near future: Ziddi, Shurob and Fon-Yaghnob. These mines have proven reserves of around 500 million tons and could supply four new plants totalling 1,300 MW of capacity (Dushanbe-2, Shurob-1 and -2, and Fon-Yaghnob). The energy content of the coal varies between 6,500 and 9,100 kCal/kg. Fourteen enterprises (including foreign investors) are engaged in coal production and distribution (mainly at the Fon-Yaghnob and Shurob coal deposits). The role of the State is limited to providing the transport infrastructure (road and rail) and enforcing environmental and safety regulations.

According to the Agency of Statistics, coal production in 2014 reached 878,100 tons, which is a fourfold increase over 2010 (table 11.2). Coal production has increased, due to a shift of the country's industrial enterprises from the more expensive natural gas and electricity to the more economical fuel – coal – for heating and other needs.

In 2015, coal production reached 1.042 million tons, but it is expected that production will be 1.7 million tons at the end of 2016 and that there will a 10 per cent annual increase throughout the following three years. However, taking into consideration the Government's ambitious plans to continue installing more capacity for coal-fired TPPs by 2020 and to begin exporting electricity generated from coal in the future, it is likely that the required production volumes of coal to power these facilities will reach well above 2.5 million tons by 2030.

Tajikistan has proven gas reserves, but the extraction industry is not well developed. In 2012, domestic production of natural gas was less than 5 per cent of total annual supply and there was a dramatic reduction in total gas supply in 2013 and thereafter (table 11.3).

Tajikistan's oil resources are estimated at 117 million tons. Annual production contributes a very small part of the country's oil balance. Most of the oil and oil products used in Tajikistan are imported from the Russian Federation.

According to the Tethys oil and gas exploration company operating in the Bokhtar Production Sharing Contract area, which covers some 35,000 km², the gross unrisksed mean recoverable resources are estimated to be 27.5 billion barrels of oil equivalent (3.2 trillion m³ of gas and 8.5 billion barrels of oil and condensate).

There is no nuclear power generation in Tajikistan.

Table 11.2: Coal production and imports, 2010–2014, tons

	2010	2011	2012	2013	2014
Total	208 863	238 677	435 866	525 319	890 556
of which:					
Production	199 700	236 400	412 000	515 600	878 100
Imports	9 163	15 355	23 866	9 719	12 456

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Table 11.3: Natural gas production and imports, 2010–2014, million m³

	2010	2011	2012	2013	2014
Total	194.3	194.9	139.7	2.1	2.9
of which:					
Production	20.3	14.9	7.0	2.1	2.9
Imports	174.0	180.0	132.7	0.0	0.0

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Transit

At the moment, Tajikistan's 549 km of natural gas pipeline connects points in Uzbekistan through north-western Tajikistan. Tajikistan also has 38 km of oil pipeline.

The 410-km-long Tajikistan section of Line-D of the China–Central Asia Gas Pipelines is expected to run from Turkmenistan across Uzbekistan, Tajikistan and Kyrgyzstan to China, with an expected delivery capacity of 30 billion m³ of natural gas every year once construction is completed.

Refineries

As of 2016, there were two oil refining plants in the country: in Shakhrinavsky district and in Kanibadam district. One more refinery – in Dangara district – was due to be commissioned in early 2017.

Electricity sector

According to the Government, the country has the capacity to produce around 5,388 MW of electricity, and currently around 98 per cent of this is produced by hydropower. Over the last 10 years, due to the construction of the 670 MW Sangtuda-1 and the 220 MW Sangtuda-2 HPPs in 2011, total capacity in Tajikistan has increased by more than 1,000 MW.

As of 2014, Tajikistan had six large and over 265 small HPPs with a total generation capacity of 5,070 MW, and two CHPs with a capacity of 318 MW. Annual electric power generation has not significantly changed in the period 2010–2014, and amounted to 16,505 million kWh in 2014. Despite installed capacity of about 5,070 MW, the current system can only provide firm capacity of approximately 2,200 MW during winter. As the system uses only run-of-river, many more HPPs need to be built to meet firm capacity needs, and thus, financial needs are increased. This also leads to high costs for firm capacity, far exceeding the cost of installed capacity and, in some cases, the cost of TPPs. High installed capacity would support a higher level of generation in the summer months of high flows. However, without available export markets, surplus electricity generated during the summer cannot be sold, which affects the financial viability of such plants.

In summer, the country is able to produce additional quantities of electricity and to export it. In 2014, the daily volume of electricity production throughout the country was around 49.8 million kWh, including more than 8.6 million kWh of exports to Afghanistan and Kyrgyzstan. Afghanistan receives more than 6.9 million kWh of electricity daily, and Kyrgyzstan around 1.7 million kWh. Tajikistan reportedly supplies electricity to Afghanistan and Kyrgyzstan only during the spring-summer period (table 11.4).

Photo 11.1: Nurek HPP control center



Table 11.4: Electricity production and distribution, 2010–2014, million kWh

	2010	2011	2012	2013	2014
Total supply	16 773.6	16 888.4	16 988.3	17 136.1	16 505.3
of which:					
Production	16 434.7	16 238.4	16 974.0	17 115.0	16 472.0
Imports total, including from:	338.9	65.0	14.3	21.1	33.3
Uzbekistan	321.4	18.0	0.0	0.0	0.0
Kyrgyzstan	17.5	47.0	14.4	21.1	33.3
Total consumption	14 272.8	14 436.0	13 878.7	13 646.7	12 148.5
Losses	2 321.1	2 261.5	2 433.1	2 521.9	2 804.0
Exports total, including to:	179.7	190.9	676.5	968.1	1 552.8
Afghanistan	82.5	124.4	595.2	940.0	1 326.1
Kyrgyzstan	96.6	66.5	58.6	28.1	226.7
Kazakhstan	0.0	0.0	22.7	0.0	0.0
Uzbekistan	0.6	0.0	0.0	0.0	0.0

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Approximately 70 per cent of the Tajikistan's population suffer from extensive shortages of electricity during the winter. These shortages, estimated at about 2,700 GWh, about one quarter of winter electricity demand, impose economic losses estimated at over US\$200 million per annum or 3 per cent of GDP. When the losses during transmission and distribution of electricity are considered, the deficit at the generation level amounts to about 3,100 GWh during winter, compared with a total winter supply requirement of 11,200 GWh, a gap of about 24 per cent.

The electricity shortages increased considerably in 2009 when Tajikistan's energy trade with neighbouring countries through the Central Asia Power System ceased. Without prompt action to remedy the causes of Tajikistan's electricity crisis, and with growing demand, the shortages could increase to about 4,500 GWh by 2016 (over one third of winter electricity demand) or worse.

Over the last decade, Tajikistan had an annual electricity demand of between 16,000 and 17,000 GWh, reaching its maximum in 2007 (table 11.5). In the wake of the economic crisis, demand declined to a level just above 16,000 GWh.

The Government realizes that the rehabilitation of HPPs in operation is a priority measure to recover the energy system and to ensure energy security in the country. In 2012, modernization of Varzob-1 HPP was finalized. The construction of Switchgear-220 kV at the Nurek HPP and modernizing the fourth hydro unit of the Golovnaya HPP were completed in 2013. Construction projects of Switchgear-500 kV at the Nurek HPP have been finalized in 2014. Between 2012 and 2016, the Government is prioritizing three large HPPs for rehabilitation: Nurek, Kayrakkum and

Golovnaya (Sarband). Rehabilitation also offers an opportunity to increase the electricity generation per unit of water. Such upgrades are conservatively estimated to increase firm capacity by 2.5–5 per cent, or an additional 65 MW, which will provide an additional 260 GWh of electricity.

Hydropower plants

The Nurek HPP, the largest in Tajikistan, with a capacity of 3,000 MW, generates over 11 billion kWh of electric power per year and is the cornerstone of Tajikistan's power system. The dam is 300 m tall, making it the tallest dam in the world. The reservoir is 70 km in length and covers 98 km². The original, primary purpose of the reservoir was to accommodate irrigation needs, with energy use as a by-product. Nurek HPP produces more than 40 million kWh of electricity each day, representing over 70 per cent of the total electricity produced in the country.

Even with Nurek reservoir, Tajikistan's hydropower storage capacity is insufficient to meet the country's winter energy requirements. The reservoir has adequate capacity to meet weekly variations in river flows, but not seasonal variations. As a result, Tajikistan is in the situation of having excess capacity during the summer with limited market opportunities for sales. Water is spilled during the summer as the reservoir capacity in the system is inadequate to allow storage for the winter months, when it is needed.

Although the level of the Nurek dam is 300 m, the useful level of water used to generate electricity presents only 53 m. There are concerns about the process of silting up of the Nurek reservoir, located on the alignment of the Vakhsh River.

Table 11.5: Electricity balance, 2005–2013, GWh

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total production	17 090	16 935	17 494	16 147	16 117	16 435	16 238	16 974	17 115
of which from:									
Coal	0.512	0.535	0.942	1.035	1.035	1.035	1.151	2.210	2.675
Gas	123	234	380	347	217	35	38	74	44
Hydro	16 967	16 701	17 114	15 800	15 900	16 400	16 200	16 900	17 071
Imports	4 508	4 840	4 361	5 297	4 304	432	172	114	117
Exports	4 258	4 231	4 259	4 421	4 247	286	197	775	1 061
Losses	2 746	2 745	2 954	2 985	2 099	2 330	2 271	2 445	2 528
Consumed in the country	14 508	14 679	14 722	14 244	13 536	14 093	13 686	13 711	13 487

Source: www.iaea.org/statistics/statisticssearch/report/?country=TAJIKISTAN&product=balances&year. Accessed 28 November 2015.

According to the Government, and in the current situation, Nurek HPP expects full sedimentation in 15–20 years' time. It is estimated that continuing siltation of Nurek will cause the production of electricity in the winter to drop.

The majority of the existing power plants in Tajikistan, including the large Vakhsh cascade with a total capacity of over 4.5 GW, were designed in the 1950s, with no regard for climate change implications. Their planning did not provide for their design, rehabilitation and management being able to cope with more frequent extreme events under a range of projected climate change scenarios. The turbines, generators and hydraulic equipment of HPPs, as well as the electricity distribution equipment, have been in operation for more than 30 years. These technical resources are fully utilized and require regular maintenance and major repair. With international help, power production from the Nurek HPP has been improved by replacing the generators.

The Government has been putting major emphasis on the completion of the 3,600 MW Rogun HPP project, which was started in the 1976 but had to be discontinued for lack of funds after the collapse of the Soviet Union (box 11.1).

Power grids

In 2009, Tajikistan's power grid consisted of three separate systems: the northern, southern and Gorno-Badakhshan systems. The country's northern and southern networks were not directly interconnected. Bulk transfer of energy between the north and south was achieved by power exchange using a 500 kV transmission line through the territory of Uzbekistan. Tajikistan's transmission system consisted of two voltage levels: 500 kV and 220 kV. There are two 500 kV lines running from the Nurek HPP to the

500/220 kV Regar Substation, and a connection runs from there to the 500 kV system of Uzbekistan.

In 2010, Tajikistan launched the 500 kV south–north high-voltage transmission line from Regar to Khujand (386 km), linking the southern and northern grids in a unified power grid.

In 2011, the south–north power line, which allows the country's national grid to be independent, went into operation. This greatly increased the possibility of physical access to energy services for the entire Tajikistan population and to balance electricity supply by moving voltage between areas in need.

Tajikistan's heat generation and distribution infrastructure is largely concentrated in Dushanbe and was developed more than 40 years ago. It consists of a combined heat and power (CHP) plant and several large district heating systems. Several other cities have district heating systems based on heat-only boiler plants.

Since the 1990s, there has been no investment in the district heating systems and, therefore, heat distribution infrastructure is outdated and service quality is currently very poor. Only one centralized heating system remains in Dushanbe. The old Dushanbe CHP plant and the eastern and western boiler facilities, with total capacity of 190 MW, can cover only 60 per cent of the overall need for heating in the city. Because of the lack of gas and furnace fuel, the Dushanbe CHP plant runs on only 20–25 per cent of its designed capacity and its equipment is obsolete and outmoded. Private sector enterprises in Dushanbe, as well as in other cities of Tajikistan, do not have access to the centralized heat supply system. Heating and hot water supply in residential areas are provided mainly through the burning of liquid, fluid and solid fuels in various types of stoves.

Box 11.1: Construction of the Rogun HPP

Completion of the construction of the Rogun HPP, with a capacity of 3,600 MW and annual electric power output of 13.1 billion kWh, is a priority for Tajik energy engineering. Together with the other water reservoirs, this HPP's water reservoir, with a capacity of 13.3 km³, would be able to ensure multi-year regulation of the runoff into the Amu Darya basin to increase the sustainability of water supply for about five million ha of land in the riparian countries in low-water and drought periods.

From 2011 to 2014, the World Bank supported two studies, the Techno-Economic Assessment Study (TEAS) and the Environmental and Social Impact Assessment (ESIA). The main purpose of these studies was to evaluate the viability of the Rogun HPP, to provide an independent and objective assessment of the proposed project based on technological, economic, social and environmental factors, and to suggest potential alternatives to the Rogun HPP. All interim and final reports of the Rogun assessment studies were made public on 1 September 2014, which marked the end of the assessment process.

The studies also served as a basis for decision-making and dialogue for the riparian countries. Five rounds of meetings in the region were conducted with the participation of the officials from riparian countries, the diplomatic and development community and hundreds of civil society organizations over the four-year period.

As part of the assessment process, two independent panels of experts, composed of recognized professionals selected by the World Bank, were formed – an Engineering and Dam Safety Panel and an Environmental and Social Impact Assessment Panel. The role of the panels was to ensure due diligence and international quality standards, as well as objectivity and credibility through independent advice and guidance.

The ESIA, completed in 2014, concluded that, overall, subject to modifications in the original design and the implementation of identified mitigation measures and monitoring, a large dam could be built and operated at the Rogun site in line with international safety norms. The assessment concluded that impacts could be managed with known mitigation measures. It is noteworthy, however, that the question remains potent as to whether or not the Government has sufficient institutional capacity and appropriate implementation mechanisms and procedures in place to enforce mitigation measures and requirements for monitoring to ensure compliance with international environmental and safety norms outlined in the World Bank assessment report.

In August 2014, the Final Report of the Environmental and Social Panel of Experts concluded that the final ESIA was of acceptable international standard and, subject to some comments on key issues, the Panel agreed with the overall conclusions and recommendation made in the ESIA. However, the Panel still had concerns on three key points: (i) possible downstream impacts in the Amu Darya basin; (ii) resettlement of up to 42,000 people in the area to be affected by the future Rogun reservoir; and (iii) the final selection of dam height. The Panel recommended to take advantage of the forthcoming project optimization phase to apply a multi-criteria decision approach, or similar, with stakeholder participation, to arrive at an optimized dam height based on both technical and social considerations.

Thermal power plants

Today, construction of a new Dushanbe-2 CHP plant is under way and is planned to be commissioned in phases. According to Barki Tojik, the first 50 MW unit of the first line of the Dushanbe-2 CHP plant came into operation in January 2014 and the second 50 MW unit of the first line came into operation in September 2014. The second line is expected to come into operation in the autumn of 2016, with the first unit to come into operation in October 2016 and the second in December 2016. The second line consists of two units with a total capacity of 300 MW, and is expected to increase the plant's capacity to 400 MW.

Although the Government is actively pursuing the construction of the new CHP plant in Dushanbe, it is not aligned with any investment in the rehabilitation of the outdated district heat distribution infrastructure. Neither is it possible to verify which responsible authority oversees the rehabilitation and maintenance of the heat distribution infrastructure in the capital.

Shurob-1 TPP, with a capacity of 300 MW, is expected to be commissioned in 2018. An additional 300 MW is forecast to be added at Shurob-2 in 2020. The coal supply for a fourth coal-fired power plant, Fon-Yaghnob, has been confirmed and a feasibility study for a 500 MW plant is being discussed. Dushanbe-2, Shurob-1, Shurob-2 and Fon-Yaghnob would add new capacity to the system totalling 1,300 MW.

Fuelwood

Although, it has been estimated that 70 per cent of the country's total population and more than 90 per cent of the rural population use solid fuels (wood, coal or dung) for heating and cooking, and that almost 50 per cent used wood as their principal fuel in 2014, fuelwood consumption data are not recorded in the country's energy balance.

Since more than 70 per cent of the population lives in rural areas, one can assume that about five million people use fuelwood as their primary source of

household energy. The annual per capita consumption of fuelwood is estimated at 3–4 m³. In an average village of 150 households, the annual demand for fuelwood is between 2,700 and 3,600 m³. Given the long, cold winter, poorly insulated houses and the inefficiency of many stoves, the annual demand for fuelwood is estimated to be much higher – some 15 million m³ to 20 million m³.

11.3 Environmental pressures

Fossil fuels

Worldwide practice shows that existing mining practices still cause environmental problems, in particular large-scale land use, an overburden of removal and disposal of waste, disturbance of hydrology, acid mine drainage, fugitive dust and reclamation. These activities have an impact on the air, surface water and groundwater, soil, and wildlife and human populations.

There are no data available on the environmental impact of fossil fuel extraction in Tajikistan.

Transit of fossil fuels

Transportation of gas and, especially, oil might generate significant environmental risks. During a pipeline's construction stage, aggregate extraction, blasting, using rock hammers, road construction, micro-tunnelling and horizontal directional drilling

could affect the geology and geomorphology. The environmental impacts of pipelines are mainly related to the risk of an oil or gas leak or spillage, and are location specific. There are no data available to enable a conclusion to be drawn on whether or not Tajikistan follows international guidelines and best practice on the management of risk of spills from existing pipelines.

Electricity production

Hydropower plants

Generation of hydroelectric power changes the river environment. While hydropower is a renewable resource, the impacts of the hydropower sector include habitat loss and displacement of local communities. As there are plans to construct more HPPs with reservoirs in Tajikistan, information on general environmental pressures from large HPPs with reservoirs (box 11.2) has to be taken into account.

As a majority of the HPPs in Tajikistan were constructed in the period from the 1950s to the 1970s, no fish-passes were considered in their design. The construction of a fish-pass for the heavily fragmented Syr Darya River was proposed as part of the Kayrakkum HPP in the north of Tajikistan. This is especially important for the Syr Darya River, since it is home to two endemic species of sturgeon and other rare fish species.

Box 11.2: Environmental pressures from large HPPs with reservoirs

The formation of large water reservoirs can slow the water flow rate and increase water surface temperature because slower water absorbs more heat from the sun. It causes a more pronounced stratification effect – with the coldest water at the bottom and warmest on the surface. If the water released for power generation purposes is coming from the bottom, where it is colder and consequently has less oxygen, it affects the river's ecosystem and habitats downstream. Installation of aerating turbines can assist in increasing dissolved oxygen.

There can be wildlife impacts both within the dammed reservoirs and downstream from the facility. Reservoir water is usually more stagnant than normal river water. Therefore, the reservoir will have higher than normal amounts of sediments and nutrients, which can cultivate an excess of algae and other aquatic weeds. In addition, water is lost through evaporation in dammed reservoirs at a much higher rate than in flowing rivers. If too much water is stored behind the reservoir, sections of the river downstream from the reservoir can dry out if an insufficient amount of water is released at certain times of the year. This can lead to detrimental effects on animal and plant life downstream from the facility.

Dams can also trap sediments passing down the river. Because of this, the channel may show signs of degradation (loss of sediments) or aggradation (accumulation of sediments), depending on whether floods can move the remaining incoming sediments. Reduced sediment and nutrient loads can increase riverbank erosion and damage the biological and economic productivity of rivers and estuaries. Degradation caused to rivers below dams can kill fauna and flora and damage agriculture and water supplies.

These adverse impacts can be minimized through careful management of water releases from the turbines and spillways, to ensure adequate downstream river water supply for riparian ecosystems, reservoir and downstream fish survival, water quality, aquatic weed and disease control, irrigation, downstream flood protection, recreation and power generation. The ideal water release pattern would closely mimic the natural flooding regime.

In mountainous Tajikistan, hydropower facilities are equipped with huge reservoirs for storing water upstream of the power plants and high dams to retain waters in the reservoirs. There are nine water reservoirs containing 0.028 billion to 10.5 billion m³ of water, most of them located in the Vakhsh River basin. These facilities need careful monitoring and maintenance as they are located in very seismic zones and any breach would threaten the valleys downstream. Before 1990, dam monitoring and maintenance were planned and ensured at the central level, and it is a task that Tajikistan on its own cannot afford to fulfil today. Underinvestment in power infrastructure results in increasing leaks in dams, failing turbines and transformers – symptoms of ageing infrastructure – and reduced staffing and monitoring.

Thermal power plants

The country's TPPs mainly use coal. Coal combustion leads to the formation of extremely hazardous POPs (dioxins and furans, polyaromatic hydrocarbons) and has very strong carcinogenic and mutagenic effects on humans. The environmental impacts of TPPs' hazardous air emissions include acidification of the environment, bioaccumulation of toxic metals, contamination of rivers and lakes and degradation of buildings and culturally important monuments. Due to the fact that more coal-fired TPPs are currently in the pipeline in Tajikistan, an increase in effects upon the environment might be expected to take place in the future.

According to the Government, the newly built Dushanbe-2 CHP plant operates in a clean and efficient manner, using the latest technologies and filters to reduce emissions by 99.8 per cent. The facility requires more than 22,000 tons of coal per month. Construction of the coal-powered plant was, reportedly, in compliance with Tajikistan's environmental regulations. The plant has automatic pollution measures installed and it self-monitors emissions in conformity with the norms and standards adopted more than 40 years ago. However, the excessive amount of emitted coal dust dispersed across its neighbourhood during its launch in 2014 points to technical issues with the plant's operation and the control of emissions within environmental standards.

Fuelwood

Unreliable power supply and the lack of modern and affordable heating supply facilities have had an adverse environmental impact. The cutting of valuable mountain forests has contributed to the loss

of the woodland belt; this has affected biodiversity and contributed to GHG emissions. Deforestation and degradation of forests have increased soil erosion, which has resulted in lower soil productivity, and have increased the level of vulnerability of rural communities to natural disasters, such as landslides caused by torrential rains. One striking example of the impact of fuelwood use on vegetation is the use of teresken (*Ceratoides papposa*) shrubs in eastern Tajikistan, which has led to the virtual disappearance of this vegetation type in many areas.

The absence of fuelwood (energy) plantations on suitable sites around villages inhibits both the protection of the remaining natural forests and reduction of the negative impacts of wind and water erosion of the soils.

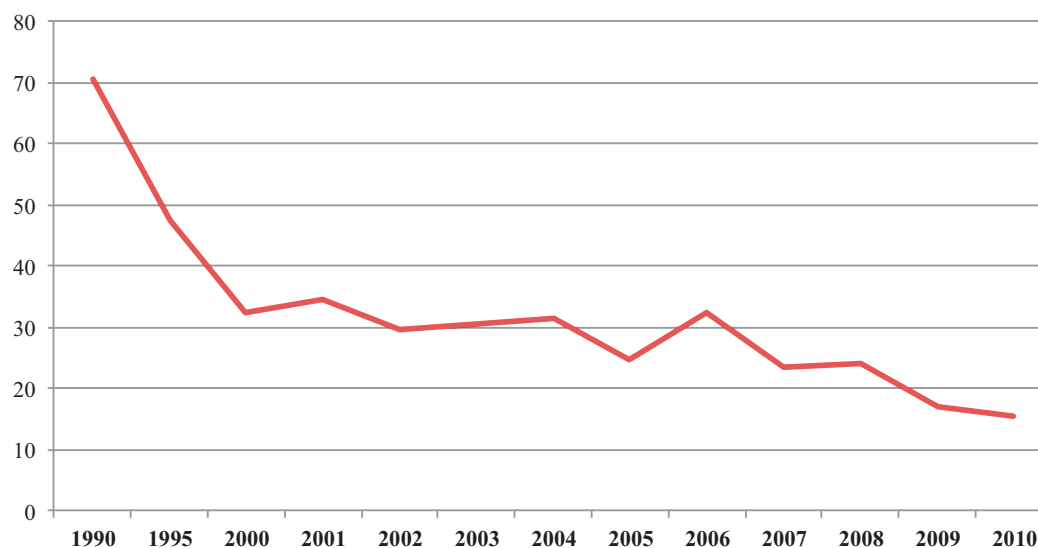
Greenhouse gas emissions

Energy and industrial processes are the most substantial sources of GHG emissions in Tajikistan. According to the Ministry of Energy and Water Resources, by 2012, CO₂ emissions in the energy sector amounted to slightly more than 2 million tons; in terms of carbon equivalents, this amounts to 12–15 per cent of the 1990 level. GHG emissions associated with international transportation and with biomass-based energy generation for the population are not taken into account, given that no large facilities for fuel processing and transportation are available in Tajikistan and emissions in this sector are insignificant. The contribution of the fuel extraction and energy generation sector to overall CO₂ emissions is insignificant. This is due to the fact that a considerable proportion of electric power in Tajikistan is generated by HPPs. However, the current volume of methane emissions in energy (coal mining) is not available.

Figure 11.1 depicts a decrease in the share of GHG emissions in the energy sector since 1990, equating to 15.6 per cent in 2010.

11.4 Energy intensity and efficiency by end use

According to the IEA, the energy intensity of Tajikistan in 2000 was 0.33 toe/1,000 US\$ 2005 PPP, and this decreased to 0.14 toe/1,000 US\$ 2005 PPP in 2013. In 2013, the energy intensity of Tajikistan's GDP was between 1.6 and 2.5 times lower than that of China and the Russian Federation, but still 1.3 times higher than average energy intensity in Europe. The amount of specific energy needed to produce goods and services in Tajikistan is more comparable to that in Armenia, Georgia and Slovenia.

Figure 11.1: Share of GHG emissions from the energy sector, 1990, 1995, 2000–2010, per cent

Source: Data compiled from UNFCCC secretariat statistics.

Energy intensity in Tajikistan is three times higher than in most developed countries and energy efficiency potential is assessed by the Ministry of Energy and Water Resources at 30 per cent of current power consumption.

In Tajikistan, the per capita electricity consumption index (2,367 kWh) is nearly nine times higher than in the low income countries (269 kWh), to which Tajikistan also belongs. Even achievement of the world average level may contribute to a significant increase in the country's GDP and may ensure sustainable development of its economy. Recent UNDP-supported research, "Poverty and Social Impact Assessment: Energy Sector in Tajikistan" (2011), has found that houses in rural areas are very energy inefficient, losing 50–60 per cent of the heat generated.

As the nature of industry changes from heavy, energy-intensive production to services and small enterprises, the energy intensity of GDP is decreasing. The current energy intensiveness of GDP in Tajikistan is 50 per cent less than in 1991 and by the period 2020–2030 this will reduce further by a factor of more than two. In Tajikistan, energy saving measures are estimated to be 2.5 to 3 times less costly than producing additional energy through current energy generation and transmission facilities.

Since 2005, investments in energy efficiency in Tajikistan have increased more than threefold,

reaching almost 3.5 per cent of GDP, with budget funding from all sources amounting to at least 30 per cent of investment costs. The GDP energy intensity has decreased by about 30 per cent compared with 1995.

According to the Agency of Statistics, electricity consumption by industry sector has increased from 2010 to 2014, with household consumption seeing a dramatic decrease in 2014 from the previous year (table 11.6). Heat energy consumption by industry sector has been fluctuating in the period 2010–2014, while household heat consumption increased almost tenfold in 2014 over the previous year (table 11.7).

Total energy consumption has increased from 1,944 ktoe in 2005 to 2,218 ktoe in 2013. The biggest gain in energy consumption was seen in the transport sector, where energy consumption increased almost threefold since 2005 and equated to 118 ktoe in 2013 (table 11.8). The increased number of old, inefficient vehicles in Tajikistan accounts for the increase in total final energy consumption levels by the transport sector from 2005 onwards.

According to the IEA, the largest energy consumer is the industry sector (figure 11.2), with 21.3 per cent of the total final energy consumption (not taking into account the 42.5 per cent attributed to "non-specified"). The second highest consumer is the agriculture and forestry sector, with 15.9 per cent, followed by residential, with 11.3 per cent.

Table 11.6: Electricity consumption by industry and households, 2010–2014, million kWh

	2010	2011	2012	2013	2014
Total consumption	10 928.0	9 261.6	13 923.2	11 705.5	8 354.9
of which:					
Industry	7 523.6	8 297.2	9 484.8	6 651.3	7 962.4
Households	3 404.4	964.4	4 438.4	5 054.2	392.5

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Table 11.7: Heat energy consumption by industry and households, 2010–2014, Gcal

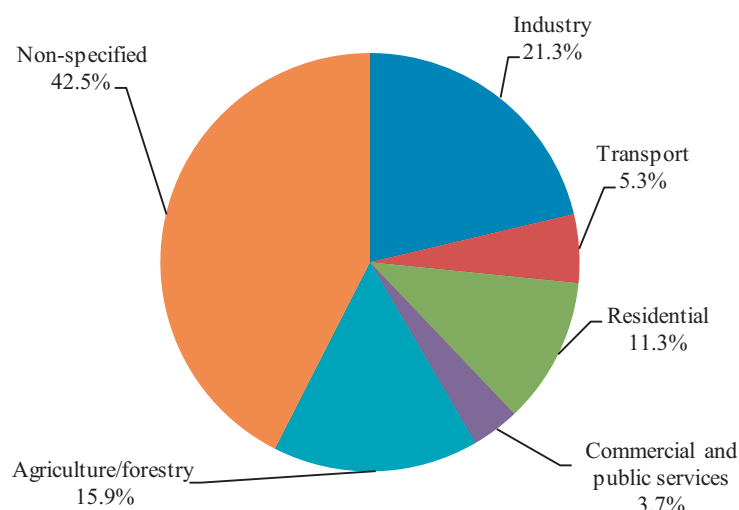
	2010	2011	2012	2013	2014
Total consumption	127.3	210.9	263.4	108.2	170.2
of which:					
Industry	117.8	194.0	262.4	107.6	163.9
Households	9.5	16.9	1.0	0.6	6.3

Source: Material-Technical Statistics of Tajikistan, Agency of Statistics, 2015.

Table 11.8: Energy consumption by economic sector, 2005–2013, ktoe

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1 944	2 023	2 303	2 196	1 896	1 957	1 959	2 036	2 218
Industry	566	573	575	556	528	639	555	546	473
Transport	47	61	92	91	86	97	115	110	118
Residential	272	275	276	267	254	249	257	229	250
Commercial and public services	27	27	27	26	25	12	29	71	81
Agriculture/forestry	381	385	386	374	355	309	322	330	353
Fishing and non-specified	651	701	946	881	647	649	680	749	943
Non-energy use	1	1	1	1	1	1	1	1	1

Source: www.iea.org/statistics/statisticssearch/report/?country=TAJIKISTAN&product=balances&year. Accessed 28 November 2015.

Figure 11.2: Total final energy consumption by sector, 2013, per cent

Source: www.iea.org/statistics/statisticssearch/report/?country=TAJIKISTAN&product=balances&year. Accessed 28 November 2015.

Note: Non-specified includes all fuel use not elsewhere specified as well as consumption for which separate figures have not been provided, e.g. military fuel use for all mobile and stationary consumption.

Energy distribution networks

Electricity technical and commercial losses are 17.7 per cent and have remained virtually unchanged since 2006. However, these losses should normally be between 6 and 8 per cent, making energy losses in the Tajik power transmission and distribution networks nearly double the level of good practice and indicating a need for improvements to the transmission and distribution networks. With World Bank support, the Government has started its network loss reduction programme, but improvements to date are modest. The aim of this programme is to reduce electricity network losses from the current level of 18–22 per cent (of which, transmission system technical losses accounted for 5 per cent in 2012) to 12 per cent by 2020, with an interim target of 15 per cent by 2016.

Barki Tojik, the state-owned energy monopoly, is responsible for the production, transmission and distribution of electricity. It does not recognize commercial losses and therefore applies technical losses norms to the amount of energy received into the distribution networks from transmission. These are unreliable figures and are probably understated, due to the absence of proper methodology and a relevant metering system.

The reduction of losses requires capital investment. However, the actions needed to reduce non-technical losses, representing a financial loss to the company, are different and require capital investment, as well as efficient and effective management of the utility's commercial activities, such as metering, billing and collection. Reduction of non-technical losses is a priority for the Government and a number of steps have already been initiated. Since 2005, the World Bank and the EBRD have been financing the installation of retail (end user) meters in the two largest load centres, Dushanbe and Khujand. Installation of electricity meters helped reduce commercial losses, although technical losses increased due to increased power consumption, above the normal operating range of the power sector infrastructure in Dushanbe.

In 2013, the supply of an additional 47,000 electricity meters, distribution poles and cables, computers and accounting software, as well as supply and installation of electricity distribution substations, have been successfully completed and have improved the reliability of power supply in Dushanbe. However, the installation of these additional electricity meters and transitioning from the existing electricity billing system to a modern multi-functional billing system faced some delays.

11.5 Renewable energy sources

Currently, Tajikistan uses less than 1 per cent of the potential of RES other than hydropower. About 10 per cent of the country's population lives in remote, mountainous, off-grid areas (in valleys with small rivers and streams), where off-grid renewable energy solutions make more economic sense. To date, no comprehensive study has been carried out to assess the potential of RES in the country.

Wind

There is little potential for wind energy, but its use as a complementary resource to hydropower would be justified in some regions. The strongest winds are observed in mountainous areas, where the landscape produces the country's maximum wind speed and flows, as well as in Sughd Oblast and the Rasht Valley. Mean wind speed in these regions is about 5–6 m/s. However, grid connection cannot be realized at reasonable costs. Wind energy is therefore considered a technology for decentralized solutions, and the feasibility of pursuing development of off-grid wind energy to power remote rural areas is yet to be assessed.

Solar

The climate is very favourable for the use of solar energy. On average, there are 280–330 sunny days per year, and total solar radiation intensity varies during the year between 280 and 925 MJ/m² in the foothills and between 360 and 1,120 MJ/m² in the highlands. Use of available solar energy can meet 10–20 per cent of energy demand. The estimated potential of solar energy is about 25 billion kWh/y. This potential is not used, if its use for water heating is not taken into account.

Solar stoves that were designed and produced in Tajikistan in the 1990s are convenient for local use in remote regions of the country. Their internal temperature reaches 130°C. Some work on improvement of these stoves has been accomplished. According to expert opinion, a typical solar stove produced in Tajikistan can potentially save 0.15–0.2 tons of fossil fuels for one family annually.

The majority of solar potential is not currently exploited and there is no industrial solar energy capacity in Tajikistan. To date, photovoltaic energy systems have been used only on a pilot basis. With the support of private entrepreneurs and donors, solar panels and solar water heaters have been installed in some urban and rural hospitals, schools and private houses.

Photo 11.2: Greenhouse, Nisur village, Bartang valley, GBAO

Geothermal

The potential for using geothermal resources, and the availability and characteristics of thermal water, are not well researched in Tajikistan. Preliminary studies indicate that 45 billion kWh/y could be generated by exploiting the country's geothermal energy sources, in particular in the vicinity of Khodja-Obi-Garm.

Biomass

Agricultural waste is a potential energy source, with the anaerobic fermentation of manure being one of the most promising options for biogas generation in Tajikistan. A few experimental biogas generators are currently operating in rural areas. Thermochemical conversion of cotton residues also has good potential for biomass energy generation. In 2014, 177,637 ha of cotton were planted. The stalks of such cotton plants are currently used for winter heating in rural areas.

11.6 Legal, policy and institutional framework

Legal framework

The 2000 Law on Energy, amended several times in the review period, includes provisions related to the protection of the environment and of the population from adverse impacts of the energy sector. The Law declares different ownership forms (state, private,

joint-stock, mixed and joint) for energy sector enterprises. The Government and delegated governmental bodies are responsible for monitoring the activities of energy companies, protecting property and consumer rights, determining energy tariff policies, and offering and approving concessions for energy facilities.

The 2015 Law on Oil and Gas establishes the legal, economic and institutional framework of state policy in the sphere of oil and gas and is aimed at the development of this sector in Tajikistan. The Law sets out safety requirements for the facilities that use oil and gas and for oil and gas pipelines. It also defines procedures for design and operation of oil and gas pipelines and requirements for the organization of works to eliminate the consequences of accidents.

The 2012 Law on Coal includes provisions on the regulation of quality and efficient use of coal reserves; safety of operations of the coal industry; requirements for the production, processing and utilization of coal; and work safety and social protection of coal industry workers.

The 2013 Law on Energy Saving and Energy Efficiency stipulates the legal and organizational framework for energy efficiency and provides for the introduction of energy efficiency materials, appliances and technologies. The Law has provisions

for introducing mandatory energy audits, establishing procurement procedures that incorporate criteria on energy efficiency, and requirements for energy use in buildings and household appliances, etc. The Law also provides for the establishment of a national fund for RES, energy saving and energy efficiency. As of December 2015, the national fund is not operational. In practice, energy efficiency measures are still heavily focused on the supply side, with very little improvement in demand-side management. Energy subsidies and socially determined pricing mechanisms have failed to promote sound energy efficiency policies and measures.

The 2010 Law on Renewable Energy Sources sets out the principles and objectives of state policy on renewable energy; identifies ways to integrate renewable energy into the national energy system; regulates activities aimed at increasing renewable energy use; and determines economic and organizational measures to stimulate production and use of RES. The Law outlines some practical steps in the organization of the legal, financial, scientific and technical support specified in its provisions. However, weak institutional capacities at central and local levels inhibit enforcement of RES policies.

The 2012 Tax Code establishes a royalty on water to be paid by HPPs for the use of water to produce energy. Small HPPs with capacity below 1,000 kW are exempt from royalties. A number of tax incentives are provided for construction of HPPs (2012 Order of the Tax Committee, No. 17-f), including exemption from VAT, road user tax, real estate tax, social tax for non-Tajik nationals and several other taxes.

The 2010 Law on the Safety of Hydrotechnical Infrastructure (chapter 1) regulates activities related to ensuring the safety of hydrotechnical infrastructure during the design, construction, operation and other project stages. The Law identifies the obligations of state authorities, owners and operators of hydrotechnical structures. In order to implement this Law, in 2014 the Government established the Service for State Surveillance over the Safety of Hydrotechnical Facilities subordinated to the Ministry of Energy and Water Resources. The aim of the Service is to regulate the safety of these facilities within the country, as well as to enforce state control in this area. The Service has started developing appropriate institutional capacity and regulatory and logistical frameworks for its successful operation.

The 1997 Law on Privatization of State Property prohibits the privatization of the Nurek and Rogun HPPs.

The 2004 Law on the Use of Nuclear Energy sets out the legal and technological aspects related to the development of nuclear science and technology, and the secure use, storage and transportation of nuclear and other radioactive materials in the context of Tajikistan's accession to the international agreements on non-proliferation of nuclear weapons, nuclear and radiation safety. The Law sets out measures for the social protection of citizens living and working in the vicinity of nuclear facilities, sources of radiation and nuclear storage facilities.

In 2009, the Decree of the President No. 653 "On additional measures on the economical use of energy and energy saving" and the 2009 Resolution of the Government No. 626 banned the manufacture, import and sale of incandescent light bulbs. The process of mass switch-over to energy-saving lamps in the country started in May 2009 and was completed by the end of the same year. Local authorities and social protection bodies were requested to provide energy-saving lamps to 241,000 low income families by October 2009. These families received about two million energy-saving lamps, due to compensation from the state budget in the amount of US\$3.3 million. In the period 2009–2011, two new plants for production of energy-saving lamps have been built and put into operation; each has a production capacity of three million lamps per year.

Policy framework

There is a lack of long-term energy sector planning in Tajikistan, which presents one of the most significant risks inhibiting the country's ability to make its energy sector climate resilient. Energy efficiency has very low priority in practice, determined by the fact that such a large proportion of the population does not have secure and reliable access to energy.

Hydropower and renewable energy sources

The 2007 Comprehensive Programme to target the widespread use of renewable energy sources, such as the energy of small rivers, solar, wind, biomass, and underground sources for the period 2007–2015 (2007 Resolution of the Government No. 41) included a set of measures to create a production base and infrastructure for wider use of RES: solar, wind, biomass, small hydro and geothermal.

The Long-term Construction Programme for Small Hydroelectric Power Plants for the period 2009–2020 (2009 Resolution of the Government No. 73) represented a start for adaptation of the hydropower sector to climate change, including appropriate HPP design and setting up, and, where possible, mixing

with other RES to reduce the climate vulnerability of the energy sector. This Programme aimed to ensure that the country's distant regions receive power at a low price. It proposed construction of 189 small HPPs (SHPPs) with a total capacity of 103 MW by 2020, and generation of 800 million kWh of electricity per year.

As of 2013, out of 189 planned SHPPs, 41 were commissioned, 20 were under construction and 128 were yet to be implemented. As of late 2015, 314 SHPPs exist in Tajikistan, with a total installed capacity of over 26,000 kW, but about one third of them (103 units, with a total capacity of about 5,700 kWh) are currently not working. Many SHPPs in remote rural areas have been built in a makeshift manner without adequate expertise. Many are poorly designed, freeze in the winter, lack technical maintenance and become non-operational after a relatively short period. This can be due to the absence of well-established or functioning supply chains for SHPPs, which would ensure the broad availability of such systems and better service support for end users. This has put into question the relevance of centrally planned investments and/or turnkey technology transfer, and highlighted the need to look for better technology delivery models.

The Long-term Construction Programme for Small Hydroelectric Power Plants for the period 2009–2020 has been under review by the Ministry of Energy and Water Resources with the aim of using a more effective and coherent methodology when planning and formulating policies for new SHPPs. The Programme was superseded by the Programme on Renewable Energy Development and Construction of Small Hydropower Plants for the period 2016–2020 (2015 Resolution of the Government No. 795).

The new Programme focuses on attracting investment and creating more favourable conditions for investors, for wider use of the hydropower resources of small rivers and streams and other RES (such as solar and wind energy). It recognizes the current shortcomings in the country in the process of construction and operation of SHPPs, hindering the growth of investment and cost effectiveness of already constructed plants. The annex to the Programme identifies 138 villages where feasibility studies have been carried out for potential photovoltaic solar installations, with total capacity of 4.3 MW. The Programme also identifies 25 SHPPs with feasibility studies in place, with total capacity of 63.2 MW, and describes further potential for an additional 39 SHPPs, with total capacity of 32.5 MW, once feasibility studies are completed. The annex also includes a wind atlas identifying 10 areas

in which feasibility studies need to be carried out for the potential installation of wind turbines.

Energy efficiency

The Programme for the Efficient Use of Hydropower Resources and Energy Efficiency for the period 2012–2016 (2011 Resolution of the Government No. 551) places special emphasis on energy saving and green technologies as one of the key elements in reducing energy demand. One of the main objectives of the Programme is to eliminate the need to import electricity by 2013, by commissioning new power generation capacity and reducing electricity losses in the energy system to 13.5, 13.2 and 13.0 per cent in 2014, 2015 and 2016, respectively. According to the Agency of Statistics, electricity continued to be imported in 2013 and 2014 from Kyrgyzstan and the total electricity losses in the energy system have increased from 13.8 to 17.0 per cent in the period from 2010 to 2014.

The Programme also aimed to increase the export potential of electricity to 6,995 million kWh by 2014. To this end, electricity exports continued to increase steadily over the last five years, and a notable increase of 62 per cent took place in 2014. Nevertheless, actual electricity exports reached 1,552 million kWh in 2014, representing only 22 per cent of the projected electricity export potential outlined in the Programme. This may indicate that the methodology used for the forecasting of electricity export was rather optimistic and not fully aligned with the present realities of Tajikistan's export potential.

Other

The Programme for the Development of Forestry for the period 2006–2015 (2005 Resolution of the Government No. 396) acknowledges the impact of fuelwood dependence among rural inhabitants on forest resources and lists the establishment of timber and fuelwood plantations among the general needs that drive the Programme, but does not contain measures to address the fuelwood issue among its specific objectives, tasks or actions.

Institutional framework

In late 2013, the structure of the Government changed (2013 Decree of the President No. 12). A new Ministry of Energy and Water Resources was established on the basis of the former Ministry of Energy and Industry and former Ministry of Land Reclamation and Water Resources. The management and operation of irrigation and some other

infrastructure was delegated to a new Agency of Land Reclamation and Irrigation under the Government.

The Ministry of Energy and Water Resources is responsible for policy on water resources management, hydropower and state energy policy. The Ministry also serves as the national authority for the Clean Development Mechanism, and is in charge of energy-related policies and regulation, including the promotion of renewable energy, specifically hydropower. The Ministry directs and controls the activities of the Service of State Surveillance in the Sphere of Energy and Service for State Surveillance over the Safety of Hydrotechnical Facilities, both directly under the Ministry, as well as its subordinated enterprises and institutions.

The Committee on Environmental Protection is overseeing the use of natural resources and environmental protection. It is not clear whether the Committee's data on the results of environmental inspections are analysed and systematically disseminated to other ministries to inform future policymaking.

The production, transmission and distribution of electricity is held by the state-owned monopoly Barki Tojik, and limited progress has been made in separating the generation, distribution and transmission functions. Barki Tojik is managed according to geographic (rather than thematic or functional) criteria, which reduces accountability and complicates the management of commercial activities.

In August 2011, the Government approved an individual restructuring programme for Barki Tojik for the period 2011–2018, which aims to turn the company into a commercially viable entity with the ultimate objective of unbundling. In July 2014, the company's management was reshuffled and all employees must now undergo a qualification review. In addition, in May 2014, the Government adopted a resolution to improve the financial situation of Barki Tojik.

The power supply of Gorno-Badakhshan Autonomous Oblast is provided by the private Pamir Energy Company, which received the electric power lines and generating capacities (owned by Barki Tojik) for a period of 25 years under a Concession Agreement with the Government. Pamir Energy Company is the only example of public-private partnership in the Tajikistan energy system.

The Anti-Monopoly Service regulates prices on electricity, natural gas and district heating (chapter 3).

The Agency of Statistics, with assistance from the EU-regional energy cooperation programme INOGATE, developed and approved in April 2013 the Energy Statistics Action Plan, which focuses on the development of a quality energy balance in Tajikistan. INOGATE facilitated the development of a tailor-made methodology for energy data collection and energy balance compilation. The structure and methodology proposed for energy balance compilation is increased capacity of the Agency of Statistics to collect and compile energy statistics harmonized with international standards.

In 2008, the Academy of Sciences established the Centre for Research and Use of Renewable Energy within the framework of the Comprehensive Programme to target the widespread use of renewable energy sources, such as the energy of small rivers, solar, wind, biomass and underground sources for the period 2007–2015. The Centre's objectives are to create a database of RES in the country, train technicians and raise public awareness. The Centre has produced rough estimates of gross RES and the technical and economic capacity, and potential locations, for exploitation of different types of RES (sun, wind, biomass, small hydropower and geothermal).

A Technical Committee "Energy saving, energy efficiency and energy management" was established in 2012 as part of the Agency on Standardization, Metrology, Certification and Trade Inspection under the Government (Tajikstandard). This Committee is currently developing standards (based on existing European and Russian standards) in the area of buildings, energy-consuming products and renewable energy. However, efforts to introduce standards are partly undermined by the 2010 Law on Standardization, which stipulates that standards are applied on a voluntary basis. Standards become mandatory only if specific technical regulations refer to them.

Independent power producers include Sangtuda-1 HPP (670 MW) and more than 30 corporate and private small HPPs, with a total capacity of 55 MW. Sangtuda-2 (220 MW) started operating under build-operate-transfer (BOT) terms until 2025.

To date, there is neither an independent energy regulatory authority nor an established department within an existing governmental authority in

Tajikistan to govern, regulate, enforce and monitor energy efficiency.

Regulatory measures

As of the end of 2015, there is no real energy market in Tajikistan and the electricity sector is far from being a well-functioning competitive market providing incentives to attract investments in energy developments.

Electricity tariffs are low and do not reflect the costs of energy production. The State partially subsidizes household electricity tariffs. The 2013 World Bank report "Tajikistan's winter energy crisis: Electricity supply and demand alternatives" emphasized the need to raise tariffs in order to better recover costs and improve services. The Government has signed an agreement with the World Bank, whereby it will gradually start implementing the electricity tariff increase until 2025. In 2015, the electricity tariff for the population was US\$2.04 cents/kWh, and for industry, US\$0.497/kWh.

In the period 2007–2012, the Government progressively increased average billed tariffs; however, the real increase was significantly lower.

The magnitude of tariff increase was uneven among various categories of consumers. Industrial (excluding TALCO) and residential users experienced the largest tariff increases. Meanwhile, TALCO and pumping stations for water supply and irrigation water, accounting for 50 per cent of total electricity consumption, had the lowest tariff increase. Such tariff increase patterns, combined with poor collection rates from pumping stations for water supply and irrigation water and variable collection rates from TALCO, has a significant impact on Barki Tojik's financial performance. Since 2012, seasonal tariffs have been introduced for TALCO and for pumping stations for water supply and irrigation water. In July 2014, tariffs for electricity and heating were increased by around 15 per cent, except for TALCO, whose annual average tariff was increased by around 56 per cent.

At present, there is no governmental funding for energy efficiency projects.

Adaptation to and mitigation of climate change

Tajikistan's energy sector is extremely sensitive to climate change. As approximately 98 per cent of the country's electricity is produced from hydropower sources in river basins fed by glacial meltwater and

snowmelt, the energy sector is highly dependent on hydrology and therefore is greatly exposed to climate change. Most climate models predict significant changes in the dynamics of Tajik glaciers, snowmelt and precipitation in the coming decades. The Fedchenko Glacier has already lost over 30 per cent of its original size. For the short winter periods, the glacier is unable to restore the lost water reserves that are indispensable for efficient operation of large HPPs located in the country.

Significant increases in water reserves in the next few decades from enhanced glacial melting and melting of accumulated snow are expected to be followed by drastic reductions in supplies as the mass of glacial ice and accumulated snow shrinks, although there is some uncertainty about the timing of these changes.

The impacts of climate change on hydrology were not taken into account in the past in the design, rehabilitation, and management of hydropower facilities to ensure that they were able to cope with more frequent extreme events, such as floods and mudslides, and continue to generate electricity safely, efficiently and reliably under a range of projected climate change scenarios. Volatility of water flows as a result of climate change is likely to significantly impact upon the country's hydropower-based energy system.

Transmission and distribution can also be at significant risk from more frequent extreme events. Very heavy precipitation, floods, mudflows and landslides now occur earlier in the year, causing disruption for transmission and distribution and making maintenance more difficult and expensive. High temperature and rapid snow and glacier melting from 1–15 July 2015 triggered mudflows in Barsem and Kolkhozobod villages of Shugnan District, Gorno-Badakhshan Autonomous Oblast. The mudflow that occurred on 16 July 2015 caused significant damage to infrastructure and households in these villages. The mudflow damaged electric lines which supply electricity to the region from the main hydropower station Pamir-1. To prevent further flooding, the water going to the Khorog HPP was blocked, and there was no electricity in the whole area, including Khorog town.

Putting in place plans to address this volatility remains a key priority over the next years. The EBRD is supporting the Kayrakkum Hydropower Rehabilitation project, which aims to strengthen the climate resilience of Tajikistan's hydropower-dominated energy sector (box 11.3).

Box 11.3: Kayrakkum Hydropower Rehabilitation Project

In July 2014, a US\$76 million project was agreed by the EBRD, the Government of Tajikistan and Barki Tojik to modernize the Kayrakkum HPP, as part of the Pilot Programme for Climate Resilience (PPCR). Kayrakkum Hydropower Rehabilitation Project has won the EBRD award of "Best Project in Climate Change Adaptation".

The project applied a highly innovative approach, which incorporates climate change in the investment design. The experts involved in the project have calculated the future hydrology of the reservoir under different scenarios of climate change, which was the base for selecting the most suitable design for rehabilitation of the station in the whole range of projected possible climate change scenarios.

The impact of this project goes beyond the rehabilitation of the plant. The fundamental approach of the inclusion of climate change issues into investment planning will greatly improve the sustainability of Kayrakkum HPP in the context of the changing climate of Tajikistan, as well as provide a reliable power supply for the people of the northern part of the country. Managers of Barki Tojik will learn to identify the risks of climate change associated with hydropower, and ways to control them. By the combination of such information and its application in the company's business activities, the project will optimize power generation and improve the dam's safety, thereby helping to move towards best international practice. The project is a pilot one which will provide outputs for future application in the hydropower sector of Tajikistan and throughout the region, and have the potential for future investment projects.

Source: Barki Tojik (www.barqitojik.tj/en/activity/projects/328/196558/). Accessed 2 December 2015.

11.7 Energy-related global and regional agreements

Tajikistan ratified the Energy Charter Treaty and its Protocol on Energy Efficiency and Related Environmental Aspects in June 1997. The In-Depth Review of Energy Efficiency Policies of Tajikistan was released by the Energy Charter in 2013.

Tajikistan has been a member of the IAEA since 2001. As such, the country seeks to promote the peaceful use of nuclear energy.

Tajikistan participates in the International Fund for Saving the Aral Sea (IFAS) and its Inter-State Commission for Water Coordination (ICWC) (chapter 6). Through the 1999 Protocol, Tajikistan is a Party to the 1998 intergovernmental Agreement on the Use of Water and Energy Resources in the Syr Darya basin, which covers water and energy exchange among the four Syr Darya River basin states and provides for the scheme of water and energy exchange, which is based on the principle of harmonizing the regime of water facilities and reservoirs of the Naryn Syr Darya cascade so as to provide a sufficient quantity of water for irrigation. As of late 2015, the Agreement does not work.

Selected projects

The Central Asia–South Asia Electricity Transmission and Trade Project (CASA-1000), supported by the World Bank, envisages the construction of the transmission interconnection between Kyrgyzstan and Tajikistan, with grid reinforcement in Tajikistan. The objective of the project is to create the conditions for electricity trade

between the Central Asian countries of Tajikistan and Kyrgyzstan and the South Asian countries of Afghanistan and Pakistan.

The Energy Loss Reduction Project, also supported by the World Bank, has been under implementation since 2005 and closed in 2014. It pursued two objectives: (i) to assist in reducing the commercial losses in the electricity and gas sectors, and to lay the foundation for the improvement of the financial viability of the electricity and gas utilities in a socially responsible manner; and (ii) to assist in the viability assessment of the proposed Rogun HPP. Achievement is as follows:

- The first objective was substantially achieved with respect to laying of the foundation for the improvement of the financial viability of Barki Tojik. Electricity tariff adjustments and improvements in cash collections allowed Barki Tojik to make significant progress towards cost recovery, as well as improve the transparency of its operations in recent years through conducting an annual audit and making its results available to the public. The bulk of electricity meters supplied under the project were installed and the balance of the supplied meters, as well as the completion of a billing system and development of commercial management systems, was supported under the Tajikistan Winter Energy Project. These activities will help Barki Tojik make further progress in reducing losses and improving the transparency and accountability of its operations. The Winter Energy Project will also support completion of the Nurek HPP rehabilitation, dam safety and sedimentation

studies, initiated under the Energy Loss Reduction Project.

- The second objective has been fully achieved, and credibility of the studies of the proposed Rogun HPP was further validated through the thorough review of the studies by two independent Panels of Experts (box 11.1).

The UNDP's project on technology transfer and market development for small hydropower, launched in 2012, is financed by GEF and UNDP. The project's aim is to accelerate the development of small-scale hydropower generation in Tajikistan by removing barriers through enabling the legal and regulatory framework, capacity building and developing sustainable delivery models. The duration is four years with a total budget of US\$3.33 million. The project has been successful in contributing towards removing barriers and creating a favourable regulatory framework for small-scale hydropower development in the country. This was done through the completion of training for 30 government officials and establishing an interagency working group for simplification of small-scale hydropower licensing and construction procedures. This pilot has demonstrated that the capacity of the local manufacturers for the civil engineering of larger SHHPs is still poorer than expected.

In January 2014, the ADB approved a US\$10 million project to offer US\$8.8 million in credit lines to microfinance institutions. This will allow microfinance institutions to provide credit, at competitive rates, to finance energy efficiency improvements by households, such as installation of more energy efficient stoves, solar heaters and home insulation. Financing is available to borrowers up to a maximum amount equivalent to US\$5,000 for a five-year period. The current uptake of these microloans remains very low.

11.8 Energy sector development options and their environmental implications

The main Government priority is to increase HPP capacity in order to achieve energy security and become a major exporter of electricity to neighbouring countries. The Government considers the export of electricity as a major driver for economic growth and foreign exchange earnings. The Government plans the construction of Rogun HPP, rehabilitation of Nurek HPP, construction of a number of SHPPs, completion of Dushanbe-2 CHP plant, an increase in coal production, reduction of electricity losses and construction of domestic power transmission lines, alongside CASA-1000 for the export of surplus electricity in the summer.

However, as large power plants are oriented towards power exports and large industrial estates, these form only a partial solution for rural energy supply and will not solve the problem of excessive use of fuelwood for heating in rural areas and the subsequent increased rates of deforestation of the country. Exports create both an opportunity and a risk. In the long term, beyond 2025, further additions to summer generation could encounter challenges in finding export routes. Consequently, water would have to be discharged, undermining the economic feasibility of the HPPs, compromising private investment and posing financial risks to the Government. Given hydropower's central role in the country's development, streamlining exploitation and aligning with domestic needs and export capacity will help to maximize the value of the resource.

The energy sector in Tajikistan is highly dependent on hydrology and therefore is greatly exposed to volatility of water flows as a result of climate change, which, in turn, carries risk to the hydropower system stability. More diverse supply of energy resources would reduce overall system risk by reducing exposure to individual technology failure. Investing in coal-fired power plants could profoundly change the structure of the energy sector in Tajikistan. The addition of thermal resources would secure reliable winter power, help balance the variability of the existing hydropower system, and introduce possible system optimization between thermal and hydro services for further system stability and cost savings. Therefore, maintaining a balance with thermal resources will be important over the long term. That said, investments could be raised and spent on projects and programmes on energy efficiency and conservation, and development of potential RES and other "green" initiatives, which could create jobs and thus redirect the economy to a more efficient use of natural resources. Furthermore, the construction and operation of new coal-fired power plants can lead to an increase in pollution and associated health and climate risks.

The current energy model envisages an energy-intensive economy, which suggests an extremely wasteful energy consumption pattern in the country alongside the enormous potential to improve the efficiency of energy consumption. To achieve and sustain economic growth, energy access at lower prices can be necessary to make industries competitive and to contribute to job creation and development. This may require providing electricity at lower prices through subsidies, which will encourage electricity overconsumption, waste and inefficiency, and also may contribute to environmental degradation. Selling electricity at low

prices effectively stimulates excessive consumption and does not provide sufficient preconditions for energy conservation.

In summary, the current winter energy deficit is due to the limited water and energy resources of the water reservoirs, low tariffs and losses due to depreciation of plants' equipment. This deficiency is also associated with underuse of alternative energy sources, energy-intensive industrial production, excessive electricity consumption by the population, the high prime cost of fuel supply for thermal power generation, persistent problems related to export of electric energy surplus and the country's limited internal financial options.

Alternative energy development scenarios would address poverty and meet domestic needs before assessing energy for export. As a country's level of development is almost directly linked to energy consumption, all the energy produced needs to be consumed in the country, as the domestic consumption of electricity supports GDP growth that exceeds the cost of energy itself. This, in turn, makes domestic use of energy more efficient than its direct export. Therefore, energy efficiency can be a particularly valuable way to increase the availability of energy resources without constructing further power stations, which can incur a large debt to the economy of the country.

Right-sizing of hydropower projects would be another important factor in the alternative energy development scenario, whereby shifting the planning criterion to meeting domestic demand at least cost would match investments and project size to winter flows, i.e. "right-sizing" projects to demand and water availability. It would enable the alignment of exports with domestic needs, thus realigning power investments with the development of stable export markets.

Alternative scenarios would also facilitate the use of small decentralized hydro technologies, combined with intermediate energy efficiency improvements and deployment of solar energy technologies, particularly in very remote areas with low population densities, where grid reinforcements or new connections seem unfeasible. All this can reduce electricity shortages and generation costs and improve household health conditions.

11.9 Conclusions and recommendations

The power sector is highly subsidized, and consequently tariffs for electricity are still low and do not reflect the costs of energy production. Energy

subsidies and socially determined pricing mechanisms have failed to promote sound energy efficiency policies and measures. Selling electricity at low prices stimulated excessive consumption and did not provide sufficient preconditions for energy conservation.

Recommendation 11.1:

The Government should pursue the policy of restructuring electricity tariffs to eliminate cross-subsidies and achieve the level of prices that reflects the costs of production in the power sector, while taking adequate measures to protect vulnerable social groups.

With regard to the renewable energy sources (RES), Tajikistan uses less than 1 per cent of the potential of RES other than hydropower. About 10 per cent of the country's population lives in remote, mountainous, off-grid areas where off-grid renewable energy solutions make more economic sense. To date, photovoltaic and wind energy systems are used only on a pilot basis. Overall, solar power is not yet considered as a priority supply option. The potential for using geothermal resources, the availability of thermal water and its characteristics are not well researched. The Government works on creating a favourable regulatory framework for small-scale hydropower development.

Recommendation 11.2:

The Government should:

- (a) *Support renewable sources of energy, in particular solar energy for water heating, small hydropower taking into account the minimum ecological flow, and wind energy for off-grid energy supply;*
- (b) *Consider conducting studies to identify prospective geothermal sites, which could support off-grid energy supply.*

The 2013 Law on Energy Saving and Energy Efficiency stipulates the legal and organizational framework for energy efficiency and provides for the introduction of energy efficiency materials, appliances and technologies. The Law has provisions for introducing mandatory energy audits, establishing procurement procedures that incorporate criteria on energy efficiency, and requirements for energy use in buildings and household appliances, etc. It provides for the establishment of a national fund for renewable energy sources, energy saving and energy efficiency. Energy efficiency has very low priority in practice, determined by the fact that a large proportion of the population does not have secure and reliable access to energy.

To date, there is no established governmental department to govern, regulate, enforce and monitor energy efficiency reforms.

Recommendation 11.3:

The Government should establish an independent national centre for energy efficiency and renewable energy to facilitate the implementation of strategic goals on energy efficiency defined by the Government.

Analysis of the energy sector policy framework reveals the lack of long-term energy sector planning in Tajikistan, which presents one of the most significant risks to the country's ability to make its energy sector climate resilient. As approximately 98 per cent of the country's electricity is produced from hydropower sources in river basins fed by glacial meltwater and snowmelt, the energy sector is highly dependent on hydrology and therefore is greatly exposed to climate change. Most of the existing HPPs in Tajikistan were built with no regard to climate change.

Recommendation 11.4:

The Ministry of Energy and Water Resources should:

- (a) *Develop and adopt a long-term climate-resilient national energy strategy;*
- (b) *Take into account the impacts of climate change on hydrology when planning for new hydropower facilities, by ensuring that their design and management are able to cope with more frequent extreme weather events under a range of projected climate change scenarios.*

Inconsistencies were observed between energy-related data (data on imports of gas and on renewable energy sources), alongside fuelwood consumption data not being recorded in the energy balance. The methodology used for policy formulation and forecasting of electricity export potential, in particular, was rather optimistic and not fully aligned with the present realities of Tajikistan.

Recommendation 11.5:

The Government should:

- (a) *Continue improving the collection, monitoring and verification of data from the energy sector in accordance with internationally agreed standards;*
- (b) *Include fuelwood statistics in the energy balance.*

Chapter 12

TRANSPORT AND ENVIRONMENT

12.1 Overview of the transport sector and transport infrastructure

Tajikistan is a landlocked country in Central Asia. More than 90 per cent of its territory is mountainous. The landscape puts severe restrictions on the development and use of railways and aviation for domestic transportation. Road transport is also subject to limitations imposed by unfavourable natural conditions. Many highways and mountain passes are closed for the winter period (from December to May), in view of snowfalls and avalanches. Significant daily and seasonal temperature amplitudes, flash floods, mudflows, rockslides and rockfalls lead to the rapid deterioration and destruction of road infrastructure.

From the Soviet Union, Tajikistan inherited road and rail infrastructure by which a number of regions of Tajikistan were linked together through neighbouring countries. This circumstance often contributes to Tajikistan's transport problems, due to regional trade and transit obstacles, as well as border crossing issues at some borders.

All these factors have led the World Bank to a conclusion that Tajikistan is "Central Asia's least accessible, most isolated country, with only limited regional and international connectivity". The Tajik Ministry of Economic Development and Trade has calculated that the average distances to the consumers of aluminium and raw cotton, Tajikistan's main national export products, are 4,156 and 3,241 km, respectively, thus making these products less competitive. The share of transportation expenditures in the cost of production ranges from 5 to 35 per cent, depending on the sector of the economy. Thus, an effective transport system and reduction of logistics costs are of vital importance for the economy of Tajikistan.

At the same time, the geographical location of Tajikistan at an intersection of Afghanistan, China, Kyrgyzstan and Uzbekistan, could make it a bridge connecting Europe and Central, East, South and South-West Asia. To overcome the isolation, the Tajik Government adopted a strategy for building an integrated transport network in the country and

connecting it with international transport corridors, some of which pass through Tajikistan.

Over the last decade, 23 government investment projects worth more than 3 billion somoni have been implemented and brought into operation – 1,650 km of built and renovated roads, 109 bridges and 27 km of tunnels. As of late 2015, 11 projects totalling 5.5 billion somoni are being implemented on transport. Given high infrastructure costs, the Government has raised substantial funds from a number of countries, intergovernmental organizations and financial institutions (table 12.1).

Due to the Government's efforts to improve the infrastructure and to create an enabling environment for transport, between 2007 and 2014, the country gained 32 positions in the global Logistics Performance Index (LPI) (table 12.2). It is currently ranked 114th of some 160 countries surveyed in this index. Tajikistan improved its ranking in all LPI components, with particular growth in international shipment (44 positions). Slower progress was observed in infrastructure and timeliness.

Road sector

Roads are divided into public and non-public ones. The total length of public roads is 14,140 km, and there are 12,791 km of non-public (mostly rural or industrial access) roads. The road network density is about 19 km per 100 km², which is significantly lower than in developed mountainous countries (e.g. 173 km in Switzerland, 137 km in Austria). The public roads are under the jurisdiction of the Ministry of Transport. By type of roading material, 4,493 km of public roads are paved in asphalt, 8,614 km are of gravel and the remaining 1,033 km are not paved. The road network is oriented towards the Russian Federation and other CIS countries, with only limited links to China and South Asia. Road transport dominates over airlines and railways for domestic freight transport. The average hauling distance for freight is 22 km, which is too short for efficient transport by air or rail. A similar situation pertains for domestic passenger transport, which is overwhelmingly undertaken by road.

Table 12.1: Transport investment projects and major development partners of Tajikistan, 2005-2015

	\$US million
Projects being implemented, total	1 127.3
Projects completed, total	632.1
Prospective projects, total	7 078.0
Contribution of Tajikistan	175.2
Loans, total	1 037.0
China	605.2
France	26.5
Islamic Republic of Iran	21.2
Asian Development Bank	105.9
European Bank for Reconstruction and Development	50.0
Islamic Development Bank	71.3
World Bank	38.3
Abu Dhabi Foundation	15.0
Kuwait Fund for Arab Economic Development	33.3
OPEC Fund	44.5
Saudi Development Fund	26.0
Grants, total	533.1
China	35.1
Islamic Republic of Iran	17.0
Japan	102.1
United States of America	30.4
Asian Development Bank	324.0
European Bank for Reconstruction and Development	8.1
World Bank	6.8
Aga Khan Foundation	7.8
Kuwait Fund for Arab Economic Development	2.0

Source: Ministry of Transport, 2015.

Table 12.2: Logistics Performance Index position, 2007, 2010, 2012, 2014

Component	2007	2010	2012	2014
LPI rank	146	131	136	114
LPI score	1.9	2.4	2.3	2.5
Customs rank	140	147	85	115
Customs score	1.9	1.9	2.4	2.4
Infrastructure rank	125	128	138	108
Infrastructure score	2.0	2.0	2.0	2.4
International shipments rank	136	127	135	92
International shipments score	2.0	2.4	2.3	2.7
Logistics competence rank	141	125	130	113
Logistics competence score	1.9	2.3	2.2	2.5
Tracking and tracing rank	146	141	143	119
Tracking and tracing score	1.7	2.3	2.1	2.5
Timeliness rank	146	98	146	133
Timeliness score	2.1	3.2	2.5	2.7

Source: World Bank, 2015.

Toll roads

The only toll road is 337 km long, extending from Dushanbe to Khujand in the north of Tajikistan, and further to Chanak in Uzbekistan. The fees are collected by an authorized private company, which is also in charge of road maintenance. The tolls amount

to 59 somoni for light duty vehicles (LDVs) and 490–635 somoni for trucks, depending on the load. These fees are rather expensive, given the low average income in Tajikistan. There are, however, some discounts for public transport and for local citizens who live in the regions which the road goes through.

Number of vehicles

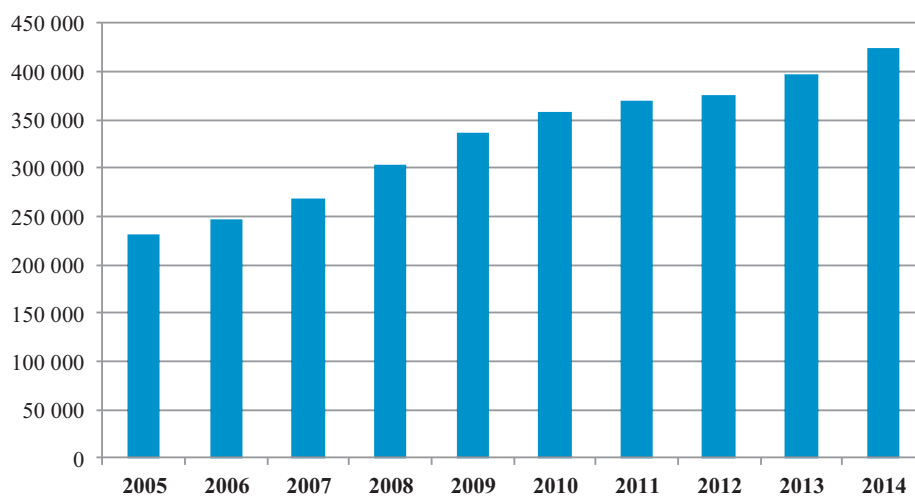
Over the last decade, dramatic growth in the vehicle fleet (more than 80 per cent) has occurred (figure 12.1). These statistical data also include old decommissioned vehicles that still remain registered.

Due to importation of vehicles, the average increase in the fleet has been in the range of 20,000 to 30,000 vehicles per year. Even the introduction of higher import duties and taxes in February 2013 (18 per cent VAT, 10 per cent excise and 5–7 per cent import

duty) did not affect this booming market. Nevertheless, vehicle ownership in Tajikistan is still rather low at 43–44 vehicles per 1,000 people, the lowest rate in Central Asia. A 50 per cent higher figure (66 vehicles) is observed in Dushanbe (figure 12.2), where the rapid increase in the number of vehicles has already resulted in traffic congestion and increased air pollution.

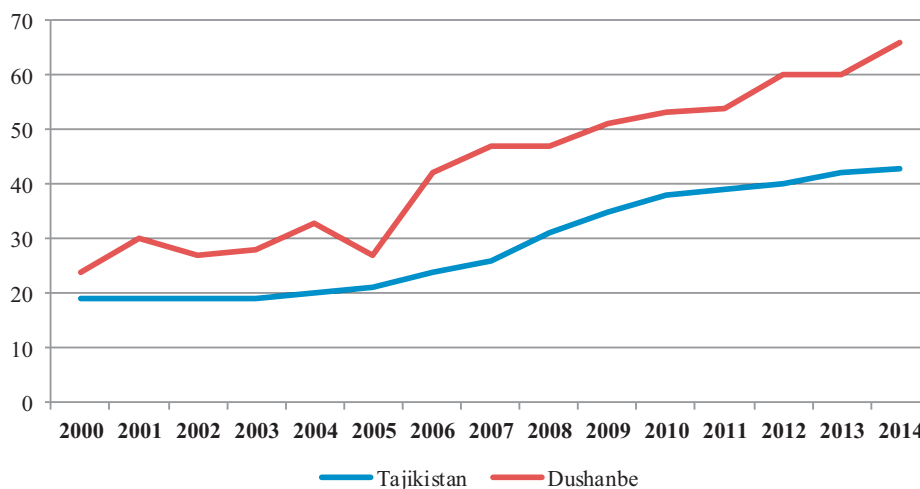
Table 12.3 provides the current structure of the fleet. Privately owned LDVs constitute 83 per cent of the fleet; many have been converted to gas fuel.

Figure 12.1: Registered vehicles, 2005–2014, number



Source: Ministry of Interior, 2015.

Figure 12.2: Light duty vehicles, 2000–2014, number per 1,000 population



Source: Agency of Statistics, 2015.

Photo 12.1: Road in Varzob District, leading north to Sughd Oblast**Table 12.3: Registered fleet by vehicle category as of 31 December 2014**

	Number	Of which: gas fuelled
Owned by physical persons		
Total [1]	404 396	132 448
Trucks	30 308	9 039
Special vehicles	915	66
Buses	11 713	3 494
LDVs	357 552	119 849
Motorcycles	2 720	-
Trailers	1 128	-
Semi-trailers	60	-
Owned by legal entities		
Total [2]	26 206	4 138
Trucks	9 087	925
Special vehicles	3 243	393
Buses	3 676	460
LDVs	9 637	2 360
Motorcycles	139	-
Trailers	384	-
Semi-trailers	140	-
Grand total [1]+[2]	430 602	136 586

Sources: Ministry of Transport and Ministry of Interior, 2015.

Vehicles with foreign registration plates

The above picture would not be complete without mentioning the large number of foreign freight and passenger vehicles crossing the Tajikistan borders. In

2014, according to the statistics maintained by the Tajik Association of Road Carriers "ABBAT", 47,610 foreign-registered vehicles crossed the country's borders for entry, exit or transit. This figure is 25 per cent higher than the corresponding number of domestic vehicles (37,997). To use Tajik roads, foreign vehicles must pay fees of 25–200 somoni (US\$4–30), depending on the vehicle's category (size).

Public transport

Road transport plays the main role in providing passenger services. The public transport network in Dushanbe includes 75 routes, of which 34 are serviced by buses, 14 by trolleybuses and 27 by taxis.

For the time being, trolleybus services are only provided in the capital, Dushanbe, by a state-owned company. The fleet includes around 150 vehicles with an average age of 7.5 years. However, this fleet currently runs at half its capacity (i.e. 70 vehicles). The trolleybus infrastructure was originally destined to serve 14 routes with a total length of 256 km (in two-way terms) across the entire city. This number has gradually reduced to seven operating tracks with a length of 134 km, due to heavy deterioration of the overhead catenary and unreliable operation of three electric power substations that are in need of rehabilitation. To improve the situation, a joint project with the EBRD has started. There are also

ongoing projects to launch trolleybus lines in other major cities (Khujand, Kulob and Kurgan-Tyube).

Apart from trolleybuses, public transportation services in Dushanbe are provided by three large state-owned bus enterprises and some 20 licensed private operators. In Dushanbe, the public transport fleet includes a total of 216 buses, 56 minibuses (12–15 seats) and over 2,000 private fixed-route taxis. The local government allocates funds annually for renewal of the public fleet. In 2014, under public fleet replacement projects, the municipality of Dushanbe financed the purchase of 50 buses of "LiAZ-525653" brand, 25 buses of "PAZ-320402-05" brand and 30 trolleybuses produced in the Russian Federation. Yet the deteriorating condition of public transport with high seating capacity remains a major problem. The municipal government also plans to construct passenger terminals at the city's four main gateways, with the aim of reducing interurban vehicular traffic inside the city.

High demand on passenger transportation services has led to the emergence and mushrooming of illegal carriers who cause serious traffic problems. By expert estimates, in Dushanbe alone there are some 4,000 illegal (unlicensed) carriers using low-capacity minibuses for up to 12 passengers. These illegal vehicles do not follow the prescribed public transport stops. Instead, they stop at random to pick up and drop off passengers, often at prohibited places (e.g. pedestrian crossings), thus causing chaos and traffic jams. The unlicensed carriers provoke "in-route" competition rather than encourage "for-route" competition.

Rail sector

Currently, the railway network is 960.6 km long, including 684.8 km of the main railway, 75.6 km of access roads and 200.2 km of station tracks. Not all the tracks are electric. Until recently, the railway network used to consist of three separate sections (central, north and south) which were connected only via Uzbekistan and Turkmenistan. In 2014, the south and central sections were linked by a new domestic line, Vahdat–Yavan, which is 40.7 km long. The railways have 33 stations (10 in the centre, 10 in the north and 13 in the south) and are operated by the State Unitary Enterprise Tajik Railways. The rolling stock includes 2,269 freight wagons, 441 passenger cars and 56 locomotives. Rail has a dominant position in long-distance freight transport of bulky export (aluminium, cotton) and import (fuel) commodities. A new Tajikistan–Turkmenistan–Afghanistan rail line is in project and may become an

important factor in the economic development of Tajikistan and other countries of the region.

Aviation

Air transport mainly provides long-distance international passenger transport. There are four major international airports: Dushanbe, Khujand, Kulob and Kurgan-Tyube. About 70 per cent of international traffic is from/to Dushanbe and 28 per cent is from/to Khujand. Annually, one million air passengers are transported between Tajikistan and Central Asian countries, the Russian Federation, Turkey, the United Arab Emirates, Iran, Afghanistan and China. Most passengers (87 per cent) travel to and from the Russian Federation. Passengers travelling between Tajikistan and Turkey and between Tajikistan and China account for 4.7 and 4.1 per cent, respectively. Domestic passenger travel by air is very limited, with most flights (89 per cent) between Dushanbe and Khujand. An outline of air transport in Tajikistan is provided in table 12.4.

Table 12.4: Major indicators of air transport, 2015, number

Indicator	Number
International airports	4
Local airports	29
International flights	5 813
Domestic flights	306
Flight destinations	28
Air companies	20
Foreign	17
Domestic	3
Aircraft (domestic)	72
In order	32
Not in order	5
Under storage	35

Sources: Ministry of Transport, 2015.

Inland water transport

Inland water transport plays no significant role in Tajikistan. There are small boats, barges and ferries on the Amu Darya, Panj, Syr Darya and Vakhsh Rivers.

Pipelines

The only gas pipeline connects Uzbekistan and Tajikistan. Supplies stopped as of January 2013, and there are ongoing negotiations to resume deliveries. In 2014, the Chinese Government launched a project to build a new gas pipeline from Turkmenistan to China via the territories of Uzbekistan and Tajikistan. The length of this gas pipeline in Tajikistan is

expected to be more than 400 km. The project is scheduled to be commissioned before the end of 2016.

Passenger transport

In 2009–2015, passenger numbers have been increasing, slightly, but steadily, from 514 million in 2009 to 564 million in 2015 (table 12.5). Aviation, which is mainly used for international transport, has demonstrated growth (14 per cent). Road transport dominates domestic passenger services, both urban and interurban, with minibuses constituting the vast majority of the fleet. In Dushanbe, trolleybuses carry an almost unchanging number of passengers (10 million) annually. The role of rail passenger transport is marginal and continues to decline.

Overall, in 2009–2015, passenger turnover increased by 7.44 per cent, from 8,590 million to 9,230 million (table 12.6). International traffic by air increased by

23 per cent, whereas passenger turnover for rail has declined by 64 per cent.

Freight transport

Continuous growth in road freight transport (61 per cent in the period 2009–2015) has ensured an overall increase in freight transportation across all modes in this period, from 56,862,000 to 74,431,800 tons (a 31 per cent increase) (table 12.7). Freight transport by rail has declined by 57 per cent. Air freight has remained at approximately the same low level, since it is mainly used for small packages and high-value consignments.

In terms of freight turnover, the situation looks very similar (table 12.8). Only road transport witnessed a steep rise, from 3,725 million ton kilometres (tkm) in 2009 to 5,672 million tkm in 2015 (a 52 per cent increase), thus offsetting the stagnation or decline in other modes. The steepest decline can be seen in rail transport (which dropped more than threefold).

Table 12.5: Passenger transportation by mode of transport, 2009–2015, million persons

Mode	2009	2010	2011	2012	2013	2014	2015
Total	514.6	539.5	542.3	520.7	545.0	556.9	564.5
Rail	0.7	0.6	0.6	0.5	0.5	0.4	0.4
Road							
of which:							
Motor	503.3	527.2	530.7	508.9	533.2	545.1	553.1
Trolleybuses	9.9	10.9	10.2	10.3	10.2	10.2	10.2
Air	0.7	0.8	0.8	1.0	1.1	1.1	0.8

Source: Agency of Statistics, 2016.

Table 12.6: Passenger turnover by mode of transport, 2009–2015, million pkm

Mode	2009	2010	2011	2012	2013	2014	2015
Total	8 590.5	9 036.1	9 447.7	9 806.9	10 206.2	10 305.1	9 230.1
Rail	45.3	32.8	31.5	24.0	20.9	17.8	16.0
Road							
of which:							
Motor	6 853.4	7 037.8	7 219.7	7 234.2	7 225.9	7 305.5	7 137.2
Trolleybuses	46.5	50.9	48.5	48.5	48.3	48.3	48.3
Air	1 645.3	1 914.6	2 148.0	2 500.2	2 911.1	2 933.5	2 028.6

Source: Agency of Statistics, 2016.

Table 12.7: Freight transportation by mode of transport, 2009–2015, thousand tons

Mode	2009	2010	2011	2012	2013	2014	2015
Total	56 862.8	59 327.4	61 656.6	68 399.4	72 248.3	74 411.2	74 431.8
Rail	14 545.5	10 445.6	9 256.7	8 405.1	6 735.3	6 807.7	6 125.6
Road	42 315.1	48 879.6	52 397.3	59 991.8	65 510.7	67 600.9	68 304.1
Air	2.2	2.2	2.6	2.5	2.3	2.6	2.1

Source: Agency of Statistics, 2016.

Table 12.8: Freight turnover by mode of transport, 2009–2015, million tkm

Mode	2009	2010	2011	2012	2013	2014	2015
Total	5 012.9	4 957.6	5 508.8	6 345.0	6 693.8	6 180.3	5 995.5
Rail	1 282.1	808.4	702.9	554.9	402.2	389.7	316.9
Road	3 725.2	4 143.9	4 799.5	5 782.9	6 284.8	5 783.3	5 672.3
Air	5.6	5.3	6.4	7.2	6.8	7.3	6.3

Source: Agency of Statistics, 2016.

12.2 Environmental pressures

Air

Over recent years, the impact of the transport sector on air pollution has stabilized in absolute terms (tables 12.9 and 12.10). Compared with 2009, emissions of air pollutants from transport in 2014 have increased by only 14 per cent (from 249,000 to 284,000 tons), while the vehicle fleet has increased by 26 per cent (from 337,425 to 423,303) in the same period. This phenomenon is explained by the fact that more and more vehicles with petrol engines (especially LDVs) have been converted to use liquefied petroleum gas (LPG) as fuel, because of its lower price and consumption rate. In 2014, the share of such vehicles in the fleet had already reached 32 per cent (table 12.3). Since vehicles running on gas produce lower emissions than those running on petrol, this has led to reduced average levels of pollutants and GHG emissions per vehicle.

In relative terms, however, road transport remains by far the main source of air pollution. In 2014, its contribution was more than 13 times higher than the total emissions from the industry and energy sectors (table 12.10, stationary sources). According to the Committee on Environmental Protection, the major causes of air pollution by road transport are the poor technical condition of vehicles, poor quality of fuel, underdeveloped systems for traffic management and infrastructure, and small percentage of environmentally friendly vehicles.

Greenhouse gas emissions

Since 2011, no data on CO₂ emissions from transport (mobile sources) has been made available. According to the 2014 Third National Communication to the UNFCCC, in 2012, CO₂ emissions from transport made up 70 per cent of total emissions, which was three times higher than 15 years previously.

For Future Inland Transport Systems

Use of the For Future Inland Transport Systems (ForFITS) tool (annex VI) provides projections of

transport sector well-to-wheel (WTW²) CO₂ emissions for the reference scenario and four additional scenarios: vehicle fleet renewal, shift to public transport, increase in the LPG share and combined scenario.

The reference scenario (scenario A) accounts for the expected evolution of socioeconomic parameters such as population and GDP. It includes default data in ForFITS on the expected evolution of fuel consumption characteristics by powertrain to reflect future improvements in vehicle technology and their associated costs. Other characteristics defining the transport system in the base year (e.g. fuel taxation schemes, road pricing, passenger/freight transport system structure, fuel characteristics and behavioural aspects) remain unchanged in projections.

Four additional scenarios are as follows:

- Scenario B (vehicle fleet renewal scenario): Evaluates the impact of decreasing the average age of the personal passenger LDV fleet (currently 15–18 years) by one third by 2030;
- Scenario C (shift to public transport): On the basis of ongoing projects developing trolleybus lines in Dushanbe and major cities, as well as projected further increases in bus services, this scenario simulates a shift from personal vehicles to public transport modes, due to structural changes in the passenger transport system;
- Scenario D (increase in the LPG share): Simulates a continuation of the trend of the conversion of gasoline-fuelled personal passenger vehicles to LPG powertrains. The scenario evaluates the impact of the increase of the share of the fleet with LPG powertrains to 38 per cent by 2030;
- Scenario E (combined): A combined scenario reflects an interconnected scenario where scenarios B and C each come into effect.

² Well to wheel (WTW) refers to CO₂ emissions from vehicle operation, as well as emissions from the production of the fuel used for vehicle operation.

The main results obtained for each scenario are shown in table 12.11. Further details can be found in annex VI.

The estimated WTW CO₂ emissions in 2013 from the transport sector for Tajikistan show that emissions from freight vehicles were 20.96 per cent higher than those from passenger vehicles (2.5 billion kg compared with 2.1 billion kg).

In the *reference* scenario, projections of CO₂ emissions from the transport sector show an overall increase of 81.10 per cent by 2030 from 2013, with freight vehicles still contributing higher levels of emissions of CO₂. The gap between freight and passenger vehicle emissions is widening as scenarios analysed only tackle the passenger sector. The increase in each sector shows the large impact of expected economic growth on CO₂ emissions.

While projections of future CO₂ emissions under the four alternative scenarios show this same increasing trend, several demonstrate opportunities to decrease future transport CO₂ emissions relative to the *reference* scenario. A decrease in the average passenger car life to two thirds under the *vehicle fleet renewal* scenario is projected to lead to a relative reduction of 8.85 per cent in terms of passenger transport energy use in 2030. This translates to a 3.32

per cent decrease in overall WTW CO₂ emissions in 2030 compared with the *reference* scenario. The projected effect of the *shift to public transport* scenario is more pronounced. Under this scenario, an overall decrease in WTW CO₂ emissions of 16.76 per cent is projected in 2030 compared with the *reference* scenario. This decrease is largely attributed to a decrease in passenger transport activity associated with a population shift towards denser cities. The *increase in LPG share* scenario results in a much lower projected impact when compared with other scenarios. The higher upstream emissions for LPG fuel blend in comparison with gasoline counterbalance the marginal improvements from tailpipe emissions. While a shift to LPG may be justified in economic terms, the effect on transport emissions is not projected to be substantial. The *combined* scenario projects a total decrease of 19.46 per cent by 2030 in total WTW CO₂ emissions for the transport sector.

These results together show the effect of steps that can be taken by Tajikistan to limit emissions from the passenger transport sector. Tajikistan faces challenges in that its expected future economic growth would typically correspond with an increase in CO₂ emissions. However, improvements in the efficiency of its transport sector could help mitigate these issues.

Table 12.9: Air polluting emissions from mobile sources by selected pollutants, 2009–2014, thousand tons

	2009	2010	2011	2012	2013	2014
Total	249.1	260.4	260.0	260.2	275.0	330.4
Carbon monoxide	178.8	191.2	190.9	184.3	194.8	236.9
Hydrocarbons	38.8	38.7	38.8	38.1	40.3	48.9
Nitrogen oxides	31.1	30.1	30.0	34.6	36.6	44.4
Lead	0.4	0.3	0.3	0.4	0.4	0.1
Sulphur dioxide	..	..	..	2.8	2.9	0.1

Source: Agency of Statistics, 2016.

Table 12.10: Air polluting emissions from road transport by vehicle category and from stationary sources, 2014

	Light duty vehicles	Freight vehicles	Buses	Special vehicles	Total for road transport	Stationary sources
Vehicles, number	362 180	45 779	16 720	3 960	428 639	-
Total, thousand tons	284.8	27.3	15.6	2.6	330.3	21.1
Carbon monoxide	204.2	19.6	11.2	1.8	236.9	16.5
Hydrocarbons	42.2	4.1	2.3	0.4	49.0	..
Nitrogen oxides	38.3	3.7	2.1	0.3	44.4	1.0
Sulphur dioxide	..	..	..	..	..	2.6

Source: Committee on Environmental Protection, 2016.

The results described in more detail in annex VI demonstrate the potential impact of having transit-oriented land use policies and of increasing the share of public transport in passenger transport activity and increasing the efficiency of the transport sector, through a shift to newer and more energy efficient personal passenger vehicles. Projections generated by ForFITS based on these scenarios show that pursuing such policies can temper the current trend of increasingly high WTW CO₂ emissions stemming from the transport sector of Tajikistan. With a view to mitigating the impact of future CO₂ emissions from its transport sector, Tajikistan may wish to further investigate the relative cost of implementing the following measures:

- Decreasing the average age of the passenger LDV fleet;
- Developing policies necessary to support a shift towards increased use of public transport.

Other environmental pressures from transport

No information was made available on pressures from transport on water, land uptake, soil, noise, biodiversity or landscapes.

12.3 Road safety

Figure 12.3 provides an overview of accidents, injuries and deaths for the last decade. The Road Police keep a detailed list of types of traffic violations that cause the reported accidents. According to the Road Police data, the most common reasons for accidents are speeding (47 per cent), driving into the oncoming traffic lane (20 per cent) and dangerous manoeuvring (11 per cent). More than 50 per cent of road traffic accidents are committed by young people.

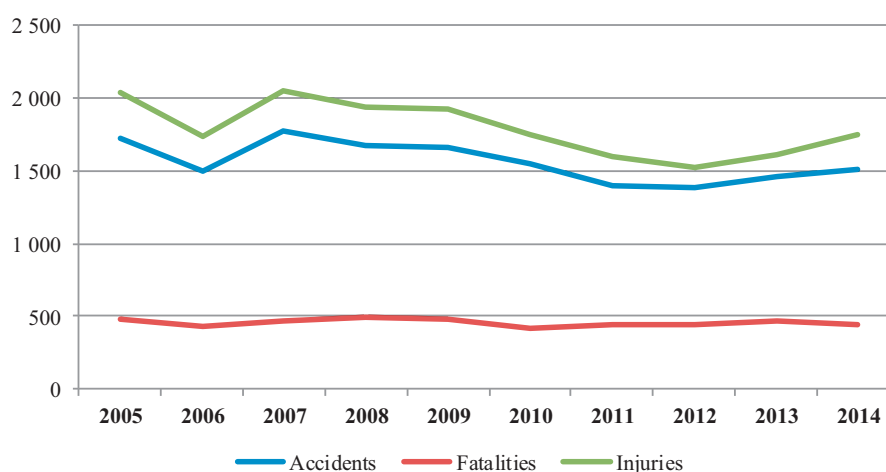
Naturally, the Road Police statistics mainly focus on road users (drivers). However, it would not be fair to attribute traffic accidents only to drivers' faults, lack of discipline or inexperience. Other contributing factors, which are identified in the Programme for Improvement of Road Safety on Motor Roads for the period 2014–2016 (2014 Resolution of the Government No. 372), include poor road infrastructure and maintenance, lack of road signs and technical means of traffic control, poor traffic organization and the technical condition of vehicles.

Table 12.11: Main outputs: reference and alternative scenarios

	Unit	2013	2030				
			Reference	Vehicle fleet renewal	Shift to public transport	Increase in LPG share	Combined
Total pkm	billion pkm	20.40	31.00	30.00	20.20	31.10	19.50
Total energy use	million toe	1.30	2.35	2.26	1.94	2.35	1.87
Total WTW CO ₂ emissions	billion kg CO ₂	4.65	8.43	8.14	7.01	8.43	6.78
Total WTW CO ₂ emissions per capita	kg CO ₂ /person	569.80	750.50	724.70	624.10	750.50	603.60
Total WTW CO ₂ emissions intensity	kg CO ₂ /GDP*1 000	224.20	131.70	127.10	109.50	131.70	105.90

Note: GDP is measured in purchasing power parity (PPP) units at 2013 prices.

Figure 12.3: Road safety figures, 2005–2014, number



Source: Ministry of Interior, 2015.

In spite of the dramatic increase in the vehicle fleet in the period 2005–2014 (more than 80 per cent, figure 12.1), the figures for accidents, injuries and deaths remain at the same level, due to the measures taken by the Government and local authorities (box 12.1).

12.4 Greening the sector: Electrifying public transport

For the time being, trolleybuses are only used in Dushanbe, but there are projects to open trolleybus lines in other cities (Khujand, Kulob and Kurgan-Tyube). To finance these projects and to maintain the existing network in the capital, the Government seeks the support of foreign investors.

For example, the Dushanbe State Communal Unitary Trolleybus Company has received a loan from the EBRD towards the cost of the Dushanbe Public Transport Project. The proposed project, which has a total estimated cost of US\$8.1 million, includes the:

- Rehabilitation of up to 12 km of trolleybus overhead electrical infrastructure;
- Rehabilitation of traction power substations and traction power equipment;
- Replacement of feeder cables.

Another important project on sustainable transport in Dushanbe, "Support to Sustainable Transport Management in Dushanbe", has been conducted under the auspices of UNDP (box 12.2).

Box 12.1: "Safe City" project in Dushanbe

As part of the Government's efforts to improve road safety, the "Safe City" project was launched in 2013 in Dushanbe. It focuses on the introduction of a comprehensive system of video surveillance. In total, 855 CCTV cameras with 360-degree vision are being installed at 70 intersections and central streets in the capital. These cameras monitor traffic, including offences committed by road users. Video records are stored and processed at a control centre at the Ministry of Interior.

The total cost of the project is some US\$22 million. Of this, US\$20.9 million is a foreign long-term loan for 20 years, and the remaining US\$1.1 million comes from Tajik sources. It is expected that the loan will be repaid through the collected penalties for offences registered by the system.

The project seems to be a success. Following the first group of cameras being put into operation, the number of accidents decreased by 50 per cent. Between 31 October 2013 and 1 July 2014, the total amount of fines exceeded 13 million somoni (about US\$2.6 million).

Photo 12.2: Landslide on Dushanbe-Khujand road



Box 12.2: Project "Support to Sustainable Transport Management in Dushanbe" (2010–2014)

Since early 2000, Tajikistan's capital city, Dushanbe, has been experiencing a rapid expansion in the use of private motor vehicles, alongside the deterioration in public transport services. This has led to a significant increase in urban air pollution and GHG emissions. It is estimated that 87 per cent of the total air emissions in Dushanbe are associated with vehicles.

The project aimed to reduce local GHG emissions and improve access to and the quality of public transport services for all residents. It was expected that by the end of the project the share of sustainable modes of public transportation would have increased from the current 8 per cent to 28 per cent, leading to a near 50 per cent reduction in GHG emissions from the city's transport sector.

To achieve these ambitious targets, the project developed and helped Dushanbe City Government implement an integrated policy framework, which included:

- Enhancing vehicle efficiency and setting appropriate fuel quality standards;
- Improving the quality of public transport services, in particular trolleybuses;
- Increasing opportunities for non-motorized modes of transport, such as walking and cycling;
- Developing integrated land use/transport plans to reduce demand for travel;
- Enhancing municipal institutional transformation and governance structure to embrace sustainable transport.

Project outcomes:

- The project succeeded in the development of a comprehensive analysis of urban transport legislation and "Programme for improvement of Urban Passenger Transport System" with a detailed Action Plan to address the identified gaps and issues, which suggested the modification of current urban transport-related legislation in 2014–2015.
- The first cycle lane (5 km) implemented in Dushanbe City as part of the demonstration project (in 2012) became a landmark in changing the mindset of the Municipality about actually implementing such a scheme. Another success of the project was the agreement by the Municipality that all new road construction and rehabilitation works would include the provision of cycle lanes and bus lanes (where space permits).
- The project also succeeded in strengthening the capacity of project stakeholders through conducting a study tour on the Bus Rapid Transit system and providing training on transport/land-use modelling, GHG emissions calculation, parking strategy development, etc.

The project was financed by GEF, UNDP, the Government of Tajikistan (in kind) and the private sector (in kind).

Source: UNDP Country Office, Tajikistan, 2014.

12.5 Emission and fuel standards for vehicles

The latest fuel standards for vehicles were established by the Government in 2014 in the Technical Regulation "Safety Requirements for Petrol, Diesel, Fuel Oil and Jet Fuel" (2014 Resolution of the Government No. 30). They are identical to the standards applicable in the countries of the Eurasian Economic Union (EEU), i.e. Armenia, Belarus, Kazakhstan, Kyrgyzstan and the Russian Federation. The main parameters for petrol and diesel are given in tables 12.12 and 12.13.

In substance, classes 2 to 5 of petrol and diesel fuels largely correspond to the Euro-2 to Euro-5 standards. Compared with the EU member States and other countries, the huge difference in Tajikistan is that there are no legal restrictions on the use and/or importation of lower classes of fuel. To some extent, this situation is paradoxically rectified by the fact that

Tajikistan does not produce its own fuel, due to the limited refinery capacities and the absence of domestic oil fields. As importing crude oil is not economically viable (there are no pipelines), the bulk of gasoline is imported from Kazakhstan, Kyrgyzstan and the Russian Federation by rail. A similar picture is observed for natural gas and LPG. Because these three countries have officially banned the production of leaded gasoline, all imported gasoline in Tajikistan should have been lead free as of 2000. In accordance with the technical regulations of the EEU, since the beginning of 2015, only diesel emission class K5 is available on the market. Compared with the lower K4 class, K5 has tightened regulatory parameters for sulphur content (10 ppm), making this fuel fully compliant with European standard EN590: 2009 (Euro 5). Current fuel standards for petrol correspond to Euro 4 standard (50 ppm sulphur). It is expected that Euro 5 standard for petrol will become obligatory in the EEU in 2016.

Table 12.12: Petrol fuel requirements

Parameter	Unit	Requirements for classes			
		Class 2	Class 3	Class 4	Class 5
Sulphur content, max.	mg/kg	500	150	50	10
Lead content, max.	mg/l	Absent	Absent	Absent	Absent
Oxygen content, max.	%		2.7	2.7	2.7
Hydrocarbons contents, max.					
Benzene	% v/v	5.0	1.0	1.0	1.0
Aromatics	% v/v	-	42.0	35.0	35.0
Olefins	% v/v	-	18.0	18.0	18.0

Source: Technical Regulation "Safety Requirements for Petrol, Diesel, Fuel Oil and Jet Fuel" (2014 Resolution of the Government No. 30).

Table 12.13: Diesel fuel requirements

Parameter	Unit	Requirements for classes			
		Class 2	Class 3	Class 4	Class 5
Sulphur content, max.	mg/kg	500	150	50	10
Polycyclic aromatic hydrocarbons	per cent	-	11	11	11

Source: Technical Regulation "Safety Requirements for Petrol, Diesel, Fuel Oil and Jet Fuel" (2014 Resolution of the Government No. 30).

For the time being, there are no elaborated emission standards for vehicles in Tajikistan, but only requirements for the content of selected pollutants in exhaust gases, which are measured as part of a roadworthiness test. At the same time, the 2015 Law on Ensuring the Environmental Safety of Road Transport envisages the introduction of environmental classification of road vehicles. Most probably, EU emission standards would be taken as a model. It should be understood, however, that EU Directives and ECE emission provisions (Regulations Nos. 24 (Diesel smoke testing), 49 (Emissions of heavy vehicles equipped with diesel, CNG and LPG engines) and 83 (Emissions of light vehicles)) apply to new vehicle models, which should be type approved before being placed on the market. The prescribed emission tests are based on different test cycles and require advanced (and expensive) equipment and facilities. In Tajikistan, second-hand imported vehicles continue to account for the overwhelming majority of new vehicle registrations. Thus, the Tajik authorities may rely on the environmental classification of these vehicles established by the type approval authorities in the countries of their origin (manufacturing). At the same time, an adequate set of administrative tools, economic measures and incentives would encourage imports, ownership and use of "greener" cars.

Fuel is subject to excise taxes. For petrol, the excise amounts to €55 per ton of petrol. Diesel is taxed much lower, at €8 per ton. For LPG, the excise tax is even lower, €4 per ton. On top of excises, all fuels are subject to VAT (18 per cent). These taxes

contribute to the pump fuel prices in Tajikistan (around 5–6 somoni per litre of gasoline or diesel and 3 somoni per kg of LPG), which are higher than in neighbouring countries of Central Asia. For example, in Kyrgyzstan, the excise tax for petrol is €15 per ton and €4 for diesel, compared with €55 and €8, respectively, in Tajikistan.

12.6 Legal, policy and institutional framework

Legal framework

A legal foundation of the transport sector is the 2000 Law on Transport, which sets out general requirements for transportation services and establishes the liability of transport operators. Pursuant to the Law, transport companies bear the responsibility for safety and environmental protection in the course of transport operations. The 1995 Law on Road Traffic defines the legal basis for road traffic with the aim to ensure traffic safety and to protect the life and health of citizens. The 2002 Law on Roads and Road Activities determines the principles of state regulation in this domain, including an article on mandatory environmental protection in the course of all road-related activities. The 2009 Charter of Motor Transport (2009 Resolution of the Government No. 696) contains a chapter on environmental protection that provides a comprehensive list of tasks and responsibilities in this area of road transport operators. The 2015 Law on Oil and Gas establishes legal provisions for the construction and functioning of pipelines, including requirements for environmental safety and protection.

Law on Ensuring the Environmental Safety of Road Transport

This 2015 Law on Ensuring the Environmental Safety of Road Transport sets out a number of principles, including the priority of environmental safety in the formation of transport policy, health care, economic support and promotion of activities to ensure the environmental safety of motor transport.

To mitigate the environmental impacts of the motor transport sector, the following measures are foreseen:

- Introduction of environmental classification of vehicles, based on their emissions;
- Carrying out of state environmental inspection of motor transport;
- Introduction of technical specifications for motor fuels;
- Production and sales of environmentally friendly motor fuel;
- Systematic monitoring of the quality of motor fuels;
- Disposal of batteries;
- Roadside maintenance.

If implemented properly, this Law could become a milestone in environmental activities in the transport sector. However, a set of regulations directly envisaged by the Law (e.g. classification of vehicles) are lacking. No measures aimed at early implementation have been taken. The country has not yet adopted international standards for road vehicles that could facilitate the implementation of the Law. Given the complexity and cross-cutting character of these issues, the adoption of a road map at the governmental level would be warranted.

Policy framework

State Targeted Programme for Transport Sector Development for the period up to 2025

The 2011 State Targeted Programme for Transport Sector Development for the period up to 2025 (2011 Resolution of the Government No. 165) provides a detailed analysis of the current transport system in Tajikistan and defines a comprehensive set of goals for the short-, middle- and long-term until 2025. The total financing for the Programme is expected to be almost US\$10 billion, 85 per cent of which is raised funds (tax credits and international grants). For different transport modes, the Programme foresees further rehabilitation and construction of new infrastructure, as well as renewal of fleet and rolling stock, with a particular emphasis on rail and road transport.

The Programme also aims at reduction in the number of road accidents. It is expected that, as a result of the Programme, around 10,000 accidents would be prevented and about 2,300 lives would be saved. The Programme also establishes a range of measures and an investment/financing programme to mitigate the impact of transport on the environment. The latter describes the plans of the Government to attract foreign investment/credit and to push companies and individuals to pay for specific services (e.g. converting vehicles to gas).

Programme for Improvement of Road Safety on Motor Roads for the period 2014–2016

The Programme for Improvement of Road Safety on Motor Roads for the period 2014–2016 (2014 Resolution of the Government No. 372) replaced the Programme for Improvement of Road Safety on Motor Roads for the period 2009–2013 (2008 Resolution of the Government No. 598). The Programme objectives include not only a reduction in the number of road accidents, fatalities and injuries, but also protection of the environment from vehicle emissions.

The Programme envisages a wide range of policy and organizational measures aimed at:

- Improving the efficiency of public administration and control of traffic safety;
- Preventing dangerous activities of road users and improving their discipline;
- Bringing the technical condition of roads into line with the existing standards;
- Providing road construction companies with technical means for traffic control;
- Bringing driving schools into compliance with the existing rules and improving the quality of training for drivers;
- Improving legal, informational, organizational and technical support for enforcement activities;
- Improving the efficiency of emergency response, rescue and emergency medical assistance to victims of road accidents;
- Eradicating corruption among employees of enforcement authorities.

The Programme is mainly financed from the state budget.

Institutional framework

The Ministry of Transport is responsible for all transport modes. Management of rail transport is carried out by the State Unitary Enterprise Tajik

Railways, which is subordinated to the Ministry of Transport.

The Road Police of the Ministry of Interior is responsible for registering vehicles, recording traffic accidents and issuing driver's licences. Periodic technical inspections of vehicles have been outsourced to a private company and are supervised by the Road Police. Another department of the Ministry, the Environmental Police, is responsible for conducting regular emission tests of vehicles. In the past, the Environmental Police were part of the Committee on Environmental Protection.

The Committee on Environmental Protection is responsible for, among other things, monitoring air pollution. Fuel quality standards are defined by Tajikstandard. Local authorities oversee public roads in towns and villages.

Regulatory and economic instruments

Quality of road vehicles and tax issues

Analysis of the fleet demonstrates its progressive ageing. For example, the proportion of trucks and buses that are older than 10 years has increased to 80 per cent. According to the Committee on Environmental Protection, vehicles produced before 1990 still account for 30–35 per cent of the total number of registered vehicles. Around 25–30 per cent of vehicles were produced in the period 1990–2000 and 20–25 per cent in the period 2000–2010. It is also possible that some old vehicles are decommissioned but still remain registered.

According to various estimates, the average age of the vehicle fleet is around 15–18 years, for both LDVs and freight vehicles. Most newly registered vehicles are second-hand cars imported from the Eastern Europe and Baltic States. Therefore, they meet only Euro 1 or, at a maximum, Euro 2 emission standards. The catalytic converters in imported second-hand cars are mostly out of date or are not even installed.

One third (32 per cent) of vehicles have been converted to gas fuel, due to economic pressures. These vehicles are using LPG (i.e. propane-butane mixture), rather than CNG (i.e. methane), due to safety issues and high transportation costs. The widespread use of LPG has led to reduced level of pollutants and GHG emissions.

The existing system of customs import duties and taxes provides almost no incentives for the importation of recent vehicles. The only difference is

that new vehicles (produced within the last five years) are subject to a 5 per cent import duty, compared with 7 per cent for vehicles that are older than five years. This 2 per cent difference is not significant, taking into account that all imported vehicles are also subject to a 10 per cent excise tax and 18 per cent VAT. Customs duties and taxes provide no distinctions based on a vehicle's engine power, volume, powertrain or fuel (petrol, diesel, hybrid, etc.).

Legal entities in Tajikistan pay a monthly road user tax (ch. 37 of the Tax Code), which is roughly calculated as a percentage of a company's turnover. As of 1 January 2015, the rate is 0.175 per cent for trade, procurement, supply and marketing activities and 0.7 per cent for other activities. This tax is not linked to actual road usage or number of vehicles. This tax was expected to be abolished as of 1 January 2017, however it was not abolished.

Annual vehicle ownership tax (ch. 39 of the Tax Code) is calculated as a product of an engine's horsepower (hp), a coefficient depending on the vehicle's category and a calculation unit established by the Government for taxation purposes (40 somoni as of 1 January 2015). For example, for a truck with a 300 hp engine and carrying capacity up to 10 tons, the tax would amount to 1,320 somoni (US\$193). For a passenger car (LDV) with a 150 hp engine, the tax would amount to 450 somoni (US\$66). No distinction is made based on the powertrain or fuel consumption.

The prices for petrol and diesel are in the range of 5–6 somoni (US\$0.7–0.9) per litre. LPG costs around 3 somoni per kg. Bearing in mind lower LPG prices and fuel consumption, many private vehicle owners have converted their vehicles to LPG. The equipment for such retrofitting costs US\$250–400, depending on the manufacturer. The installation of LPG equipment is performed by licensed companies (garages) on the basis of technical specifications developed by the Research Institute under the Ministry of Transport and Tajikstandard.

Periodic vehicle inspections

The Government has introduced mandatory periodic vehicle inspections and emission testing to determine the roadworthiness of LDVs and freight vehicles (2010 Resolution of the Government No. 390). These inspections are carried out annually, except for public transport, for which biannual checks apply. The service fees amount to 150–250 somoni (around US\$20–30). The technical requirements are based on inter-State standards agreed among CIS and EEU

countries. In their own turn, these standards take into account:

- ECE Vehicle Regulations listed in the Consolidated Resolution on the Construction of Vehicles (ECE/TRANS/WP.29/78/Rev.4) and aimed at the improvement of safety and protection of the environment; and/or
- Relevant EU directives for roadworthiness and emission testing, in particular 96/96/EC as amended by 2003/27/EC.

The established norms for emissions of pollutants by vehicles depend on a number of factors, including the fuel type, engine volume, vehicle age and category. In principle, the maximum permissible content in the exhaust gases is determined by the vehicle manufacturer. Where this information is not available, or where the competent authorities decide not to use it as a reference value, the content must not exceed the values given in tables 12.14 and 12.15.

For motor vehicles equipped with diesel engines, the

exhaust gas opacity is measured. The limit values of the coefficient of absorption are as follows:

- Naturally aspirated diesel engines = 2.5 m⁻¹;
- Turbo-charged diesel engines = 3.0 m⁻¹.

Although vehicle emissions are tested in the course of annual technical inspections, they are also subject to obligatory quarterly environmental checks performed by the Environmental Police under the Ministry of Interior, which issues the so-called "ecological vouchers". These checks cost 8 somoni (US\$1.2) per check/voucher for LDVs and 14 somoni (US\$2) for freight vehicles. Drivers are required to have a valid ecological voucher on board. Its presence can be verified at environmental checkpoints located at main entry roads to cities, in protected areas and on some motorways. For example, four such posts are situated around Dushanbe. The police staff at environmental checkpoints have testing equipment and, if necessary, can also inspect vehicles' exhaust gases for air pollutants.

Table 12.14: Limit emission values for petrol vehicles of different categories (test at idle)

Vehicle category	Engine rotation speed at idling	CO, % vol	CH, ppm
M1, M2, M3, N1, N2, N3, produced before 1 October 1986	low	4.5	
M1 and N1, without exhaust neutralizing systems	low	3.5	1 200
	high	2.0	600
M2, M3, N2, N3, without exhaust neutralizing systems	low	3.5	2 500
	high	2.0	1 000
M1 and N1, equipped with two-component exhaust neutralizing systems	low	1.0	400
	high	0.6	200
M2, M3, N2, N3, equipped with two-component exhaust neutralizing systems	low	1.0	600
	high	0.6	300
M1 and N1, equipped with three-component exhaust neutralizing systems and on-board diagnostics system	low	0.5	100
	high	0.3	100
M2, M3, N2, N3, equipped with three-component exhaust neutralizing systems and on-board diagnostics system	low	0.5	200
	high	0.3	200

Source: Ministry of Transport, 2015.

Note: Vehicle categories are defined in the Consolidated Resolution on the Construction of Vehicles (ECE/TRANS/WP.29/78/Rev.4).

Table 12.15: Limit emission values for LPG and CNG vehicles (test at idle)

Engine rotation speed at idling	Vehicles produced before 01.07.2000						Vehicles produced after 01.07.2000					
	CO, % vol		CH, ppm				CO, % vol		CH, ppm			
	LPG	CNG	Engine volume, l		LPG	CNG	LPG	CNG	Engine volume, l		LPG	CNG
			3 and below	above 3					3 and below	above 3		
Low	3.0	3.0	1 000	800	2 200	2 000	3.0	2.0	1 000	700	2 200	1 800
High	2.0	2.0	600	500	900	850	2.0	1.5	600	400	900	750

Source: Ministry of Transport, 2015.

This system of pollution checks and related charges seems to be mainly designed for fiscal purposes, rather than for improving air quality. First, the charges are levied per check/voucher, irrespective of the actual emissions of individual vehicles. Second, from a technical point of view, the high frequency of environmental tests (every quarter) is not justified. If a vehicle's emissions are found to be in order (e.g. at an annual technical inspection), it is rather unlikely that, three months later, the test results would be substantially different. Third, there have been reports by vehicle owners that environmental vouchers are often sold without the vehicle having passed the actual test. Similar occasions have been reported in respect of annual roadworthiness inspections.

12.7 Global and regional agreements and processes of particular importance to the environment

Tajikistan is a contracting party to nine United Nations transport legal instruments administered by ECE. In particular, Tajikistan joined the 1957 European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) and the 1970 Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP). Given its potential as a transit country and the high impact of accidents involving such cargoes on the environment and human health, participation in these instruments strengthens the capacity of the country to better prepare for such types of events, as well as strengthening its position as a transit corridor. In 2011, the country joined the 1998 Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles. It is not yet a contracting party to the 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, or to the 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections.

Tajikistan has also concluded 39 bilateral agreements with nine CIS countries and seven other countries. As a member of the Shanghai Cooperation Organisation, Tajikistan ratified its 2014 Agreement on the Creation of Favourable Conditions for International Road Transport.

Tajikistan does not regularly participate in the Steering Committee or in activities under the Transport, Health and Environment Pan-European Programme (THE PEP).

12.8 Conclusions and recommendations

According to statistical data, road transport is responsible for the vast majority of air pollution in Tajikistan. The recent Law on Ensuring the Environmental Safety of Road Transport proclaims a number of important principles and envisages a wide range of measures to mitigate the environmental impacts of the road transport sector. However, a coordination mechanism among various public authorities is not yet available. The available international standards for road vehicles, which are indispensable for the proper implementation of this Law, have not yet been adopted.

Recommendation 12.1:

The Government should adopt a road map for the implementation of the 2015 Law on Ensuring the Environmental Safety of Road Transport, clarifying time frames for each step.

The vehicle fleet in Tajikistan is ageing, due to large-scale importation of outdated second-hand cars. As a result, motor transport is identified as the number one cause of environmental impacts on the quality of air in Dushanbe and other cities. The situation also has adverse effects on road traffic safety and continues to worsen, due to the constant increase in vehicle numbers, especially in the capital. There are insufficient policy measures to improve the quality of fleet. The current system of vehicle emission tests and roadworthiness inspections is not stringent enough and mainly gears up for revenue collection, rather than for improving air quality and road safety.

Recommendation 12.2:

The Government should introduce economic incentives and/or administrative tools to facilitate the renewal of the country's ageing fleet by:

- (a) *Adopting emission standards for vehicles and their technical specifications;*
- (b) *Allowing importation only of vehicles that meet the Euro 3 standard and above and, in the period 2018–2020, raising this threshold level to Euro 4, as was done in the countries of the Eurasian Economic Union in January 2015;*
- (c) *Reducing customs payments (import duty, value added tax and excise) for importation of new vehicles (produced within the last five*

- years) and/or vehicles meeting the Euro 4 standard and above;
- (d) Differentiating vehicle ownership tax based on vehicle emissions, fuel and powertrain;
 - (e) Gradually phasing out the use of vehicles that are more than 25 years old and of those not equipped with catalytic converters;
 - (f) Strengthening inspections of roadworthiness and vehicle emission tests and, at the same time, reducing the frequency of environmental checks from quarterly to biannual or annual;
 - (g) Tightening control over the fuel quality standards, especially vis-à-vis sulphur content of liquid fuel, and phasing out the use of fuels that do not meet Class 3 or 4 standards.
- (d) Combating unlicensed passenger operators in Dushanbe and introducing bidding procedures for private transport companies that would take into account road safety and environmental protection;
 - (e) Learning from the experience of other countries and conducting projects on combatting air pollution from transport sector.

Despite completed and ongoing projects, the current system of public transport cannot cope with the increasing needs of the population. This is due to the outdated fleet, deteriorating infrastructure and inefficient structure of routes for various types of public transport (trolleybuses and buses with different seating capacities). The growing demand for public transport services, in particular in the capital, is partially met by unlicensed private companies that operate without proper control by the authorities, cause traffic problems and impede road safety.

Recommendation 12.3:

The Government, in cooperation with local authorities, should intensify its efforts to develop sustainable transport systems, including public transportation, by:

- (a) Continuing the rehabilitation and enlargement of trolleybus networks and developing other low-emission urban transport modes (trams, light rail, etc.);
- (b) Modernizing the bus fleet, in particular by replacing minibuses for 12–15 passengers used for both intercity and urban transport by larger buses and coaches with capacity of at least 40–50 passengers;
- (c) Improving urban transport planning, optimizing traffic management and public transport routes;

Tajikistan is not yet party to two ECE agreements in the area of vehicle regulation that are of particular importance for environmental protection and road safety – the 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of such Inspections. At the same time, Tajikistan is already indirectly using many provisions of these Agreements through national and inter-State (CIS and EEU) standards that have been transposed into national legislation. The implementation of these legal instruments will contribute towards the improvement of the environmental performance and roadworthiness of vehicles travelling on the roads of Tajikistan.

Recommendation 12.4:

The Government should accede to:

- (a) The 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions;
- (b) The 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections.

Chapter 13

HOUSING AND UTILITIES SECTOR AND THE ENVIRONMENT

13.1 Overview of the housing situation

Level of urbanization

As of 1 January 2015, the total population of Tajikistan was 8.352 million (figure 13.1). This represents an increase of 24.3 per cent compared with the beginning of 2005. The total urban population is 2.215 million and the total rural population is 6.136 million. Over the past decade, urban and rural areas have seen an increase in their population of 24.45 per cent and 24.25 per cent, respectively.

The level of urbanization in Tajikistan is low. As of 1 January 2015, the urban population accounted for only 26.5 per cent of the total population of the country, and this figure remained unchanged from 2005.

There are 74 urban settlements. According to the national classification, these include:

- 4 cities (population of 100,000 or more);
- 6 large towns (population of 40,000 to 100,000)

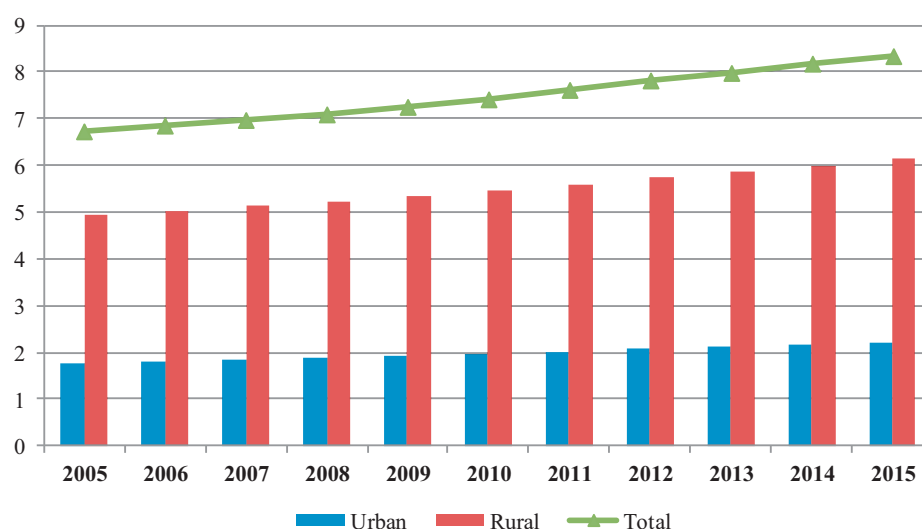
- 34 medium-sized towns and settlements (population of 10,000 to 40,000)
- 30 small towns and settlements (population under 10,000)

Tajikistan's capital, Dushanbe, is the largest city by population, with 788,700 inhabitants as of 1 January 2015. Three other large cities are Khujand, the administrative capital of Sughd Oblast (pop. 172,700), Kurgan-Tyube (pop. 102,900) and Kulob (pop. 101,200) – both located in Khatlon Oblast.

Large towns include Isfara (pop. 46,900), Istaravshan (pop. 59,900), Kannibadam (pop. 49,700), Penjikent (pop. 40,600), Tursunzade (pop. 52,400) and Vakhdat (pop. 42,200).

There are 370 jamoats (small rural hamlets) in Tajikistan. Of these, 43 are in Gorno-Badakhshan Autonomous Oblast, 93 in Sughd Oblast, 133 in Khatlon Oblast and 101 in the districts under republican subordination.

Figure 13.1: Resident population, 2005–2015, million



Source: Statistical book "Size of Population in the Republic of Tajikistan as of 1 January 2015", Agency of Statistics, 2015.

Population density in urban centres

As of 1 January 2015, the average population density in Tajikistan was 58.6 people per km². Due to Tajikistan's mountain terrain, its territory is not evenly populated. Gorno-Badakhshan Autonomous Oblast is the least populated part of the country (3.3 people per km²). The highest population density is in Dushanbe (7,887 people per km²). That city covers 0.1 per cent of the total area of the country and accounts for 9.4 per cent of the total population. Other cities and large towns have a much lower population density.

Housing stock

As of 1 January 2015, there were 90.2 million m² of housing stock (figure 13.2). There was a 52.5 per cent increase in housing stock during the last 10 years. Rural housing stock grew by 75.58 per cent and urban housing stock by 21.4 per cent. Total floor space in rural areas (59,617,000 m²) appears to be twice as large as total floor space in urban areas (30,572,600 m²). The maximum increase in the size of the rural housing stock took place in 2012–2013 because of housing construction funded by migrant remittances.

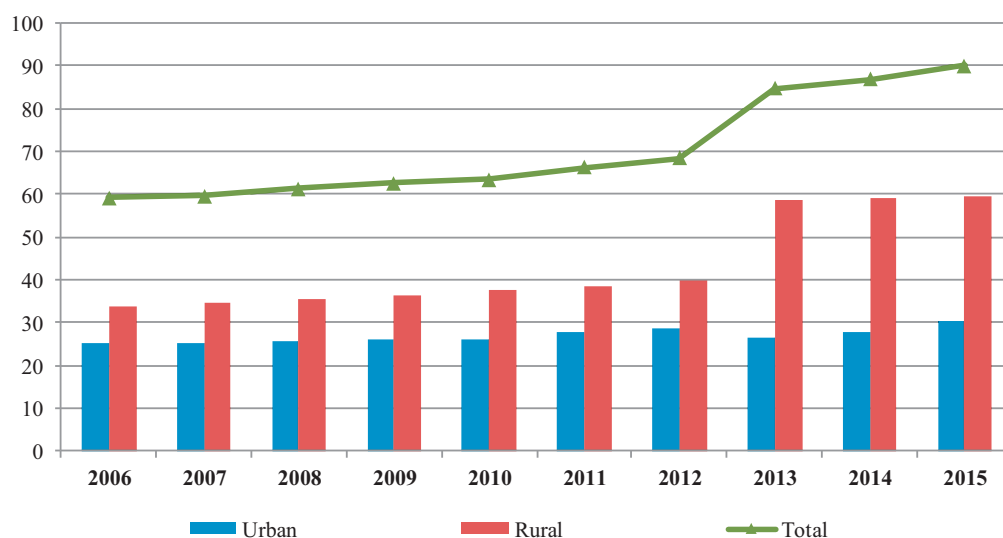
Information about technical conditions of the housing stock is based exclusively on data obtained through the population census held in September 2010 and published in 2013 by the Agency of Statistics. To assess housing stock and housing conditions in line with the recommendations provided by the United Nations, the Conference of European Statisticians and the Interstate Statistical Committee of the CIS,

the census questionnaire was designed and filled in on the basis of public survey.

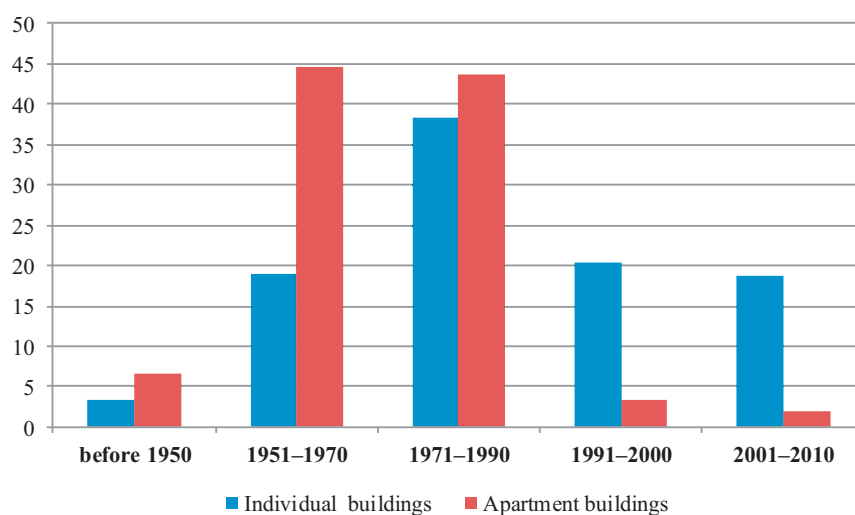
According to the 2010 population census data:

- The population living in individual (single-family) residential buildings accounts for 87.52 per cent of the total population of Tajikistan. Inhabitants of individual residential buildings make up 54 per cent of the urban population and 99.51 per cent of the rural population;
- The total number of individual buildings in Tajikistan is 915,225, of which 82.77 per cent are in rural areas and 17.23 per cent are located in towns and townships;
- The total number of apartment buildings is 9,778, of which 94.46 per cent are urban and 5.54 per cent are rural;
- In the city of Dushanbe, there are 3,001 apartment buildings (30.69 per cent of all apartment buildings in the country) and 38,427 individual buildings (4.2 per cent of all individual buildings in the country);
- Over 80 per cent of all individual buildings are made of raw bricks and adobe blocks, which appear to be not very durable materials; among apartment buildings, those with burnt brick walls are prevalent (50.65 per cent), along with those with concrete block and slab walls (39.36 per cent);
- 85.6 per cent of all individual buildings and 57.92 per cent of all apartment buildings have corrugated asbestos-board roofs, and 35.43 per cent of all apartment buildings have concrete roofs with bitumen coating.

Figure 13.2: Urban and rural housing stock, 2006–2015, million m²



Source: Statistical Book "Regions of Tajikistan", 2012, 2013, 2015; Tajikistan in Figures, 2013, 2015.

Photo 13.1: Multi-apartment and individual housing, Dushanbe**Figure 13.3: Buildings commissioned in various periods of time, percentage of total number of buildings in use at the end of 2010**

Source: The Republic of Tajikistan Population and Housing Census 2010. Housing Stock and Housing Conditions of the Population of the Republic of Tajikistan, Volume VIII, Agency of Statistics, 2013.

About 60 per cent of all individual buildings and almost 95 per cent of all apartment buildings have been in use for more than 25 years (figure 13.3). These include 22.48 of all individual buildings and 51.11 per cent of all apartment buildings that have been in use for over 45 years. Most residential buildings were constructed during the Soviet period

and were designed to have a short service life (not more than 50 years).

Durational exploitation along with low quality construction practices in respect of individual buildings, and inadequate maintenance of apartment buildings, are the underlying causes of the very poor technical conditions of a significant part of the

housing stock in Tajikistan, and also of a high demand for capital repairs. The technical deficiencies of apartment buildings almost entirely concern common (shared) property, such as roofs and roof drainage systems, foundations, facade walls, doors and windows of entrances, and water and sewerage pipes. A considerable amount of heat is lost through enclosure (outside walls and windows) of bearing-wall buildings. Although, according to data presented in the Programme of Development of the Housing and Utilities Sector for the period 2014–2018 (2014 Resolution of the Government No. 506), only 10,600 m² of floor space are worn out, and 6,500 m² of floor space are in critical condition, independent experts argue that, in 2008, the share of worn-out apartment buildings had already reached 40 per cent of all apartment buildings and 50–80 per cent of worn-out apartment buildings were in need of urgent repair. Since then, no programmes of capital repair or modernization of apartment buildings have been carried out, so their technical conditions have continued to deteriorate.

New housing provision

As of the end of 2014, the average floor space per capita was 10.9 m², which is below the social norm of 12 m² established by the 1997 Housing Code. Per capita floor space figures for urban areas tend to be better than for rural areas (13.9 m² and 9.8 m² per capita, respectively). The provision of housing per person has improved since 2009, when the mean value of per capita floor space was 8.5 m² (13.3 m² per capita in urban areas and 6.8 m² per capita in rural areas). The improvement of housing provision in rural areas is achieved by considerable self-build construction of single-family houses. In cities and towns, housing construction is mainly led by the private sector and aimed at wealthy customers; a decent housing market remains unaffordable for average households because of their low annual incomes.

According to the Housing Code, people who need to have their housing conditions improved are eligible for provision of dwelling units from state or public housing stock as prescribed by the legislation. At present, however, there is neither a policy nor a state programme for development of social housing and affordable housing for rent. Budget funding of new construction projects for those recognized as being in need of housing improvements is scarce. There are a few cases of certain institutions and agencies, supported by khukumats (local authorities), building houses for their employees (teachers, military service persons, young specialists).

New construction projects are mainly financed by individuals from their own funds. In some cases, they may take out loans, including soft loans intended for certain groups of the population. Migrant remittances form the major source of financing of new construction projects. In urban areas, developers give away 10 per cent of new residential buildings, financed from private investment, to local authorities who then provide the dwelling units to eligible individuals on a waiting list. Over the years of active construction, the scheme helped provide a significant number of apartments as public (social) housing, especially in the city of Dushanbe. The lack of land plots for new developments within the boundaries of the city gave rise to construction of high-rise residential buildings, which replaced old stock in the central part of Dushanbe. Upon agreement with the owners of apartments in the buildings that are subject to demolition, the developers undertake to provide them with new apartments in place of the old ones after completion of new construction, and to cover costs of the rent while the construction is in progress.

The highest levels of apartment building construction took place in 2010, 2013 and 2014. In 2015, the earnings of labour migrants from Tajikistan in the Russian Federation declined drastically against the backdrop of financial crisis. Eventually, new construction projects in Tajikistan were put on hold, and even the projects in progress were suspended. The provision of public (social) housing discontinued.

Opportunities to receive public (social) housing or new apartments in place of old ones in buildings subject to demolition are available in cities, where private developers conduct intensive housing construction. Yet such opportunities are not available in small towns, townships and rural areas. In rural areas, land plots are provided for construction of individual buildings to those dwellers who need to have their housing conditions improved. Although the legislation requires that land plots intended for new construction projects are equipped with already developed technical infrastructure, local authorities, especially in rural areas, appear to be unable to do so because of the lack of finance. The practice of land allocation continues, however, to help people provide themselves with housing.

Construction of new dwelling units in rural and urban areas also involves the building of extensions to and alteration of the existing individual buildings within the boundaries of the previously allocated land plots.

Performance of construction works in respect of apartment buildings and individual buildings in urban

settlements is carried out under the supervision of territorial inspectorates of the Committee on Architecture and Construction under the Government. In rural areas, construction of individual buildings by dwellers themselves, departing from construction design documentation (which is a mandatory requirement for the allocation of a land plot for the purpose of housing construction), still tends to be a widespread practice because of the lack of training and shortage of inspectors in the oblast and district construction inspectorates.

Resettlement from areas prone to natural disasters

Resettlement of people from areas prone to natural disasters poses a special problem. Each year, many residential buildings in Tajikistan are damaged to different degrees as a consequence of natural disasters (table 13.1).

Tajikistan has some experience in addressing natural disasters. For example, in 2010, over 600 houses with basic living services were built in less than nine months in order to assist the victims of flooding in the east of Khatlon Oblast.

According to the Perspective Plan of Resettlement of Households from Critical Zones of the Republic of Tajikistan (1999 Resolution of the Government No. 344), 7,664 households were to be resettled in the period 2000–2004 and 5,240 households were to be resettled in the period 2005–2010 throughout the whole country. In fact, 3,200 households were relocated in the period 2005–2009. There are no data available in respect of people resettled after 2009.

Pursuant to the 2010 Resolution of the Government No. 201 "On procedures of realization of ecological migration in the Republic of Tajikistan", the population of territories with the status of an environmentally hazardous area (which is assigned by the Main Administration on Geology under the Government when there is a threat of avalanche, landslide, mudflow, flooding, etc.) have to be resettled to new locations assigned by the State

Committee on Land Management and Geodesy and its district departments. According to data of the Committee on Emergency Situations and Civil Defence (2015), 1,136 hazardous areas are defined and approximately 25,000 people reside there. Official sources assert that often people express their unwillingness to be resettled because they want to live in the houses of their ancestors.

Forced resettlement usually means moving people from one rural area to another. Past resettlement projects often turned out to be ineffective: the resettled households were not satisfied with their living conditions in the new location (due to insufficient financial support for construction of houses there, inappropriate quality of soil in the allocated land for agriculture, lack of employment opportunities, etc.) and moved away from it.

Informal settlements and illegal constructions

Tajikistan's officials and representatives of the NGO sector report that the problem of illegal construction and informal settlements is currently non-existent. At the same time, there remains the problem of previous spontaneous individual housing. The Master Plan of Dushanbe (approved in 1983 and adjusted in 2010) provides for demolition of the "kibit" buildings made of traditional cob material in the central part of the city, which have total floor space estimated at about 750,000 m², with an eye to using the land for construction of multi-storey residential buildings.

Progress with achievement by Tajikistan of Target 7.D under the Millennium Development Goals is described in box 13.1.

13.2 Housing and communal services and green areas

Provision of communal services and state of utility infrastructure

The most complete information about housing amenities and access of households to communal services is provided by the 2010 population census (table 13.2).

Table 13.1: Residential buildings affected by natural disasters, 2003, 2009–2014

	2003	2009	2010	2011	2012	2013	2014
Affected residential buildings, units	8 896	2 543	4 425	1 007	1 623	314	283
of which,							
totally destroyed	883	500	646	57	217	110	50
Intended for resettlement, households	383	1 090	1 492	33	236	..	..

Source: Environmental Protection in the Republic of Tajikistan, Agency of Statistics, 2014 and 2015.

Box 13.1: Target 7.D under the Millennium Development Goals

In the Living Standards Improvement Strategy for the period 2013–2015 and a number of other strategic documents, the Government defined the national priorities for achieving MDG Target 7.C: "Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation". However, the strategic documents fail to address Target 7.D: "Achieve, by 2020, a significant improvement in the lives of slum dwellers". "Slum dwellers" implies households lacking one or more of the following five characteristics: access to improved water; access to improved sanitation; sufficient living area (not more than three persons share a room); durability of housing, and security of tenure. Taking into consideration the high proportion of individual buildings made of beaten cob and adobe brick, and poor access of dwellings to basic sanitation, along with extremely substandard per capita floor space, which is indicative of the lack of sufficient living area, attaining Target 7.D was and still is the priority for Tajikistan.

Table 13.2: Housing amenities and access of households to communal services, 2010, per cent

Dwelling units with access to	Total	Urban		Rural
		Total	Dushanbe	
Electricity	97.76	100.00	100.00	96.96
Heat supply				
Central heat supply	0.92	3.48	9.65	0.00
Individual devices, boilers	6.70	11.71	17.01	4.91
Stove heating	74.57	36.66	11.53	88.12
Electrical space heaters	17.71	48.01	61.65	6.87
No heating	0.11	0.13	0.15	0.10
Water supply				
Central water supply system	22.19	66.26	83.72	6.44
On-site water supply system	6.17	7.55	6.73	5.68
Outside water supply, standpipe	19.71	13.30	7.49	22.00
Well, borehole, other source	45.77	9.74	2.06	58.65
No water supply	6.15	3.15	0.00	7.23
Hot water supply				
Central hot water supply	0.84	3.19	8.85	0.00
Individual water heaters	22.49	39.69	57.60	16.34
No hot water	76.67	57.12	33.54	83.66
Bath and/or shower				
Bathtub/shower in a dwelling unit	17.11	50.93	68.89	5.02
Bathtub/shower outside a dwelling unit	30.89	24.77	24.54	33.08
Bath-house, sauna	7.17	5.71	4.04	7.69
No bath or shower	44.83	18.59	2.53	54.21
Sanitation (sewerage)				
Central sewerage system	15.40	49.30	68.42	3.28
On-site sewerage facilities, including septic tanks	6.42	7.75	6.11	5.95
Via a system of sewerage pipes into pit latrines, rivers	9.77	8.13	6.19	10.35
No sewerage	68.41	34.82	19.28	80.42
Toilet				
Flush toilet in a dwelling unit	13.47	47.63	65.36	1.27
Toilet of other type in a dwelling unit (including a waterless dry flush toilet)	2.62	5.27	6.46	1.68
Toilet outside a dwelling unit	82.86	46.39	28.04	95.90
No toilet	1.04	0.71	0.14	1.16
Household waste removal				
Via garbage chute	0.55	2.08	5.03	0.00
By a garbage removal truck	8.66	18.40	11.54	5.17
Garbage containers outside a dwelling unit	22.71	60.42	78.01	9.24
To garbage dump, garbage pits, etc.	68.08	19.10	5.42	85.59
No waste removal	0.00	0.00	0.00	0.00

Source: The Republic of Tajikistan Population and Housing Census 2010. Housing Stock and Housing Conditions of the Population of the Republic of Tajikistan, Volume VIII, Agency of Statistics, 2013.

Photo 13.2: Poorly maintained multi-apartment housing stock, Dushanbe

Electricity supply

All the urban population and 96.96 per cent of the rural population have access to electricity. The lack of reliable supply of electric power during winter remains a major problem. Every year, about 70 per cent of Tajikistan's population suffers from severe power outages in winter. Demand for electric power grows in winter because about 30 per cent of the population uses the electricity for heating purposes while, at the same time, HPPs reduce power production. Strict limitations are imposed in winter: consumers have access to electricity only three to seven hours a day across all regions, with the exception of Dushanbe and Gorno-Badakhshan Autonomous Oblast.

Heating

The central heating system developed during Soviet times has almost completely collapsed throughout the country, with the exception of the central districts of Dushanbe. Almost all urban dwellers living in apartments have switched to the use of electric power for heating purposes, while those living in individual

buildings rely on electric power, coal and wood. Rural dwellers use stove heating (88.12 per cent of the total rural population, according to one survey) and rely on wood, bricks of dry dung and coal for fuel.

Water supply

A number of urban settlements – Hisor, Istaravshan, Khujand, Konibadam, Kulob, Kurgan-Tyube, Panj, Shaartuz, ShakhriNAV, Tursunzade and Vakhdat – rely almost entirely on groundwater for water supply purposes. On the whole, groundwater accounts for 90 per cent of the total water taken from natural resources for supply of water to households. Groundwater tends to be of good quality and suitable for drinking. But certain water supply wells, especially in Sughd Oblast, provide substandard groundwater with excessive salinity levels, exceeding 1,000 milligrams per litre, and with hardness of over 10 moles per litre. Only water companies (vodocanals) located in cities and large towns (Dushanbe, Guliston (formerly, Kayrakkum), Khujand, Kurgan-Tyube, Kulob) monitor the quality of groundwater. Low-capacity water supply systems

relying entirely on surface water are found in Nurek (situated in Ayni District), the administrative centres of Gorno-Badakhshan Autonomous Oblast and Yavan District. Other centralized water supply systems use a combination of surface water and groundwater.

Information in respect of access of households to drinking water differs in various sources. According to the 2010 population census, 6 per cent of the total population was deprived of access to drinking water. Central water supply services are reported to be accessible to 22.19 per cent of the total population, including 66.26 per cent of the total urban population (in Dushanbe, 83.72 per cent) and a mere 6.44 per cent of the total rural population. More than 80 per cent of the rural population relies on sources such as standpipes, wells, boreholes etc. for water supply purposes. According to figures from the Programme of Development of the Housing and Utilities Sector in the Republic of Tajikistan for the period 2014–2018, central water supply services are accessible to 87 per cent of the population of towns, 61.5 per cent of the population of townships and district centres, and 43.4 per cent of the population of villages.

About 30 per cent of Tajikistan's population takes water from open irrigation ditches, small river tributaries and irrigation canals, which can hardly be regarded as improved and safe water use. Despite significant efforts by the Government and international donors in respect of safe water supply, the indicator remains high, due to population growth.

Apart from uneven access to safe drinking water, there is a problem of water shortages. Only in Dushanbe and Khujand do households have round-the-clock access to drinking water. Households with on-site water supply systems or in-yard standpipes technically have access to improved drinking water; at the same time, they encounter the problem of unsustainable water supply and low water pressure, especially in autumn, winter and spring. For small and medium-sized towns, water supply time ranges from 2 to 4 hours a day in autumn, winter and spring, and increases to up to 16 hours a day in summer. Even in summer, in the absence of electricity shortages, the supply of water according to a schedule becomes more and more widespread (taking into account the actual collection rate of utility charges, water companies compensate for their losses in this way). Apart from the fact that scheduled water supply causes users problems, this also adversely affects the quality of water, since disconnection of water supply systems entails the infiltration of polluted groundwater into the systems. This accelerates the wear and tear of water supply systems

because of a "water hammer" effect, emerging as a result of water shortages, and damages pumping equipment. Households in multi-storey apartment buildings have to replace shut-off and control valves in their dwelling units once or twice a year, because the frequent water hammer effect results in water losses and quickly renders the shut-off and control valves inoperative, although the service life of such equipment is normally up to five years.

According to the 2010 population census, only 22.49 per cent of the total population has access to hot water supply. In Dushanbe, only residents in certain areas can enjoy hot water. For supply of hot water, inhabitants mostly rely on their individual water heaters. Only 50.93 per cent of the urban population (69 per cent of the population in Dushanbe) and a mere 5 per cent of the rural population live in dwelling units with a bath tub or shower.

Sewerage

The situation in respect of central sewerage systems is significantly worse than with central supply of cold water. Only 49.3 per cent of the total urban population (in Dushanbe, 68.42 per cent), and only 3.28 per cent of the total rural population have access to a central sewerage system (2010 population census). Of 62 towns, district centres and townships, only 29 have central sewerage systems. In rural settlements, central sewerage systems appear to be almost non-existent, with the exception of buildings constructed to form a unified complex with hospitals, plants and other facilities.

In-house sewerage systems are not available to 34.82 per cent of the urban population (19.8 per cent of the population in Dushanbe) and 80.42 per cent of the rural population. According to the 2010 population census, 46.39 per cent of the urban population and 95.9 per cent of the rural population use toilets outside their dwelling units.

Water supply and sanitation services providers

Water supply and sanitation services are a monopolistic sector in Tajikistan. The SUE "Housing and communal services" (KMK), as a provider of water supply and sanitation services, covers most of the territory of Tajikistan. KMK operates via its 35 subsidiary enterprises of water supply and sanitation, 20 housing and utilities enterprises with water supply and sanitation divisions, and 17 rural water supply enterprises previously held by the state enterprise "Tajikobdehot" and later handed over to KMK. Assets of water supply and sanitation companies

comprising KMK are in republican ownership. KMK uses the assets by the right of economic management.

In the cities of Dushanbe, Khujand, Nurek and Rogun and in Faizabad District, other enterprises, accountable to local governments, provide water and sanitation services. In Nurek, the subdivision of the HPP, owned by the state energy company Barki Tojik, is the provider of water and sanitation services.

Technical condition of utility infrastructure

Urban water pipes of central water supply systems extend for a total of 3,000 km. About 95 per cent of water pipes were laid before 1980. Water supply systems are estimated to be 60–70 per cent worn out. Until recently, technical maintenance and repair of water supply systems has not been an issue of high priority. The amount of finance provided to fund the related projects has not been sufficient. Over a number of years, water distribution systems and pipes within buildings have rarely been replaced. Refurbishment works have been almost non-existent. This caused extremely high numbers of breakdowns. In most urban areas, the rate of breakdowns currently ranges from 2.8 to 3.7 breakdowns per 1 km of water pipes per year. Every year, about 7,400 breakdowns are reported to have occurred in water pipes across the country. This figure represents 2.9 breakdowns per 1 km of water pipes. In Dushanbe, some 1,890 breakdowns take place every year, a rate of 3.7 breakdowns per 1 km of water pipes (the commonly acceptable rate is 0.2–0.3 breakdowns per 1 km of water pipes per year).

The situation in respect of rural water supply infrastructure appears to be the most dire. The shortage of safe drinking water in most rural settlements is caused not so much by insufficiency of water as by deterioration of the infrastructure. In fact, 68 (54 per cent) of 125 water supply systems in the Kurgan-Tyube zone do not operate. In Bokhtar District, 13 of 14 water supply systems are reported to be out of order and are not in operation. Over the past 15–20 years, facilities and systems have neither undergone adequate technical maintenance nor demonstrated smooth performance. Of 173 drinking water wells constructed in various parts of the country at different times, 112 are abandoned because of breakdowns. Water pipe networks previously owned by collective farms (kolhoz) and state farms (sovhoz) (2,164 km of water pipes, 241 intake facilities, 369 boreholes and 184 water chlorination facilities) currently stand idle, and most of these facilities lost their owners as a result of reforms. Nevertheless, in certain rural districts (e.g. Kabad, Vakhdat and Vakhsh Districts) local

communities finance, maintain and extend water supply systems. Some international donors provide targeted small grants to rural communities for rehabilitation of water supply systems.

The length of sewerage conduits and networks extends to 1,363.1 km. Of this, 673.3 km have been handed over to KMK. The sewerage networks are 70 per cent worn out. Only one tenth of rural sewerage systems are reported to be in good working order. Of all rural sewerage systems, 5 per cent are partially operating and 85 per cent are non-operational. According to local experts, unlike water supply systems, sewerage systems are currently being paid less attention, and the projects aimed at rehabilitation of existing sewerage systems and wastewater treatment facilities and at creation of new systems and facilities in areas deprived of central sewerage systems are poorly financed.

Multi-apartment housing management and maintenance

Multi-apartment housing management

As a result of the privatization of state housing stock and the transfer of apartments into individual ownership on the payment of shares in housing cooperatives and construction of housing for private investment funds, the share of state housing stock and housing cooperatives declined to 2.5 per cent of the total housing stock in Dushanbe, 0.8 per cent of that in Gorno-Badakhshan Autonomous Oblast, 3 per cent of that in Sughd Oblast and 1.5 per cent of that in Khatlon Oblast, as of 1 January 2015.

As prescribed by the 2009 Law on Maintenance of Apartment Buildings and on Home Owners Associations, the owners of residential and non-residential premises in apartment buildings shall decide on one of three methods of management of common property: (i) directly by the owners themselves; (ii) by a home owners association (HOA), which may carry out the management function single-handed or may hire a management organization or a manager; or (iii) by a management organization or a manager under a contract with the owners.

In pursuance of the Law, the municipal authorities of Dushanbe adopted several resolutions to facilitate the establishment of HOAs (2009 and 2011 Resolutions of the Chair of the City of Dushanbe No. 603 and No. 471, respectively). Over a number of years, the Union of Consumers of Tajikistan has supported the creation of HOAs within the framework of projects financed by international donors. Still, the Law is

implemented only to a certain extent and has not brought about real reforms in respect of the management and maintenance of apartment buildings.

According to KMK data, as of 1 January 2015, 48 apartment buildings in Dushanbe were under the direct management of owners of dwelling units. Again according to KMK data, a mere 120 HOAs have been created nationwide: 56 in Dushanbe, 48 in Khujand, 9 in Buston (formerly, Chkalovsk), 6 in Kurgan-Tyube and 1 in Kulob. Yet, as reported by the Union of Consumers of Tajikistan, the number of HOAs is twice that reported by KMK, and includes 120 HOAs in Dushanbe and 96 HOAs in Khujand, although not all of them operate at present.

Over the five years following the adoption of the Law on Maintenance of Apartment Buildings and on Home Owners Associations, no competitive environment enabling the provision of management and maintenance services by management organizations was created. Some state housing maintenance organizations (SHMOs) have been transformed into management organizations; however, these are not selected by the owners and operate without concluding a contract with the owners.

Only one private management organization has been established in Tajikistan – ZAO "City-Service". As of early 2016, it provides management services in respect of eight new high-rise apartment buildings in Dushanbe.

Apartment building maintenance

SHMOs do not carry out regular maintenance work or repairs in respect of common property in apartment buildings, not least because of the low service fees for their services set by the authorities, and also due to the absence of agreements on the list of services and fees with the owners of dwelling units in apartment buildings. SHMOs are responsible for cleaning the common areas and perform the functions of a passport office, such as procedures of registration (deregistration) of place of residence, issuance of various statements and certificates, cooperation with military enlistment offices and dealing with the community in general (some SHMOs employ community advisors and educators).

Those HOAs that are actually operating perform repair works and provide maintenance of outdoor spaces funded by regular payments by the owners of dwelling units (box 13.2).

Photo 13.3: Water trough in Dushanbe



Box 13.2: Outcome of operation of the HOA "Namoyon"

In "Namoyon" HOA (Dushanbe), a monthly fee of 0.2 somoni per m² of floor space yields 15,000 somoni of common funds each year. Over five years of existence of the HOA, using these funds, reliable metal doors were installed at the entrance halls; wooden window panes were replaced with plastic ones; sewer pipes in the basement were replaced; and a table, benches and litter bins were installed in the yard. A mini-football field was established in the yard with financial support from one of the dwelling unit owners. The possibility of installing a stand-alone boiler for supply of hot water was discussed, but the owners recognized that the project was too expensive (about US\$50,000) and had to drop the idea.

*Energy and water efficiency*Types of central/district heating

According to the 2015 study by the World Bank, "Keeping Warm: Urban Heating Options in Tajikistan", central heating and small boiler houses cover only 8 per cent of the households in urban areas of Tajikistan, and are characterized by poor service quality and supply reliability. The majority of the central heating systems in Tajikistan are no longer in operation due to rising natural gas prices, interruptions in natural gas supply and the poor condition of the heating infrastructure. Most houses connected to a central heating system have a direct connection to the system with an intra-house elevator pump or a group substation. Temperature is controlled at the heat source only. Building-level metering and apartment-level thermostats are largely non-existent. This results in frequent under- or overheating of buildings. End consumers are billed based on their floor space rather than actual consumption. Along with the low tariffs, these billing practices provide no incentives to end consumers to save energy.

With respect to buildings previously served by a central heating system, it is estimated that about 80 per cent of a building's internal heating infrastructure (e.g. radiators and pipes) has been dismantled by residents because a large part of the central heating system has been out of operation for a long time. This represents a major challenge for implementation of the Government's plans for rehabilitation of the central heating network, given the high investment costs associated with replacement of radiators and intra-building networks.

New apartment buildings constructed in accordance with the construction standards rely on a heating system that is meant to be connected to a central heating network (with a view to construction of new and rehabilitation of existing CHPs and boiler houses).

Insulation and thermal modernization of "old housing"

Most residential and public buildings in Tajikistan are characterized by low energy efficiency due to poor technical conditions and insufficient thermal insulation of outside walls, top and first floors, and high air permeability through windows and doors. In many cases, the internal heating systems of buildings connected to district heating systems or boiler houses are in poor condition, which leads to uneven heating within buildings and contributes to underheating. Energy audits indicate that there is a significant energy saving potential in residential buildings, estimated to range between 30 and 40 per cent.

Within the framework of the project Improving Energy Efficiency in Residential Buildings in Dushanbe, supported by USAID (2012) (box 13.3), energy consumption and potential for energy efficiency in apartment buildings in Dushanbe were assessed. The study revealed that more than 95 per cent of all the residential buildings fail to conform to the current thermal insulation standards. Not only the panel buildings that were built in huge numbers in the 1970s and 1980s, but also four- to five-storey brick buildings with better thermal characteristics, need to have their thermal insulation improved. The new high-rise buildings constructed on the basis of monolithic technology with improved thermal insulation are an exception. Poor thermal performance of the envelopes of most residential buildings causes increased heat losses. At the same time, the findings of the assessment suggest that the current energy consumption in apartment buildings in general and, in particular, for space heating, is much lower than in many countries, though, in recent years, an upward trend emerged. Moreover, the energy consumption for space heating is significantly below the level needed to maintain comfortable living conditions. This is explained by the fact that people use electrical heaters to warm the living space when they are in an apartment and to warm only a part of their dwellings.

Box 13.3: Energy efficiency improvements in apartment buildings

A pilot project on thermal insulation of a four-storey building in Dushanbe was implemented within the framework of the project Improving Energy Efficiency in Residential Buildings in Dushanbe, supported by USAID. The pilot project revealed that complex measures on thermal insulation of buildings can significantly reduce the consumption of electricity by residents for heating needs. Yet, at present, these measures are not financially attractive, due to both relatively low energy tariffs and the fact that current energy consumption is significantly below the estimated level needed to maintain comfortable living conditions. Electrical energy savings in monetary terms, estimated based on current tariffs, allow for recovery of the capital costs of complex building insulation over more than fifty years. Incentives for carrying out complex thermal insulation of residential buildings may encompass improvement of living conditions, expansion of living space in apartments through insulated terraces and loggias, and an increase in the market value of apartments.

Source: Analysis of Energy Consumption in the Multi-Apartment Residential Buildings of Dushanbe and Assessment of Potential for Energy Efficiency, USAID, 2012.

The report "Assessment of Household Energy Deprivation in Tajikistan: Policy Options for Socially Responsible Reform in the Energy Sector" by the World Bank (2014) suggests that poor households in both urban and rural areas actively adopt low-tech, low-cost energy saving measures. These include heating only one room in a house (where almost the entire family lives during the winter), lining walls with carpets and sealing windows with polyethylene sheets. More technologically advanced options, such as plastic windows, foam insulation and energy efficient appliances, are known but largely unaffordable, even for middle-income households.

Energy efficiency of new housing

Design institutes subordinated to the Committee on Architecture and Construction have been recently tasked with developing designs of energy efficient buildings for urban and rural areas based on the application of various technical solutions. Following the required assessment and testing procedures, these designs could be approved as standard building designs. This measure should create the enabling environment for the construction of energy efficient buildings, including by individual developers in rural areas.

Electricity saving

With the aim of promoting energy efficiency in various sectors of the economy, including housing, the Government introduced measures to restrict the manufacture, import and sale of incandescent lamps. The 2009 Decree of the President No. 653 requested all government, industrial and commercial organizations to switch to the use of energy saving lamps from 1 May 2009. About 241,000 poor households were provided with energy saving lamps, financed from the state budget.

Metering of water consumption

In 2012, the demand for water produced by water supply companies decreased by 16–18 per cent compared with 1989, and even declined by 30 per cent in some cities, due to a reduction in industrial water use and discontinued supply of hot water. In 2012, central water systems abstracted 374.8 million m³ of water and, of that amount, delivered 199.9 million m³ (53.34 per cent of the total water abstracted) to consumers, including 92.6 million m³ to households. Together, water losses and unaccounted-for water represent 46.66 per cent of the total water delivered to water supply networks. According to KMK, water losses occur mostly in the building blocks, yard and in-house water systems.

Statistics indicate a decline in domestic per capita water use from 22.9 m³/year in 2009 to 12.8 m³/year in 2014 (in Dushanbe, 83.1 m³/year and 65.7 m³/year, respectively). However, these data cannot be considered reliable since they are not sourced from metered domestic water consumption.

Metering of domestic water consumption functions only in Dushanbe, and then only partially. As of 1 January 2015, 12.8 per cent of the water meters required throughout the country were installed.

Water supply rehabilitation projects supported by international donors envisage the installation of water meters in residential buildings. In Khujand, with support of the EBRD-financed project, as of early 2014, 93.1 per cent of apartments in apartment buildings and 64.6 per cent of single-family houses had installed water meters. Installation of water meters to domestic users in Dushanbe is taking place as part of the ongoing project of the World Bank.

Municipal solid waste

In 2011, the Government approved procedures for collection and removal of industrial and municipal waste (2011 Resolution of the Government No. 279). According to the procedures, special container sites shall be installed in urban and rural settlements. The sites shall be covered with asphalt, lit, equipped with runoff and have easy access for inhabitants and transport operators. The number of containers needed shall be in conformity with waste accumulation standards. Food waste shall be placed in dedicated collection tanks marked "Food waste" and shall be subject to daily removal to farms under relevant contracts. In the absence of such a contract, food waste can be placed in containers for solid waste collection.

In recent years, a number of projects for procurement and installation of solid waste containers, supported by the EBRD and World Bank, have been implemented in Dushanbe, Khujand and Kurgan-Tyube. Agreements were reached with regard to financing waste management projects in Khorog, Kulob and Nurek. Inhabitants of small towns and rural settlements place their waste at collection points. Although the frequency of solid waste removal is regulated by sanitary standards, even in Dushanbe inhabitants complain about irregular waste removal. There are no organized solid waste collection and removal services in rural areas.

Specialized state enterprises accountable to local governments provide solid waste collection services in Dushanbe, Khujand and Kurgan-Tyube. In Dushanbe, a separate waste collection enterprise operates in each of the city's four districts. In other towns and townships, waste collection services are provided by enterprises within the KMK system. A common problem is the shortage of special vehicles for waste removal and transportation. Procurement of new machinery is financed with the support of international donors.

There is no separate collection of solid waste, with the exception of fluorescent lamps. Pursuant to the 2011 Resolution of the Government No. 97, KMK enterprises shall provide services across the country with regard to the collection and storage for further treatment of used lamps, while housing and utility enterprises, subordinated to local authorities, shall do the same in Dushanbe. A facility for treatment of used lamps, initiated in Dushanbe within the framework of the World Bank's project Solid Waste Management in Dushanbe, is expected to begin operations in the near future. Two other enterprises

engaged in the production of fluorescent lamps also have potential capacity for treatment of such lamps.

Though no official data are available, private entrepreneurs are reported to have gained some experience in respect of separate waste collection (paper, cardboard and metals).

According to statistics, in 2012, the housing and utilities sector produced 566,900 m³ of waste, of which street sweeping waste made up 465,000 m³. These figures represent 29.12 per cent and 23.89 per cent of total urban waste, respectively. Solid waste in urban areas contained food waste (35 per cent), plastics (27.3 per cent), leaves and other street sweeping waste (12 per cent), cardboard and paper (11 per cent), glass (7.7 per cent) and metals (5 per cent).

KMK reports annual increases in solid waste volumes. The current waste generation standards fail to reflect the current situation. According to KMK's assessment, the average daily volume of solid waste produced by one resident is 1.92 kg, equivalent to 700 kg/year; in the 1990s, it was estimated at 114 kg/year per capita. The Dushanbe City Division on Environmental Protection reports that, in 2014, solid waste removal volume reached almost 650 tons/day, which represents a 30 per cent increase on the 450–550 tons/day in 2013.

Rural areas generate solid waste in lesser volumes. Rural households tend to use most of their solid waste for domestic needs (as fuel) or in smallholder farming.

Drainage

For stormwater drainage Tajikistan relies on a network of open canals (aryks). Special stormwater treatment facilities are non-existent. If a town has a wastewater treatment plant, stormwater, together with domestic wastewater, is transported to it. In the absence of treatment facilities, stormwater is discharged into water bodies without any preliminary treatment. The Master Plan of Dushanbe (amended in 2010 and valid until 2030) provides for construction of a separate surface water gravity sewerage system designed to treat 70 per cent of annual low-intensity atmospheric fallout and 100 per cent of urban runoff at local surface water treatment plants.

Cleaning up common areas

Specialized landscaping enterprises accountable to municipal administrations provide cleaning services in the central streets and parks of Dushanbe and

Khujand, whereas SHMOs provide these services in uptown neighbourhoods. In the cities and districts assigned to KMK, the cleaning services are provided by enterprises incorporated into a network of KMK subsidiaries. A common problem is the shortage of special cleaning machinery, and vehicles are shared by various towns and cities across the country. Procurement of new cleaning machinery and vehicles is financed with the support of international donors.

Green areas

Large green areas in parks, mini-parks, alleys and street lawns, and gardens in land pots adjacent to housing are typical of urban settlements in Tajikistan. Green areas account for about 30 per cent of the total area of cities. In 2009, the total green area of Dushanbe made up 2,478 ha (19 per cent of the city's total area). When combined with watercourses, water bodies and water protection zones, it comprises 3,605 ha (taking into account the overlapping areas), covering almost 28 per cent of the city's total area. In conformity with construction standards and norms (SNIIP MKS-ChT 30-01-2007 "Town planning, physical planning, and settlements development"), a relative density of green areas with different functions shall account for at least 40 per cent of the total area if located within built-up areas, and not less than 25 per cent of the total area if located within residential or mixed-use areas.

Apart from perennial plants (trees and bushes), many seasonal flowers are planted out in central locations of towns and cities. Green areas of common use are poorly developed in peripheral areas of towns and cities. Local experts report a negative trend in the planting of new green areas in urban communities, especially in Dushanbe – the use of coniferous trees that do not provide protective shade, as well as European broad-leaved species that are vulnerable to the hot climate of Tajikistan, in place of native broad-leaved species.

13.3 Environmental pressures

Water

The housing and utilities sector is among major contributors to pollution of water sources. However, there are no data on the total quantity of contaminants discharged into water bodies and neither are there data on the share of discharges from the housing sector within the total pollution load of water bodies.

Water supplies to the population account for about 46 per cent of the total water supplied to all water user

groups. Wastewater withdrawn by central sewers, as a proportion of the total water supplied by water facilities, accounts for only 20 per cent (in areas serviced by KMK, this is 34.6 per cent). According to statistics for 2012, the share of treated wastewater is 87.51 per cent (about 71 million m³) of the total wastewater transported to sewage treatment facilities (about 81 million m³). The effectiveness of wastewater treatment facilities is assessed as low (40 per cent). KMK reports that about 80 per cent of wastewater treatment facilities (except those in Dushanbe and Khujand) do not meet technical requirements, so wastewater in urban areas undergoes only partial biological or mechanical treatment, following which it is discharged directly to water bodies.

In rural areas and suburban areas adjacent to cities, the use of uncovered pit latrines placed in yards is widespread, which adversely affects surface water and groundwater resources.

Solid waste landfills without a system for groundwater protection are another source of water pollution.

Air

For their domestic needs, Tajikistan's urban dwellers rely mainly on electricity generated by hydropower plants. However, 88 per cent of rural households and 37 per cent of urban households with limited access to electricity, not least because of low incomes, use stoves for heating and cooking. These stoves run on solid fuels (coal, wood, agricultural waste) and contribute to air pollution.

Most boiler houses of the remaining central heating systems operate at a fraction of their design capacity and are characterized by low efficiency and high emission of pollutants, partly due to their conversion from gas to coal without modern flue-gas cleaning systems.

There are no statistical data available on air pollution by the housing and utilities sector. If the contribution of the housing and utilities sector is assessed at nearly 50 per cent of total emissions of air pollutants, the sector's emissions amount to about 17,000 tons per year (120 kg/ km²).

Greenhouse gas emissions

GHG emissions produced by the housing and utilities sector come from fuel combustion, domestic wastewater treatment by sewage treatment facilities, and solid waste landfills.

The contribution of the housing and utilities sector to GHG emissions can be estimated on the basis of a GHG inventory conducted as part of elaborating a Sustainable Energy Action Plan for Somoniyon, a central town of Rudaki District. According to 2012 data, Somoniyon's housing sector ranks second for CO₂ emissions after the transport sector. Of total CO₂ emissions, estimated at more than 25,000 tons/year, residential buildings account for 24.4 per cent or 6,138 tons/year. Given that the housing and utilities sector releases about 30 per cent of the total GHGs, its contribution across the country may be estimated at approximately 3 million tons/year.

From 2010 onwards, as a measure towards solving the problem of seasonal shortage of energy resources and the need to replace gas imports, the country embraced the strategy of increasing the production and use of coal (chapter 5). In the coming years, this strategy is most likely to entail growth in CO₂ emissions.

Waste generation

There is an annual increase in the volume of waste generation by the housing and utilities sector in urban areas. There are no sanitary landfill sites corresponding to international standards in Tajikistan (chapter 7).

Stray animals

Tajikistan has not found a solution to the problem of stray animals. There is no practice of sterilization of stray animals and there are no shelters for stray cats and dogs. The number of stray dogs keeps rising due to favourable conditions at urban waste dumps. In 2015, over 11,600 cases of stray dogs attacking humans were registered, of which 10 attacks were fatal. Cases of rabies were registered in stray dogs and in people who were bitten by infected animals.

Removal of stray dogs from the streets of Dushanbe is the responsibility of the road maintenance departments of the four districts of the city. According to data provided by the departments, more than 2,400 stray dogs were killed in the first nine months of 2015. Dead stray dogs are buried in special pits at a landfill site located at the 10th km of the Dushanbe–Vakhdat highway.

Logging

Considering that stoves are the most common method used for heating in rural areas and in individual buildings in urban areas, illegal logging in the neighbourhood has become a common practice since

low-income households have limited access to coal and wood.

Land

Tajikistan is facing a shortage of land suitable and available for housing construction. The volume of housing construction, especially of individual buildings in rural and suburban areas, increased in an effort to match the needs of the constantly growing population, and may eventually cause a reduction in the agricultural land area.

Lowlands with a microclimate favourable for farming and development of urban and rural settlements cover a mere 7 per cent of the total territory of Tajikistan. Over 80 per cent of the total population lives in lowland regions. Human settlements now cover about 155,000 ha of land, whereas, in the period 1990–2012, they extended for 100,000 ha. There may be a further increase in the area of human settlements with subsequent expansion of their boundaries, due to the growing population and estimated increase in housing construction.

A specific problem associated with urban planning consists in finding locations suitable for construction of single-family housing – which appears to be the most popular type of mass construction in towns, townships and rural settlements – without detriment to land that may be efficiently used for farming purposes (lowland plains). Experts consider the use of foothill plain belt areas (adyr zone) for single-family housing construction to be the most effective solution to the problem. This necessitates the introduction of preliminary land development measures, aimed at preventing flooding and waterlogging, and the creation of utilities and transport infrastructure. It is recommended that new construction projects within the existing boundaries of settlements envisage more active use of habitable areas, which implies the demolition of dilapidated and obsolete buildings and facilities, infill construction, construction of high-rise buildings and use of vacant industrial estates and underground spaces, wherever possible.

The amended Master Plan of Dushanbe, valid until 2030, provides for an increase in the city's area to 36,000 ha (compared with 12,000 ha in 2010) and an increase in the housing stock floor space to 27.5 million m² (3.6 times more than in 2010), because of the projected increase in population to 1.2 million (compared with 731,100 in 2010). New residential construction projects envisaged by the Master Plan (of 20.6 million m²) include: high-rise buildings (10–30 storeys), 9 per cent of the total increase in housing

stock; high-rise buildings (6–9 storeys), 41 per cent; medium-rise buildings (4–5 storeys), 31 per cent; low-rise buildings (1–3 storeys), 2 per cent; and single-family houses with a backyard (0.04–0.06 ha), 17 per cent.

Noise and vibration

There are no data available in respect of noise and vibration from the housing and utilities sector.

Human health

In Tajikistan, there are incidences of waterborne diseases (chapter 14) because almost half the water pipelines in the country fail to meet sanitary standards in the absence of sanitary protection zones and decontamination facilities.

The reliance on stoves for heating causes indoor air pollution. Electricity shortages during winter force the population to use kerosene lamps and candles, which has negative effects on people's eyesight.

13.4 Legal, policy and institutional framework

Legal framework

The 1997 Housing Code mainly regulates housing relations regarding state and public housing stock (dwellings owned by collective farms, cooperative organizations, associations, trade unions and other public associations). The Code governs the issues related to lease of dwellings under rental agreements, and maintenance of and repairs to state and public housing stock. Although the Code determines the right to ownership of residential buildings and dwelling units, its provisions on management, maintenance and repairs of the common property in apartment buildings are largely general.

Since the current Housing Code fails to match the developments in the housing sector, numerous attempts were made in the past decade to develop a new housing code. Yet all the drafts have been rejected so far. Another draft of the new housing code is being considered by the Majlisi Oli. A special taskforce was set up to discuss and finalize the draft.

The 2009 Law on Maintenance of Apartment Buildings and on Home Owners Associations defines owners' rights and duties as these pertain to management and maintenance of the common property in an apartment building, and also provides for possible options in respect of common property management. The Law establishes a procedure for setting up a home owners association as a non-profit

organization, and for ensuring its operation. The provisions of the Law are similar to the provisions of laws on management of common property in apartment buildings and on home owner associations adopted in other countries.

According to the 2012 Code on Urban Planning, buildings, structures and facilities of social, industrial, transport and utilities infrastructure shall be constructed on the basis of the design documentation. The expertise of design documentation shall be conducted in a mandatory manner in respect of construction of buildings of more than three storeys.

The 2010 Law on Drinking Water and Drinking Water Supply provides that private enterprises and individuals may own water supply facilities. Central water supply systems are defined as vital facilities that shall be subject to governmental control. Water supply sources shall be also subject to supervisory control by the Government. Non-central and autonomous water supply systems may be established in the absence of access to central water supply services. Individuals and legal entities may become the owners of non-central water supply systems, and the owners may transfer the management of the facilities to individuals and legal entities on a contractual basis. The State shall supervise and certify the source, quality and safety of drinking water.

The 2013 Law on Energy Saving and Energy Efficiency stipulates the legal and organizational framework for the introduction of energy efficiency materials, appliances and technologies. The Law has provisions for introducing mandatory energy audits and establishing procurement procedures that incorporate criteria on energy efficiency, and requirements for energy use in buildings.

The main by-laws in this field include:

- Rules for using the communal water supply and sewerage systems in the Republic of Tajikistan (2011 Resolution of the Government No. 234);
- Procedures of state control and inspection of drinking water supply (2011 Resolution of the Government No. 679);
- Procedures of accounting methods in the drinking water supply sector (2011 Resolution of the Government No. 680);
- Rules for connection to engineering networks and utility systems (2014 Resolution of the Government No. 354);
- Procedures, conditions and methods of collection, disposal, decontamination,

transportation, storage and disposal of industrial and domestic solid waste (2011 Resolution of the Government No. 279).

Building standards and norms

The construction sector continues to rely on construction standards from Soviet times. These standards eventually undergo certain revisions and are translated into the Tajik language.

The first attempt at designing new construction standards and norms resulted in the adoption of SNIIP MKS-ChT 22-07-2007 "Anti-seismic construction" in 2007. The new standard was developed with consideration of the relevant experience gained in other countries (Armenia, Kazakhstan, the Russian Federation and Turkey). The standard establishes regulations for designing all types of buildings, including individual (single-family) beaten-cob houses in rural areas. As of late 2015, amendments to the SNIIP are prepared with due consideration of the existing practice in application of innovative technologies and materials.

A construction standard, SNIIP MKS-ChT 23-02-2009 "Thermal protection of buildings", was developed on the basis of the relevant Russian Federation standard. The standard establishes increased requirements for thermal insulation of outside walls, first-storey ceilings and bottom floors, and for the use of windows with enhanced thermal properties. Following the adoption of the SNIIP, every new project for construction of an apartment building envisages the use of thermal insulation materials in walls. Starting from 2015, fire safety agencies banned the use of polystyrene foam insulation for construction of residential buildings. This is to be replaced with mineral wool heat insulation.

Policy framework

National Development Strategy for the period until 2030

The National Development Strategy for the period until 2030 establishes major long-term policy objectives designed to improve housing conditions. The objectives include improving housing availability, enhancing the quality of housing through both high-quality new construction and capital repairs to the existing housing stock, better access to and performance of communal services, especially in rural areas, and ensuring the financial stability of housing and utility enterprises.

The Strategy envisages a per capita floor space target of no less than 17 m² by 2030. Taking into account a population forecast of 11,102 million in 2030, the total housing stock should reach 188,73 million m²; therefore, the housing stock is expected to double as compared with the beginning of 2015.

The Strategy encompasses measures geared towards the purchase of their own dwellings by individuals via the use of mortgage loans, construction cooperatives and offers of urban land plots for sale at a price affordable to medium-income households for the purpose of housing construction.

The Strategy does not seek to create a sector of social and affordable rental housing with the aim of meeting the needs of low-income households.

Living Standards Improvement Strategy for the period 2013–2015

The social section of the Living Standards Improvement Strategy for the period of 2013–2015 envisages the provision of "access to safe drinking water, sanitation and communal services, and the implementation of institutional reforms".

The following target indicators for 2015 have been defined to measure the implementation of the Strategy as it relates to the "Provision of access to safe drinking water, sanitation and communal services":

- Access of the urban population to drinking water – 96.2 per cent;
- Access of the rural population to drinking water – 56 per cent;
- Access of the urban population to basic sanitation – 51.0 per cent;
- Access of the rural population to basic sanitation – 39.0 per cent;
- Share of the housing stock with metering devices – 85 per cent;
- Share of the urban population with access to housing and communal services – 80.2 per cent;
- Share of the rural population with access to housing and communal services – 25.3 per cent.

By unofficial assessment, these target indicators were not reached as of the end of 2015.

Policy documents on housing

The Concept for Reform of the Housing and Utilities Sector for the period 2010–2025 (2010 Resolution of the Government No. 321) sets out the primary objectives, principles, procedures and phases of the

reform of the housing and utilities sector. It aims to create living conditions conforming to social standards, to gradually shift users from reliance on government subsidies to paying the full cost of communal services, to provide social assistance to low-income groups and to promote economic incentives to enhance the performance of communal services and improve access to communal services.

In 2014, within the framework of implementation of the Concept for Reform of the Housing and Utilities Sector for the period 2010–2025, the Government approved the Programme of Development of the Housing and Utilities Sector for the period 2014–2018 (2014 Resolution of the Government No. 506). The Programme aims at establishing a state body responsible for development and implementation of state policy in the sector. It is expected that some responsibilities will be assigned to local executive bodies, relevant standards, norms and regulations regarding the provision of housing and communal services will be developed, privatization in the housing and utilities market will be encouraged and public–private partnerships will be involved in utilities infrastructure management. It is planned to establish a fund to promote development of the housing and utilities sector as a financial mechanism intended for development of the sector with the support of international investments and private funds.

Urban planning

In line with the 2012 Code on Urban Planning, the Government shall develop and implement urban planning programmes and approve the General Settlement Scheme for the Republic of Tajikistan. Procedures for development of the General Settlement Scheme for the Republic of Tajikistan were approved by the 2014 Resolution of the Government No. 373.

Development of urban settlements and other settlements shall take place as provided for by their master plans. A master plan defines:

- Key policies for development of a settlement with due account given to socioeconomic specificities, environmental and climatic conditions and forecast population;
- Land use zoning and development priorities;
- Measures aimed at protecting a settlement from emergencies caused by natural and manmade disasters, and at developing utilities, transport and social infrastructures;
- Reserve land for development of a settlement;
- Settlement boundaries.

A settlement's master plan establishes the following zones: residential areas; public and business areas; industrial areas; utilities and transport infrastructure areas; recreation areas; agricultural areas; special designation areas; military and other restricted access areas; and suburban areas.

A settlement's master plan serves as a basis for developing the settlement's planning schemes. The latter, in turn, serve as a basis for designing the schemes for development of smaller areas within the settlement. Project design and construction works on a settlement's territory are prohibited in the absence of a settlement's master plan and other relevant spatial planning documentation.

Over the past five years, master plans for urban settlements have been undergoing revisions aimed at expanding settlement boundaries, and ensuring the consistency between land use zoning regulations and special land use conditions related to environmental and health aspects.

Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020

As the Government recognizes the dire state of water supply infrastructure and is committed to taking measures aimed at its renovation and rehabilitation, the Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 (2006 Resolution of the Government No. 514) has been approved and implemented. In a number of urban and rural areas, large projects focused on improving the technical condition of water supply infrastructure have been implemented in recent years with the support of international financial institutions.

National Action Plan on Climate Change Adaptation

There is no special policy on adaptation of the housing and utilities sector to climate change and mitigating the impacts of the sector on climate. Some climate change adaptation measures for use by the housing and utilities sector are included in the section "Climate Change Adaptation Measures for National Economy Sectors" of the Strategy for Adaptation to, Prevention and Mitigation of Climate Change, which is part of the National Action Plan on Climate Change Adaptation (2003 Resolution of the Government No. 259). The measures include:

- Introducing automated water distribution and consumption systems;

- Encouraging the use of water saving technologies in water supply practices;
- Moving to wider use of closed-drain systems and reuse of treated drainage water;
- Rehabilitating the systems that ensure supply of adequate drinking water and treatment of urban wastewater;
- Raising public awareness of the principles of sustainable water use and water saving, via mass media;
- Encouraging the participation of the public and water users in addressing issues relating to water management, water allocation and water saving;
- Mitigating the risk and impact of floods and other natural disasters, especially in areas with poor households and undeveloped infrastructure;
- Placing residential and public buildings in safe areas;
- Developing, in the long run, new architectural and construction solutions intended to ensure the required potential for adapting to climate change.

The above-mentioned measures were not widely implemented as of the end of 2015.

Economic and fiscal instruments

Tariff-setting in respect of the products produced by the enterprises that form natural monopolies (electricity, thermal power, water and sanitation) are set in compliance with the 2007 Law on Natural Monopolies. Tariffs for electricity and thermal power are developed by the state energy company Barki Tojik, checked by the Anti-Monopoly Service and approved by the Government. Electricity tariffs are differentiated by seven user groups, and tariffs for thermal power by three user groups.

Water supply and sanitation tariffs are developed by water companies located in Dushanbe and Khujand, and by KMK. The approval of water supply and sanitation tariffs is in the domain of the Anti-Monopoly Service, with tariffs set for three user groups. From 2014, water supply and sanitation tariffs for KMK enterprises are differentiated by groups of districts.

Approval of tariffs for waste collection and removal by the enterprises integrated into KMK is also the responsibility of the Anti-Monopoly Service. The tariffs differ according to the machinery used and the distance to a waste storage site. Tariff-setting in respect of municipal enterprises lies in the domain of local authorities.

In designing the tariffs, the enterprises rely on the Regulations for the calculation of the cost of goods

(works, services) of enterprises and organizations of the Republic of Tajikistan approved back in 1999 (1999 Resolution of the Government No. 210). The level of a tariff shall be set to cover the costs relating to operation, repairs and maintenance, as well as administrative costs and depreciation. In the event that an enterprise carries out an investment project financed by international investors, the tariffs may include the project costs (up to 15 per cent of the total tariff amount) incurred by the enterprise.

Tariffs for electricity and thermal power are revised once every two or three years. The last tariff revision took place in 2014. The electricity charge set for the population (households) is 12.6 dirams/kWh, the heating (thermal power) charge is 5.7 somoni/Gcal (an increase of 14.5 per cent on 2012). For water supply and sanitation services provided by Dushanbe water company in 2015, domestic users paid 0.325 (water supply) and 0.12 somoni per m³ (sanitation). The Khujand water company charged 0.85 (water supply) and 0.55 somoni per m³ (sanitation) in 2013. Tariffs for services provided by KMK set in 2014 range from 0.70 to 0.90 somoni per m³ for water supply and from 0.38 to 0.90 somoni per m³ for sanitation.

The estimates made by international investors and KMK indicate that charges for communal services fall short of covering the actual costs incurred by utility enterprises. This results in a continuous deterioration of assets, degraded performance and declining reliability of services. Low tariffs make the utilities sector dependant on direct subsidies from the republican or local budgets, and unattractive for private investment.

The new electricity pricing methodology was developed under an EBRD-financed project with the participation of the Ministry of Energy and Water Resources. The methodology is being reviewed by the Government. The Government has signed an agreement with the World Bank whereby it will gradually implement the electricity tariff increase until 2025.

Tariffs for communal services for the population have a social dimension and are cross-subsidized by other users. Some residential consumer groups are granted benefits to cover utility charges. Utility enterprises should be compensated from government funds for the cost of the benefits granted to residential consumers. Yet, due to inadequate regulation, the benefits typically fall short of being compensated and also bring losses to the utility enterprises. Over the past five years, the total amount

of the uncompensated benefits came to more than 8 million somoni.

According to the Central Asia Longitudinal Inclusive Society Survey for 2013, social assistance mechanisms currently play a limited role in assisting the poor and vulnerable groups. Energy-related social benefits cover less than 2 per cent of the population (and about 2 per cent of the poorest quintile). A pilot reformed targeted social assistance scheme was conducted in two districts (Istaravshan and Yavan) in 2011–2012. The pilot tested a new mechanism of identifying the poorest 20 per cent of households using the Proxy-Means Test method. It showed that the new targeting mechanism was approximately twice as accurate in directing social assistance to poor households as the old programme. Despite the small transfer amounts, beneficiary households reported high satisfaction with the new mechanism (payments more than doubled those under the previous mechanism).

As of July 2015, the new programme of targeted social assistance, supported by the World Bank, has been carried out in 25 towns and districts. The Government plans to introduce the programme in another 15 towns and districts in 2016. As of November 2015, the total number of low-income families receiving targeted social assistance was 59,000. In 25 districts and towns, the programme covered 14.1 per cent of all households (i.e. 59,000 of 417,300 households). In 2016, the programme budget amounted to 15 million somoni.

Institutional framework

There is no governmental body in Tajikistan in charge of developing and implementing a housing policy and development of the housing and utilities sector. The Programme of Development of the Housing and Utilities Sector for the period 2014–2018 provides for the establishment of such a body.

The Committee on Architecture and Construction under the Government develops, approves and implements legal provisions and acts governing construction, urban planning and architectural activities and ensures enforcement in these areas. The Committee issues licences to individuals and legal entities for activities in the field of construction and architecture.

The State Unitary Enterprise "Housing and communal services" (Khojagii Manziliyu Kommunalni, KMK) is responsible for the implementation of policy on the development and operation of the housing and utilities sector in

Tajikistan. It participates in elaboration of legal acts related to this sector and develops standards and norms. It provides housing and communal services across Tajikistan (with the exception of the cities of Dushanbe, Khujand, Nurek and Rogun, and Faizabad District).

The Anti-Monopoly Service under the Government regulates tariffs for goods and services provided by natural monopolies, which include the producers of electricity and thermal power, and water supply and sanitation companies. The Anti-Monopoly Service is responsible for the implementation of consumer protection legislation.

The Ministry of Energy and Water Resources develops and implements state policy and also carries out legal regulation in respect of the fuel and energy sector and water management.

The State Committee on Land Management and Geodesy is responsible for implementing uniform state policy in the fields of land resources, geodesy, mapping and registration of real estate property, and for carrying out topographic, geodetic, airspace, cartographic and cadastral works.

Local executive authorities develop master plans for settlements, for approval by the Government. They are also responsible for settlement of the population; development of utilities, transport and social infrastructure; decision-making on civil engineering; and land allocation for development projects.

13.5 Selected international projects

The projects supported by international donors and implemented in towns, district centres, townships and rural communities are to construct and rehabilitate water supply and sanitation systems and improve solid waste management. The major projects are financed by the EBRD, World Bank, ADB and Japan International Cooperation Agency (JICA).

The most significant projects financed by the EBRD in the sector are:

- Central Water Rehabilitation in the cities of southern Tajikistan (Dangara, Kulob, Kurgan-Tyube) (project completed). The total project budget was US\$6.850 million, including US\$2 million in loans;
- Central Water Rehabilitation in the cities and districts of northern Tajikistan (B. Gafurov, Guliston (formerly, Kayrakkum), Isfara, Istiklol (formerly, Taboshar), Kanibadam and Khorog).

The total project cost is US\$27.2 million, including US\$10 million in loans;

- Central Water Rehabilitation in the cities and districts of central Tajikistan (Hisor, Shakhriyav, Somoniyon, Tursunzade). The total project cost is US\$18 million, including US\$7 million in loans;
- Central Water Rehabilitation in the cities of northern Tajikistan (Istaravshan, Pendjikent, Shakhristan, Zafarabad) and the cities of southern Tajikistan (Yavan, J. Rumi District) (phase 2). The total project cost is US\$27.5 million; the project was launched in 2013;
- Solid Waste Management in Dushanbe (completed in 2013). The total project cost is over US\$10 million, including about US\$4 million as a long-term loan. The project procured waste collection containers and machinery and equipment (chapter 7);
- Construction of a facility for solid waste processing and disposal in Dushanbe. The total amount of the EBRD funds is US\$9 million;
- Solid Waste Management in Nurek (an agreement was concluded in February 2015). The project envisages the procurement of machinery and construction of a landfill site.

The most significant projects financed by the World Bank in the sector are:

- Tajikistan Energy Loss Reduction Project, implemented in the period 2005–2014 and co-financed by the Government of Switzerland's Secretariat for Economic Cooperation (SECO). The project installed 170,000 electricity meters in Dushanbe, in almost all existing households, the premises of approximately 200 large consumers (schools, kindergartens, hospitals) and approximately 14,000 newly connected households in residential areas. It also installed 128,700 gas meters in households and the premises of large industrial consumers, transport facilities and distribution networks;
- Tajikistan Municipal Infrastructure Development Project (US\$11.85 million of additional financing for the project launched in 2006). The grant went to finance the costs of expanding investment in the water and sanitation sector and solid waste management in the urban areas of Tajikistan.

The most significant projects financed by the ADB in the sector are:

- Climate Change Adaptation in Panj River Basin (2015–2020). The project aims to rehabilitate water supply systems in seven rural settlements

adjacent to the town of Kulob, and located in Vose and Panj Districts;

- In 2015, the ADB and the Government of Tajikistan concluded a grant agreement on the project Wholesale Metering and Transmission Reinforcement. The outputs of the project include installation of more than 1,000 new wholesale electricity meters and 70 electricity transformers, and construction of a new 95-km high-voltage transmission line to improve the electricity supply in the city of Panjakent in Sughd Oblast. The total project cost is US\$67 million, including US\$54 million in grants by the ADB. The project will be carried out with the financial participation of the Government and the state energy company Barki Tojik.

The most significant projects financed by JICA in the sector are:

- Rehabilitation of water supply systems in Khamadoni District, Khatlon Oblast. The total project cost is US\$15.088 million. The construction and rehabilitation of water supply facilities in the rural settlement Moskva and jamoat Meknatobod were completed. Rehabilitation and construction of water supply networks, and rehabilitation and drilling of new boreholes for water supply, in jamoats Chubek, Pandzhrud and Pandzhob are in progress. The project entailed the procurement of machinery and equipment for water supply and sanitation enterprises in Khamadoni District;
- In 2012–2013, a feasibility study was carried out in respect of water supply system rehabilitation in Panj District, Khatlon Oblast. The amount of investment needed was estimated at US\$19.2 million.

13.6 Assessment

The urbanization rate in Tajikistan remains rather low. The urban population accounts for only 26.5 per cent of the total population.

Over the past decade, the total floor space of the housing stock in Tajikistan has increased by more than 50 per cent. This is a result of citizens' initiatives, mostly in rural areas, in the absence of any substantial governmental support. The increase falls short of satisfying people's housing needs: the average per capita floor space (10.9 m²), though improved over the past five years, remains below the established social standard of per capita floor space (12 m²). Only an insignificant number of households with the highest income may *de facto* take advantage of the housing market to improve their housing

conditions. There is no programme in place to support the construction of affordable rental and social housing. Provision of urban social housing mainly relies on a scheme whereby developers hand over to local authorities a certain share of dwellings in apartment buildings financed by private investors.

The National Development Strategy for the period until 2030 establishes an ambitious objective of achieving an average per capita floor space of 17 m² by 2030. Taking into account the projected population growth during the next 15 years of up to 11.102 million people, attainment of the objective poses a major challenge to the Government to double the floor space of the housing stock within a 15-year period. The financial mechanisms for new housing construction projects (mortgage lending, housing cooperatives) envisaged by the Strategy are geared only to high- and medium-income households and serve to support the purchase of dwellings. No support measures are envisaged for construction of self-build houses in rural areas, even though self-build houses appear to be the type of housing most in demand. The Strategy does not provide for construction of affordable urban rental and social housing aimed at satisfying the housing needs of low-income households and internal labour migrants.

Increasing the volume of housing construction, especially of single-family houses (the most preferred), requires addressing the problem of the shortage of land suitable and available for construction purposes without resorting to the option of using agricultural lands. Land development for new construction and creation of the new transport and utilities infrastructure necessitate substantial investments. Local authorities lack the required finance to address these tasks.

Construction of self-build houses is a widespread practice in rural areas. Yet the quality of self-build houses remains inadequate. New construction standards and norms with regard to anti-seismic performance and thermal protection of buildings are hardly ever applied in rural construction because of poor public awareness, the low professional skills of rural builders and the absence of standard designs for construction of single-family houses, including those which involve the use of local materials. The current understaffing of construction inspectors in local departments of the Committee on Architecture and Construction leads to insufficient supervision of construction projects, especially in rural areas.

Over the past decade, the system of management and maintenance of apartment buildings has not undergone any changes. Although the legal

framework is in place, only a few home owners associations were established. In the majority of cases, they play a minor role in improving the management and maintenance of apartment buildings. There is no private involvement in the management and maintenance of apartment buildings. For many years, apartment buildings have not had adequate technical maintenance and repairs, for reasons including low maintenance fees and ineffective management. There is a huge need for capital repairs and enhancement of energy efficiency in apartment buildings.

Access to housing amenities and basic sanitation remains very poor, especially in rural areas, where 73.5 per cent of the total population live.

The Government continues to prioritize access to safe drinking water. The water supply sector demonstrates substantial improvements brought about by implementation of a large number of projects supported by international financial institutions. Rehabilitation and construction of central sewerage systems and wastewater treatment facilities proceeds at a noticeably slower pace than that of water supply systems because the relevant projects fall substantially short of the finance required. The lack of access to sanitation and reliable wastewater treatment services has an adverse effect on the environment.

As a result of some projects financed from international grants and loans, the solid waste management situation improved in Dushanbe and some other urban settlements.

The problem of ensuring reasonable tariffs for communal services remains unresolved. Low tariffs and insufficient government funds for financing the subsidies applied by providers of communal services impede the development of the utilities sector. The impossibility of increasing tariffs to economically justifiable levels is explained by the low incomes of the population. The system of support to low-income households needs to be updated on the basis of successful experience of pilot projects in order to make it better targeted and more efficient.

13.7 Conclusions and recommendations

Taking into account the scale of the current problems in the housing and utilities sector, it is essential that a comprehensive approach be used, taking due account of social and economic factors and the state of the legal, institutional and financial frameworks. A governmental body responsible for development and implementation of state policy in the housing and

utilities sector – envisaged by the Programme of Development of the Housing and Utilities Sector in the Republic of Tajikistan for the period 2014–2018 – has not yet been established. Although local authorities have competences on some issues related to housing provision and communal services, their role is not clearly defined and they lack financial resources for addressing issues in the housing and utilities sector in their territories.

Recommendation 13.1:

The Government should:

- (a) *Define a governmental body in charge of state policy in the housing and utilities sector;*
- (b) *Delegate the relevant responsibilities and financial resources to regional/local authorities to address issues in the housing and utilities sector.*

The Government adopted the Concept for Reform of the Housing and Utilities Sector in the Republic of Tajikistan for the period 2010–2025 and the Programme of Development of the Housing and Utilities Sector of the Republic of Tajikistan for the period 2014–2018. Issues relating to modernization of the existing housing stock in apartment buildings, enhancement of its reliability and improvement of its energy efficiency and environmental safety are not addressed sufficiently. At the same time, no national housing strategy was developed and approved to encompass the whole range of issues relating to provision of affordable and high quality housing to the constantly growing population in a safe and environmentally sound environment, which should be followed by targeted state programmes to address each aspect of the housing sector, i.e. construction of commercial real estate, non-profit rental and social housing, and self-build housing.

Recommendation 13.2:

The Government should develop a national housing strategy to meet the housing needs of the constantly growing population, taking due account of opportunities and the needs of various groups of households.

The available data on the state of the housing sector are limited to the information received through the 2010 population census. There are no up-to-date reliable and comprehensive statistical data that would allow the Government to identify and comprehend the problems in respect of housing provision and the availability of communal services. There are no regularly updated statistical data covering housing conditions, housing characteristics, the availability of communal services, volumes of housing construction,

including self-build housing, tenure issues and housing needs.

Recommendation 13.3:

The Agency of Statistics should ensure the collection and dissemination of reliable and comprehensive data on the state of the housing sector.

Many Soviet construction standards are still in force in the construction sector; they are gradually reviewed and translated into the Tajik language. In parallel, the revision of construction standards and norms is in process, with an aim to establish clear requirements for design and construction of residential buildings, which would facilitate the use of new and traditional safe construction materials and modern technologies designed to resist seismic and other unfavourable natural factors and to provide environmental safety. At the same time, the level of public awareness in respect of seismic protection regulations, energy efficiency and resilience to climate change is still low. Performance of construction works in respect of apartment buildings and individual buildings in urban settlements is carried out under the supervision of territorial inspectorates of the Committee on Architecture and Construction under the Government. In rural areas, construction of individual buildings by dwellers themselves, departing from construction design documentation (which is a mandatory requirement for the allocation of a land plot for the purpose of housing construction), still tends to be a widespread practice because of the lack of training and shortage of inspectors in the oblast and district construction inspectorates.

A wealth of international experience is available to assist Tajikistan in addressing these challenges. The Sustainable Cities Programme works at city level in collaboration with local partners to strengthen their capabilities for environmental planning and management. At ECE, the Committee on Housing and Land Management has developed guidance materials on these issues, including the 2013 Good Practices for Energy-Efficient Housing in the UNECE region.

Recommendation 13.4:

The Committee on Architecture and Construction under the Government should:

- (a) *Continue the practice of revising the construction standards and norms, with the aim to establish clear requirements for the design and construction of residential buildings that encourage the use of safe materials and modern technologies in line with*

best international practice, in particular programmes such as Sustainable Cities, and relevant ECE guidance documents;

- (b) Raise public awareness in respect of the norms on seismic protection, energy efficiency and resilience to climate change;*
- (c) Improve education and professional training of specialists and workers engaged in construction works, including those engaged in individual building construction;*
- (d) Ensure proper control over compliance with the construction standards and norms, including during self-build housing construction in rural areas;*
- (e) Enhance the professional qualification of the inspectors in local departments.*

Construction of new housing, including infill construction, and implementation of transport and utilities infrastructure projects in urban areas, may lead to the reduction of green areas. Green areas of common use are poorly developed in peripheral areas of towns and cities. Moreover, non-native tree species, which are vulnerable to the climate of

Tajikistan, are used in place of native broad-leaved species in new green areas in urban communities, especially in Dushanbe.

Recommendation 13.5:

The Government should ensure:

- (a) The preservation and expansion of green areas in existing residential neighbourhoods in urban settlements, as well as compliance with the requirements for creation of green areas in new residential neighbourhoods;*
- (b) The creation of new recreation areas within and adjacent to the boundaries of urban settlements during the revision of master plans;*
- (c) Increased rates of tree planting in rural areas, to restore the forests damaged by illegal logging by the population for heating purposes;*
- (d) The use of native types of trees and shrubs, well adapted to the local climate, when developing and restoring green areas.*

Chapter 14

HEALTH AND ENVIRONMENT

14.1 Population health status

Tajikistan faces significant public health challenges. These include a high burden of disease through the prevalence of non-communicable diseases, in particular cardiovascular diseases, leading to premature mortality and morbidity. At the same time, the incidence and prevalence of some communicable diseases remain a concern, thus requiring an integrated approach addressing risk factors that span many different policy sectors beyond health.

Population development

The population of Tajikistan was estimated to be 8.2 million in 2013 (table 14.1). It is a rather young population, with a median age of 21.7 years as compared with an average of 38.6 years in the WHO European Region (www.euro.who.int/en/countries) which includes Tajikistan. The potentially economically active population (15–64 years of age) represents close to 60 per cent of the total population, a lower share than in countries in the CIS and the WHO European Region.

Tajikistan is experiencing population growth due to the persistently high birth rate and a slight decrease in death rates in the second half of the 2000s. The

fertility rate remains high and is almost double that of countries in the CIS and the WHO European Region. The Population Division of the United Nations Department of Economic and Social Affairs projects a population of 11.4 million in Tajikistan by 2030. Most of the population lives in rural areas.

According to WHO estimates, a person born in Tajikistan in 2013 can expect to live 69 years, on average: 70 years if female and 68 years if male. Although the Tajikistan population gained five years in life expectancy between 2000 and 2012 (more than the WHO European Region average increase of four years), the country's actual life expectancy rates remain considerably lower than those in the WHO European Region. Since 2000, life expectancy has increased at a higher rate in the CIS than in the WHO European Region, and Tajikistan's 69 years is now similar to the average life expectancy in considerably richer countries of the CIS (table 14.2).

In 2013, the probability that a 15-year-old person in Tajikistan would die before reaching his or her 60th birthday was estimated at 165 per 1,000 population, down from 193 per 1,000 population in 2000. The adult mortality rate is lower than the CIS average but higher than that in the WHO European Region.

Table 14.1: Key demographic indicators, 2012, 2013

	Tajikistan		CIS	WHO European Region
	2012	2013	2013	2013
Mid-year population, million	8.0	8.2	282.6	898.5
Population aged 0–14, per cent	35.2	36.0	18.8	16.9
Population aged 65+, per cent	4.7	3.8	11.4	15.3
Live births, per 1 000 population	27.8	25.9	14.9	12.0
Deaths, per 1 000 population*	4.3	3.9	12.3	10.5
Natural growth rate, per 1 000 population	23.5 ***	22.0	2.6	1.5
Total fertility rate, children per woman	3.8	3.8	1.7	1.6
Urban population, per cent**	26.6 ****	27.2	64.2	70.2

Source: WHO Regional Office for Europe, European Health for All database (accessed December 2015); Agency of Statistics, December 2015.

Notes: *Data for CIS refer to 2011; **Data for CIS and the WHO European Region refer to 2010;

***Source: www.stat.tj/ru/database/socio-demographic-sector/;

****Source: World Bank.

Table 14.2: Selected population health indicators, 2013

	Tajikistan	CIS	WHO European Region
Life expectancy at birth, years	69.0	69.5	76.6
Adult mortality rate, per 1 000 adults 15–59 years	165.0	211.9	126.7
Infant mortality rate, per 1 000 live births	40.9	14.4	8.3
Under-five mortality rate, per 1 000 live births	47.8	16.8	9.7
Maternal mortality rate, per 100 000 live births	44.0	27.0	14.7

Source: WHO, World Health Statistics 2015.

Child and maternal mortality and the Millennium Development Goals

The United Nations Interagency Group on Child Mortality estimates show a decline in infant mortality in Tajikistan by 50 per cent since 2000, to reach 40.9 per 1,000 live births in 2013, almost three times higher than in the CIS countries and five times higher than the WHO European Region average of 8.3 per 1,000 live births. The mortality rate for under-five-year-olds fell from 108.4 per 1,000 live births in 1990 to 47.8 in 2013, indicating that the country has made substantial progress towards achieving MDG 4, which aimed at reducing the rate by two thirds between 1990 and 2015. Nevertheless, both the under-five and infant mortality rates are significantly higher than the WHO European Region average (table 14.2).

Acute respiratory infections, which could be partly attributed to indoor air pollution from hazardous heating and cooking sources, particularly in poor areas, are among the main causes of under-five mortality, accounting for 17 per cent of all these deaths. Urban–rural disparities exist for both under-five and infant mortality and are associated with poor living conditions and lack of access to health services for the rural population.

Undernutrition is the underlying cause of an estimated 45 per cent of all deaths among children under five years of age. According to WHO estimates for the period 2007–2014, 13 per cent of children under five years of age were underweight and more than 26 per cent were stunted (i.e. were of low height for their age). Stunting reflects the cumulative effects of undernutrition and infections since birth – and even before birth – and is likely to have serious and long-lasting impacts on health. While there has been some improvement in the prevalence of stunting, the prevalence of under-five-year-olds who are underweight has changed little, indicating limited progress towards achieving MDG 1, which aimed to halve, between 1990 and 2015, the proportion of people who suffer from hunger.

Maternal mortality in Tajikistan shows a decrease from 68 per 100,000 live births in 1990 to 44 in 2013; after reaching a high of 120 maternal deaths per 100,000 live births in 1995. The reduction in maternal mortality in the period 1990–2013 indicates that the country has made limited progress towards achieving MDG 5, which aimed at reducing the maternal mortality rate by three quarters between 1990 and 2015. Furthermore, the maternal mortality rate in Tajikistan is very nearly three times higher than the WHO European Region average and considerably higher than that of the CIS countries (table 14.2).

Tajikistan has made limited progress towards the achievement of the MDG 5 targets related to universal access to reproductive health services, in particular for antenatal healthcare coverage, contraceptive prevalence rates and the unmet need for family planning. Important differentials in relation to wealth continue to persist, with women in the lowest quintiles receiving the lowest coverage and quality of healthcare services.

Mortality by main causes of death

In the WHO European Health for All database, there are no post-2005 data for Tajikistan on mortality by age group and by main cause of death. Therefore, it is not possible to assess developments over time or to compare countries by age-standardized or cause-specific mortality.

In 2012, mortality by all causes in Tajikistan had reduced by 20 per cent since 2010. In the period 1990–2010, the greatest reductions in mortality were experienced by females aged 1–4 years while the greatest increase was of males aged 35–39 years.

The distribution of mortality by broad cause in 2012 was similar in Tajikistan to that in the CIS and WHO European Region, with the greatest share being by non-communicable diseases. The levels of mortality by this cause and by all causes in Tajikistan are comparable to those in the CIS countries and much

greater than the WHO European Region averages (table 14.3). In Tajikistan, the toll of death by communicable diseases is almost twice as high as the CIS average and much higher than the WHO European Region average. The rate of mortality due to injuries in Tajikistan is similar to that in the WHO European Region and lower than that in the CIS.

The top three causes of disability-adjusted life years that quantify both premature mortality and disability within the population in 2010 in Tajikistan were lower respiratory infections, ischaemic heart disease and pre-term birth complications.

Overall, the three risk factors that account for the greatest disease burden in the country are dietary risks, high blood pressure and household air pollution from the burning of solid fuels. In 2010, the leading risk factors for children under five were household air pollution from the burning of solid fuels, and for adults aged 15–49, dietary risks.

Selected trends in morbidity

Communicable diseases remain a major public health priority. According to the morbidity data regularly reported by Tajikistan, respiratory and infectious diseases continue to be the main causes of hospitalization.

Tuberculosis (TB) and HIV/AIDS are the key challenges in communicable disease control. The incidence of TB has been on the rise and is associated with poor living standards and health care. Children account for 7.3 per cent of all TB cases. TB incidence rates started falling around 2005 but in 2012 were still almost twice as high as those in the WHO European Region (figure 14.1).

TB-related mortality among HIV-negative persons, which saw a significant increase in the period 1995–

2005, has been decreasing, reaching WHO European Region level in 2010 (figure 14.2). Nevertheless, the spread of TB remains an urgent issue as: (i) the number of people infected with multidrug-resistant TB is relatively high; (ii) the incidence of TB remains high among the working-age population (aged 25–44); (iii) there are shortcomings in the organization of directly observed treatment, especially during the outpatient treatment stage; and (iv) there is still a shortage of anti-TB drugs.

The overall percentage reduction of mortality from TB during the period 1990–2014 has been negative, showing a lack of progress towards MDG 6, in particular Target 6C, which aimed to halve, by 2015, and begin to reverse, the incidence of malaria and other major diseases such as TB and of HIV/AIDS. The incidence of HIV/AIDS has reduced by 13 per cent during the period 2001–2013, indicating that Tajikistan was on track regarding MDG Target 6C with respect to this growing public health epidemic.

Both incidence and mortality rates of malaria have decreased considerably in recent years as a result of targeted interventions. In 2012, 33 malaria cases were registered, 58 per cent fewer than in the same period of the previous year and almost 1,000 times fewer than in 1997. Intensive malaria vector control in the implementation of national malaria control programmes has led to a sharp reduction in incidence of the disease and the total eradication of the local cases of tropical malaria in the country.

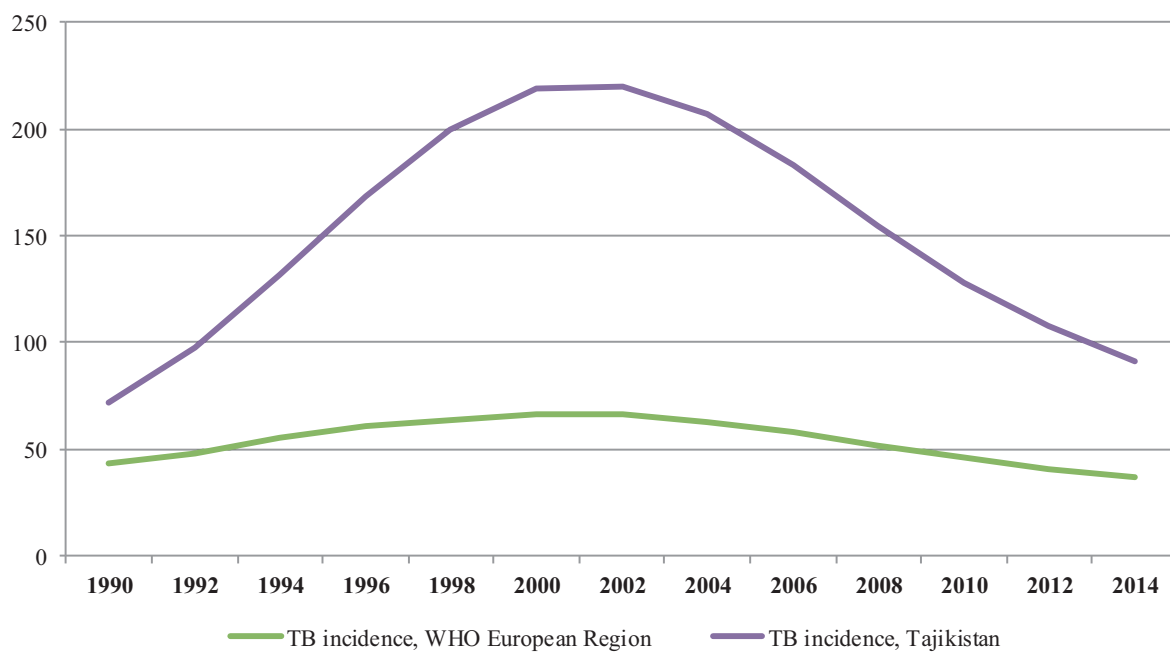
The major factors negatively affecting the malaria situation and challenging progress towards achievement of the MDGs in Tajikistan are the growing intensity of malaria transmission in areas next to the border with Afghanistan, inadequate access to quality primary health care, a lack of insecticides and limited anti-larval activities.

Table 14.3: Standardized death rate (SDR) by broad cause and share in all-cause mortality, 2012, per 100,000 population

	Tajikistan		CIS average		WHO European Region average	
	SDR	Percentage	SDR	Percentage	SDR	Percentage
All causes	951.9	100.0	946.7	100.0	614.6	100.0
Non-communicable diseases	752.6	79.1	789.5	83.4	527.0	85.7
Communicable diseases and others	147.7	15.5	73.1	7.7	40.5	6.6
Injuries	51.6	5.4	84.2	8.9	47.1	7.7

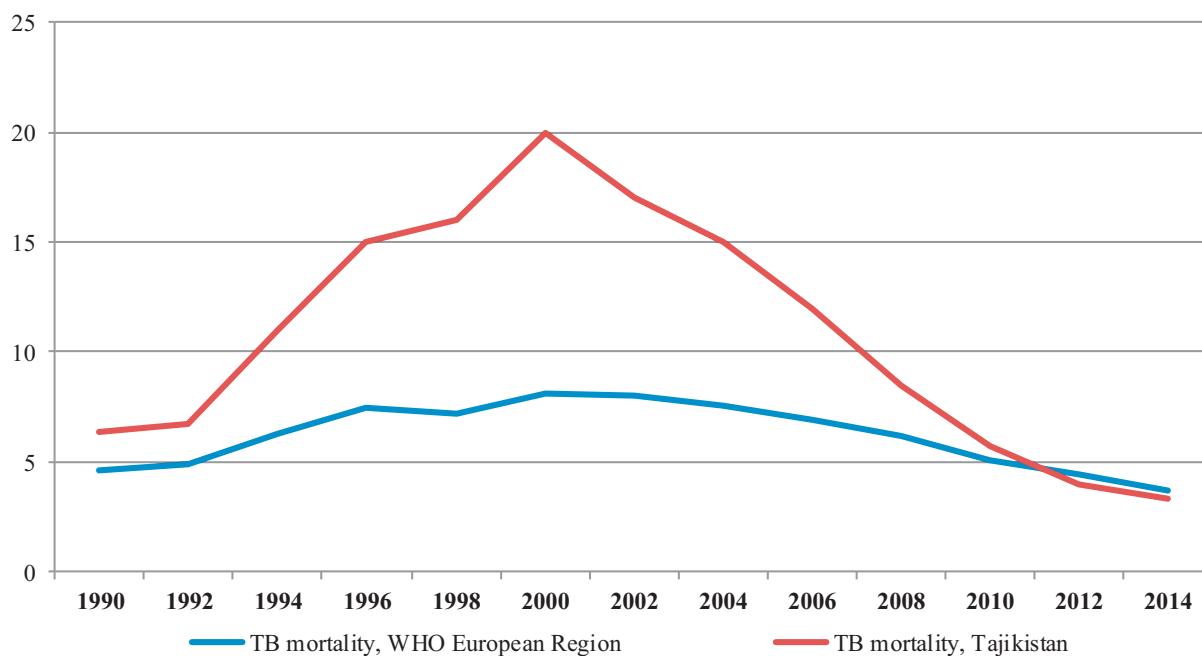
Source: WHO Global Health Observatory Data Repository (<http://who.int/gho/database/en/>), accessed December 2015.

Figure 14.1: Estimated incidence of tuberculosis among HIV-negative persons, 1990–2014, per 100,000 population



Source: WHO Global Health Observatory Data Repository (<http://who.int/gho/database/en/>), accessed December 2015.

Figure 14.2: Estimated deaths due to tuberculosis among HIV-negative persons, 1990–2014, per 100,000 population



Source: WHO Global Health Observatory Data Repository (<http://who.int/gho/database/en/>), accessed December 2015.

14.2 Health risks associated with environmental factors and environmental causes of morbidity and mortality

Air quality

Outdoor air quality

Air quality is an important environmental health issue in Tajikistan, and yet not sufficiently recognized. The Hydrometeorology Agency under the Committee on Environmental Protection is conducting air quality monitoring but health aspects are not considered in the monitoring scope/parameters and monitoring schemes; outdated standards are used. Air quality monitoring does not fully cover particulate matter (PM₁₀, PM_{2.5}), which is relevant to population exposure and associated health impacts. There are five stationary urban air quality monitoring stations in the country. Databases of the air quality parameters are lacking. There is no information available to allow estimation of health effects. The statistical book on environmental protection, from 2014, is limited only to pollutant emissions and does not refer to the population affected or potentially at risk.

With the increasing number of vehicles in use, including old vehicles, and more frequent and longer trips being taken, traffic in urban areas is now a major cause of air pollution (chapter 12). It accounts for about 60 per cent of emissions of sulphur dioxide, 83 per cent of carbon oxides, 93 per cent of nitrogen oxides and 90 per cent of lead compounds, and nearly 100 per cent of volatile hydrocarbons. An analysis of air pollution across the country shows that Dushanbe, Khujand, Kurgan-Tyube and Tursunzade are the most polluted cities. A wide range of factors contributes to this, ranging from the poor quality of motor fuel, the poor technical condition of vehicles and roads and the high percentage of vehicles produced before 1990 (35 per cent of all registered vehicles) to reduction of green areas and high natural dust content of the air.

In addition to people in rural areas making greater use of coal and firewood, the lack of affordable fuel sources drives them to use more animal dung, cotton plant stems and other types of waste for heating and cooking, which has a serious impact on ambient and indoor air quality and human health, especially under conditions of poor combustion technology.

At present, with the start of operation of the CHP Dushanbe-2 and the switch of major industrial facilities from natural gas to coal, the use of coal by

industry and as a source of electricity and heating is increasing. Unless the most advanced coal combustion technologies with efficient gas and particulates emission control are used, this may adversely affect both air quality and public health. This potential risk has not yet received the due attention of the public health and environmental sectors.

In 2015, WHO and the OECD reported on the economic cost of the public health impacts of ambient and household air pollution as of 2010, with particular reference to the countries of the WHO European Region. Estimates of the effects of air pollution in Tajikistan in 2010 totalled 7,200 premature deaths, with a majority (4,441 deaths) due to household air pollution. The estimated economic cost of the premature death toll due to air pollution is about US\$3,199 million, constituting a large fraction of the country's GDP (measured at US\$ PPP). Tajikistan is among the 10 countries in the WHO European Region for which that fraction is at or above 20 percent of GDP.

Indoor air quality

The unreliable power supply and lack of clean and affordable fuel pose significant problems for the heating of public buildings during the winter months. This is particularly true for schools and healthcare facilities in rural communities, which rely heavily on solid fuel use and lack efficient heating technologies. In turn, heating problems give rise to adverse health effects.

Following the Fifth Ministerial Conference on Environment and Health (Parma, 2010), during 2010–2013, Tajikistan took part in the School Environment and Respiratory Health in Children (SEARCH II) initiative on indoor air quality and microclimate in schools. Assessment of energy use in school buildings and the impact of building materials on children's health has been conducted with the aim of proposing measures to improve the school indoor environment and increase energy efficiency. The prevalence of morning cough was highest among the school children in Tajikistan (22 per cent) compared with an average of 14 per cent for the ten participating countries. Moreover, Tajikistan was one of the two countries with the highest levels of indoor PM₁₀ (much higher than the WHO guidelines) and benzene (higher than the EU limit) in classrooms. The main sources of those pollutants were located outdoors (mainly traffic), while high carbon monoxides and especially formaldehyde were mainly emitted from indoor sources.

Photo 14: Mountain view close to Khoja Obi Garm sanatorium, Varzob District

There are no data on exposure of the population aged 13–15 to environmental tobacco smoke in and outside the home. There are no data on smoking prevalence in the general population. According to the Tajikistan Demographic and Health Survey, in 2012, very few women (0.3 per cent of interviewed women aged 15–49) reported that they currently smoke but a greater number (7 per cent of those) reported being regularly exposed to environmental tobacco smoke, as in one in ten households smoking takes place on a daily or weekly basis.

Water and sanitation

Safe drinking water and sanitation is a longstanding environmental public health priority despite the fact that the country is rich in water resources.

MDGs on population coverage of improved drinking water sources and sanitation facilities

One of the targets of MDG 7 (Ensure environmental sustainability) is to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. In the MDGs, the term "improved drinking water source" denotes those sources that are adequately protected from outside contamination by the nature of their construction, and the term "basic sanitation facilities" denotes those facilities that hygienically separate human excreta from human contact.

WHO/UNICEF's Joint Monitoring Programme (JMP) for water supply and sanitation has assessed progress in achieving the MDG's global targets, tracking changes over 25 years to 2015. The first available baseline data on the population coverage of improved drinking water sources and sanitation facilities in Tajikistan is for 1995.

Coverage of improved drinking water sources in Tajikistan in 1995 stood at 58 per cent, yielding a country MDG 7 target of 21 per cent. In 2015, the country's coverage of improved drinking water sources has been estimated at 74 per cent of the population, with over 3 million people having gained access to improved drinking water since 1995. The JMP assessment concluded that Tajikistan has made good progress, since this change expressed in percentage points exceeds two thirds of the country's target. With respect to the coverage of sanitation facilities, the figures for the baseline and the 2015 estimate are higher and the country has met the corresponding target.

Access to water supply and sanitation

Piped water is considered to be less likely to be contaminated than other improved drinking water sources. In 1995, one third of the population in Tajikistan (two thirds of them living in urban areas) enjoyed access to piped water on their premises. Therefore, there were huge urban–rural disparities:

77 per cent of the urban population but only 15 per cent of the rural population had access to piped water. Since 1995, rural coverage has doubled while urban coverage has improved by a few percentage points. Despite this progress, the levels of rural piped water supply coverage remain low (31 per cent in 2015), bearing in mind the considerable proportion of Tajikistan's population that is rural, and the urban–rural divide is persisting. Tajikistan is among the nine countries of the WHO European Region that have an urban–rural discrepancy in access to piped water on their premises of more than 50 percentage points.

Only 52 of the 62 cities, regional centres and towns in Tajikistan have a centralized system of water supply, and only 29 of them have a sewerage system. According to a sectoral assessment in the country, in 2012, 68 per cent of the water supply systems in the cities, regional centres and towns were fully operational, 7 per cent partly operational, and 25 per cent non-operational. In rural areas, the corresponding figures were 40 per cent, 44 per cent and 16 per cent, indicating significant urban–rural inequities in water-related infrastructure with an impact on public health.

It is estimated that, in 2015, improved sanitation reached 94 per cent of the urban population (up from 92 per cent in 1990) and 95 per cent of the rural population (up from 88 per cent in 1995). There is much lower access to municipal sewerage systems: in 2013, there was 44 per cent coverage in urban areas and only 5 per cent in rural areas, reflecting the considerable pressure on water safety. Over the past 20 years, the rehabilitation of sewer networks and facilities has not been conducted, which has reduced dramatically the effectiveness of wastewater treatment. The untreated wastewater discharges pose a risk of secondary contamination of drinking water and soil.

Gender-related disparities

Women and girls are heavily affected by poor access to water and sanitation. Poor access impacts on their time distribution, mobility, health and work burden. A gender assessment carried out in rural areas in Tajikistan in the framework of the SDC's Drinking Water Programme 2012–2015, which was published in 2013, showed that women and children under 14 spend an average 4–6 hours daily (in some cases, up to 8 hours) carrying water. Not only do women spend most of their time fetching water and have narrow paths of daily movement within their community, they are also reluctant to venture from their own communities due to the lack of safe and secure sanitation facilities in public places. With the

changing climate, inadequate access to water and poor water quality also affects agricultural production and the care of livestock and increases the overall amount of labour that is expended to collect, store, protect and distribute water. The burden on women increases as they engage in additional economic activities (especially in rural areas and in the context of massive labour migration by men). Existing socio-cultural traditions in the country, especially in rural areas, establishes a negative public attitude towards women who violate traditional gender roles, which not only limits their decision-making within the household but also creates barriers to their territorial, social and labour mobility.

Water safety

In 2015, about two million people in Tajikistan, 94 per cent of them in rural areas, have to use surface water for drinking. Water is consumed directly from rivers, reservoirs, lakes, ponds, streams, canals or irrigation channels that often do not meet sanitary requirements, leading in turn to the spread of infectious diseases. With 21 per cent of its population relying on surface drinking water sources in 2015, Tajikistan is the country in the WHO European Region with the greatest proportion of its population having access to water that is prone to microbial contamination.

Almost two thirds of existing water supply systems in the country do not meet sanitary requirements, due to a lack of sanitary protection zones, water purification and decontamination/chlorination facilities. About 10 per cent of non-compliant drinking water samples fail to meet bacteriological parameters, 32 per cent fail to meet chemical parameters, and 23.8 per cent are from non-centralized sources.

The main causes of poor water quality and safety are frequent breakdowns in water supply systems and structures, equipment failure and irregular electricity supply (especially in rural areas). There is a lack of maintenance of water pipes and sewers, due to decentralized management of the country's utilities and change in the administrative structure, underfinancing and an ineffective tariff system.

Figure 14.3 shows trends in major microbial and viral water-related diseases in the period 2005–2014. The notifiable gastrointestinal infections, which continue at high levels over time, indicate a significant burden of ill health associated with unsafe water. The incidence of viral hepatitis, especially the most common Hepatitis A, which is particularly frequent under poor sanitary and hygienic conditions, tends to

be on the rise. Though declining after 2009, the life-threatening disease typhoid fever is still present.

The actual burden of water-related diseases is likely to be higher because of the limitations of the country's surveillance system. It is not possible to determine the proportion of background cases of acute gastrointestinal infection and outbreaks associated with poor water and sanitation; therefore, it is likely that the vast majority of waterborne infections remain undiagnosed and many outbreaks undetected.

Figure 14.4 displays developments in selected parasitic diseases in the period 2005–2014, with infections sourced from contaminated food and/or water. These infections are: giardiasis caused by contaminated food or water, ascariasis and enterobiasis, caused by contaminated hands due to poor personal hygiene and poor sanitation, as well as by contaminated food and, less commonly, water. Enterobiasis can affect all people and most commonly occurs among children, institutionalized persons, and household members of persons with pinworm infection. The increasing incidence rates over time is an alerting signal for environmental public health status.

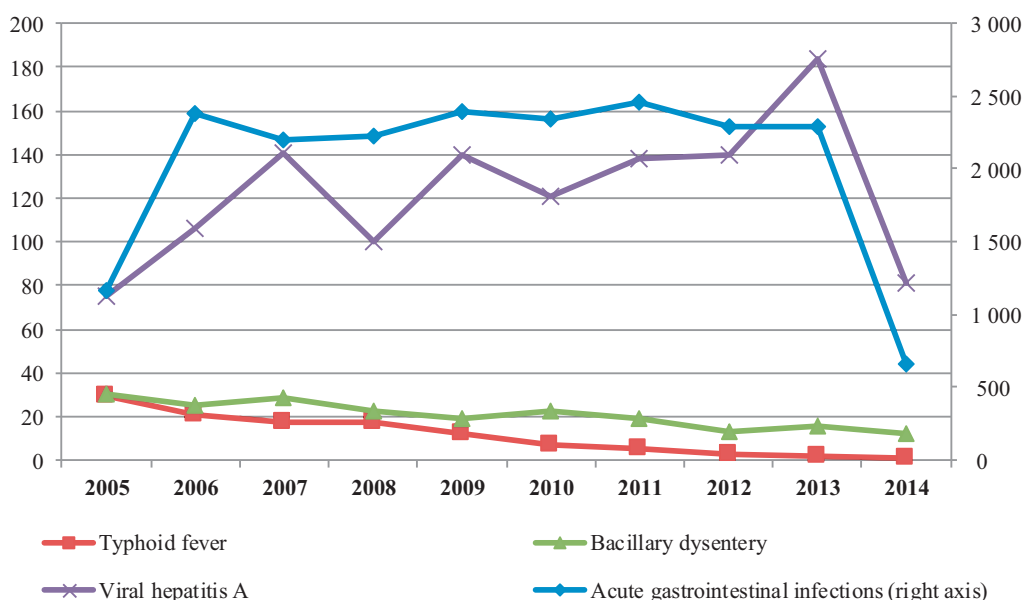
Water-related infectious diseases in children 0–14 years of age show similar patterns, in particular a high share of acute intestinal infections in total infectious diseases, persistent levels of viral hepatitis A and high levels of parasitic diseases.

Tajikistan is among the eight countries in the WHO European Region that have introduced new policy measures on water, sanitation and hygiene in schools and preschool centres after the Fifth Ministerial Conference on Environment and Health (Parma, 2010). Within the UNICEF/Government of Tajikistan Country Programme for 2010–2015, 65 per cent of schools in eight priority districts are targeted to be provided with improved water, sanitation and hygiene. Several activities on promotion of handwashing, safe water use, sanitation and oral health have been implemented since 2011, including a survey of the water and sanitation situation at schools in several districts in the Khatlon Oblast and Rasht area.

Food safety

The incidence of acute intestinal infections has remained high through the years and the incidence of some parasitic diseases is on the rise, indicating the importance of the food safety issue and overall sanitation and hygiene (figures 14.3 and 14.4).

Figure 14.3: Incidence of water-related microbial and viral infectious diseases, 2005–2014, per 100,000 population

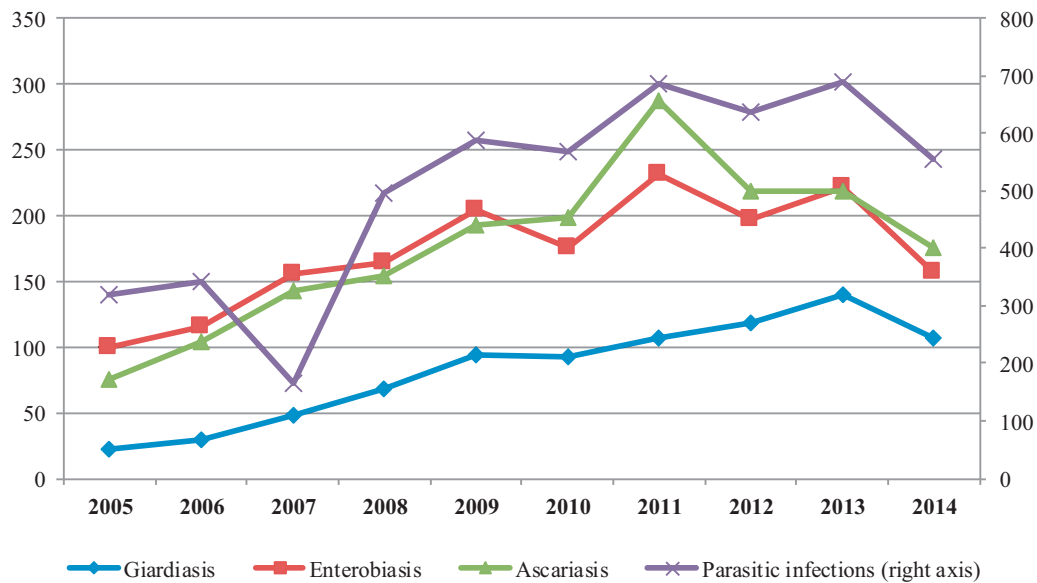


Source: Ministry of Health and Social Protection of the Population, 2015.

Morbidity from major notifiable zoonoses such as bovine tuberculosis, brucellosis and anthrax persisted in the period 2007–2011 (figure 14.5). These life-threatening diseases affecting animals are transmitted to humans by contact with infected animals or their products. Improper treatment of the

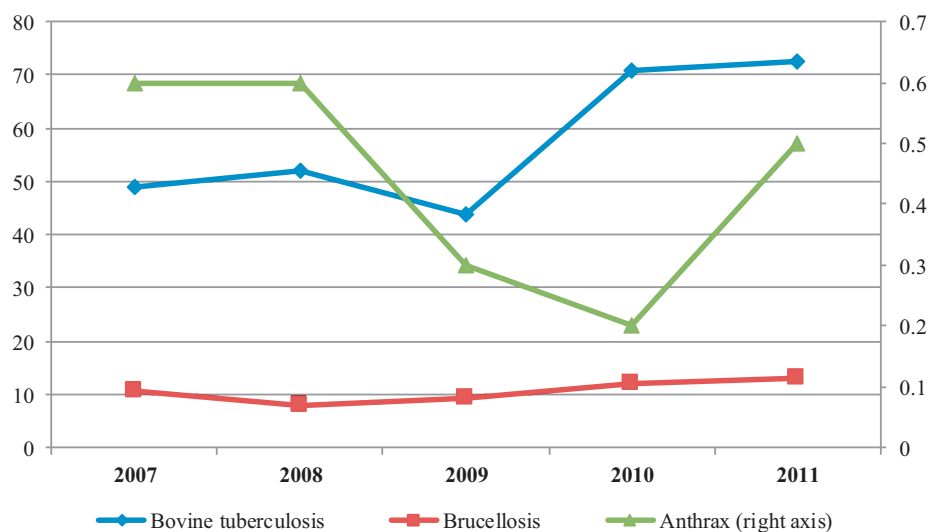
products (e.g. non-pasteurisation of milk), the existence of many small farms, the illegal selling of farm products on the streets and overall weak control determine the burden of the population's ill health of epizootic origin. Bovine tuberculosis is the most common of these diseases.

Figure 14.4: Incidence of water- and food-related parasitic infectious diseases, 2005–2014, per 100,000 population



Source: Ministry of Health and Social Protection of the Population, 2015.

Figure 14.5: Incidence of selected zoonoses, 2007–2011, per 100,000 population



Source: World Organization for Animal Health zoonoses information database, accessed January 2016; Agency on Statistics, 2015.

Nutrition

Undernutrition remains a priority issue severely affecting children and other vulnerable populations. It is persisting due to food insecurity but also because of a lack of parental knowledge about common childhood illness management and child feeding practices, and access to timely health care. One third of the population is affected by food insecurity and, within this group, more than 30 per cent of households are severely food insecure. This situation is further intensified by inadequate ability to manage undernutrition at the primary healthcare level. Complementary foods are not introduced in a timely fashion for all children. Overall, only 20 per cent of children aged 6–23 months are fed appropriately according to the recommended infant and young child feeding practices. The low rate of access to clean water, together with poor hygiene and sanitation, increases diarrheal disease incidence and further exacerbates undernutrition, especially in children.

Three centres for prevention and control of undernutrition have been set up, in Tojikobod (in the districts under republican subordination) and Bokhtar (Khatlon Oblast), and staff capacity building is currently going on. Experience gained will guide further expansion of the centres across the country. A survey of food consumption applying international methodology is scheduled for 2016 and will provide up-to-date information on progress in combating undernutrition.

The 2012 Tajikistan Demographic and Health Survey found that the vast majority of households (84 per cent) use iodized salt (of any type), but only 39 per cent of all households with tested salt use adequately iodized salt. Half of urban households have adequately iodized salt compared with only 38 per cent of rural ones. Less than 30 per cent of households in the districts under republican subordination and Khatlon Oblast have adequately iodized salt. According to the estimates, which came out in 2012, almost 68 per cent of the population have iodine levels of less than 100 µg/l, which confirms the persistence of iodine-deficiency disorders in Tajikistan. A salt iodization programme has been launched in 2013 with the aims to improve access to and availability of adequately iodized salt in retail outlets in the country in general and in Khatlon Oblast in particular, to advance the basic salt iodization quality assurance capacity of salt producers and authorized quality control agencies, and to raise community awareness about salt iodization and iodine-deficiency disorders.

Chemical safety

Persistent organic pollutants

Obsolete or banned pesticide stockpiles present a serious problem in Tajikistan (chapter 7). The two main pesticide disposal sites, at Vaksh in Khatlon Oblast and Kanibadam in Sughd Oblast, do not meet health and safety requirements, thus posing persisting significant risks to both the environment and human health.

In 2009, Tajikistan took part in the UNEP/WHO coordinated global survey on POPs in human milk, in the framework of the Global Monitoring Plan under the Stockholm Convention, which the country ratified in 2007. According to the global assessment of human exposure to POPs for the period 1998–2012, the levels for several POPs, polychlorinated dioxins and dioxin-like compounds were found to be low in the country. However, POPs from pesticides are of serious concern: Tajikistan, along with other countries, mostly from tropical and sub-tropical regions in Africa, South East Asia and the Caribbean, has high levels of DDT (dichlorodiphenyltrichloroethane) – the highest in the WHO European Region – which reflects the use of DDT in relation to the occurrence and prevention of malaria. In particular, the abnormally high exposure may be associated with the wide use of DDT during the 1950s–1970s, and the fact that the use of DDT continued until the early 1990s in spite of the DDT ban issued in 1969–1970 by the former Soviet Union. Tajikistan banned DDT from import and for use in agriculture and public health in 2004. In most of the WHO European Region, the use of DDT was discontinued long ago and the current levels of contamination are very low; the UNEP/WHO survey has shown a steady temporal decline that reflects the effectiveness of the measures taken across the WHO European Region to decrease hazardous environmental releases.

The 2010 report submitted by the country pursuant to the Stockholm Convention (only its second to date) shows difficulties in putting the National Implementation Plan (2007 Resolution of the Government No. 502) into operation due to insufficient funding, a lack of adequate information, a lack of adequate laboratories and difficulty in involving stakeholders. In addition, difficulties have been reported in the implementation of the action plan in accordance with Article 5 of the Convention, designed to identify, characterize and address the release of chemicals listed in Annex C, which are related to insufficient funding, the lack of an enforcement framework and insufficient information.

The lack of funding, human resources and analytical laboratory equipment, as well as lack of storage and disposal facilities, hamper the implementation of specific plans for the management, phasing out and disposal of PCBs. More activities have been reported in relation to raising awareness on POPs among policy and decisionmakers, provision to the public of the available information, and the training of workers, scientists, educators and technical and managerial personnel.

Estimated emissions of some POPs, including dioxins and PCBs, are tending to decline slightly.

Heavy metals

There are no systematic data on the levels of heavy metals, e.g. lead and mercury, from the monitoring of air, water, soil and food. Lead and mercury have important health effects, in particular on the neurodevelopment of children, including cognitive development, and these effects can take place even at very low levels. Expert estimates show a decrease in lead emissions, mostly due to the phasing out of leaded gasoline (chapter 5), but there can still be elevated local emissions.

A study published in 2012 found elevated concentrations of several toxic heavy metals (above the WHO Guidelines for Drinking-Water Quality) in the Istiklol uranium mining pit lake and the stream water of the tailing mountain at the Istiklol uranium tailing site, and a potential environmental and human health hazard. As there are no systematic monitoring studies or human bio-monitoring activities, it is impossible to estimate the magnitude of the risk posed by this contamination to public health or the potential effects of rehabilitation measures.

Chemical poisoning

There are no data on chemical incidents and number of cases of poisoning induced by chemicals. A chemical incident took place in May 2016 during a disinsection of school conducted by the Service of State Sanitary and Epidemiological Surveillance (SSSES) in the Shamsiddin Shokhin district of the Khatlon Oblast. The incident affected more than 50 schoolchildren. The underlying substance of the poison exposure was the insecticide sprayed but also non-adherence to the instructions for safe use by the sanitary-epidemiological personnel, and overall, lack of capacity of the health sector in chemical incident preparedness and response. The country does not have a poisons centre, i.e. a specialized unit that advises on, and assists with, the prevention, diagnosis

and management of poisoning at local and national level.

Asbestos

Exposure to asbestos, including chrysotile, occurs through inhalation of fibres in air in the working environment, ambient air in the vicinity of point sources (such as factories handling asbestos) or indoor air in housing and buildings containing asbestos materials. It causes cancer of the lungs, larynx and ovary, mesothelioma and asbestosis (fibrosis of the lungs). There is no threshold for the carcinogenic effect; all forms of asbestos are considered to be silent killers as health disorders may appear several decades after an exposure, even after only a short exposure time. The International Labour Organization (ILO) and WHO are urging their Member States to eliminate asbestos-related diseases by banning all forms of asbestos.

Asbestos-related diseases have not been registered in the occupational diseases register of Tajikistan. Workers at the asbestos facilities undergo regular occupational medical check-ups. Asbestos-containing products are legally available, e.g. pipes and corrugated roofing material are being imported from the Russian Federation and China, and the Dushanbe cement factory resumed production of corrugated asbestos-cement sheets in September 2013.

Radiation

Uranium tailings in Tajikistan remain an environmental risk because of their unsecure construction; they pose a threat at local and national levels, as well as downstream of the Syr Darya River in northern Sughd Oblast, which is home to ten radioactive burial sites. As a result of rehabilitation activities and with considerable international support, eight of the tailings have been sealed. However, at the two remaining sites, loose powder from nuclear process residue has been housed in unsecured facilities, where it can blow through cracks or seep out into the ground during heavy rains or flooding. Currently, the sites are being regularly monitored by Tajik specialists as well as international organizations, notably the IAEA.

A study published in 2013 reported on assessment of the radiological situation due to exposure to gamma radiation, radon and thoron in different indoor and outdoor public and residential environments at the former uranium mining and processing sites at Istiklol (formerly, Taboshar) and Digmay. Current levels do not represent a hazard to the health of the resident population, with the exception of some

specific situations. A radiation hazard could be associated with the Digmay site, such as elevated exposures to ionizing radiation at the tailings site and/or in industrial facilities, where gamma and radon and thoron dose rates could reach values of several 10 mSv/a.

Climate change

An assessment of the vulnerability of and climate change health impacts on the population was conducted in the framework of a WHO-coordinated seven-country initiative on protecting health from climate change (2009–2013). Under climate change in coming years, an increase in extreme heat and cold events is expected in Tajikistan, causing increased mortality in vulnerable groups such as infants and elderly people. Climate change is also expected to further aggravate air-quality-related health problems in the big cities, contributing to a worsening of the respiratory and cardiovascular consequences on groups of residents and an increase in asthma and allergies. There is a risk of certain vector-borne diseases, e.g. falciparum malaria. Rates of gastrointestinal infections, e.g. salmonella, are projected to increase, due to increasing temperature- and flood-related water contamination. The most vulnerable populations are in the rural areas.

An assessment of food security and nutrition in South Tajikistan in 2011 conducted by the Save the Children found that food prices are expected to increase and that prices of fuel and imported wheat will remain high and not decrease with the onset of the autumn cultivation season. By 2050, crop yields are projected to decrease by up to 40 per cent.

Occupational health

There is no information system on work-related accidents and injuries, nor on occupational diseases; such statistics have not been systematically produced. Surveillance of occupational diseases and overall control and enforcement of occupational safety are challenged by informal agreement being the most widespread form of employment. In recent years, increased interest in occupational health and safety issues is observable, and the role of labour inspection in addressing these is widely promoted. The staff involved in occupational health and safety have been exposed to extensive capacity building on risk management systems, targeting various high-risk sectors, such as construction, agriculture, etc.

Migrant Tajik workers, who are mostly in the Russian Federation and Kazakhstan, have to take low-skilled jobs, most of them in construction and

agriculture, and in some cases they are subject to forced labour. They are exposed to high health and safety risks from a high manual workload, hazardous working conditions in extreme climate and poor basic occupational safety conditions.

Child labour

Although national legislation prohibits the employment of children below 15 years of age (except for some types of light work, for which children above 14 years of age can be employed), child labour still remains a widespread problem.

According to the 2009 Labour Force Survey, during the period 2004–2009, almost 180,000 children below 15 years of age had to work at least one hour per week and 52,000 of those had to work 20 hours per week. This survey showed that child labour is used mainly in agriculture (98 per cent), trade (0.9 per cent), processing industry (0.5 per cent) and construction (0.5 per cent). In cities, children most commonly work as waiters, house and office cleaners, shop assistants, car washers, at loading and unloading goods and baggage at local bazaars, and on any subsidiary work. Apart from the risks they run, ranging from accidental injury to abuse, hazardous working conditions, physically demanding work, inadequate rest and malnutrition inevitably affect the children's health. Most working children are found in rural areas, where children from farming families are involved in manual labour all year round, not just at harvest time. Such a cycle of work, implying lack of schooling, leads minors – and especially girls – seamlessly into a life of bonded labour.

According to Child Labour Survey 2012–2013 conducted by the Agency of Statistics in collaboration with the ILO's International Programme on the Elimination of Child Labour, 26.9 per cent of boys and 19.7 per cent of girls aged 5–17 years are working. In the 5–11 years age group, these figures are 13.3 per cent for boys and 8.1 per cent for girls. Among 12–14 years group, 34.7 per cent of boys and 25.1 per cent of girls are working and in the 15–17 years age group, these figures are 45.5 per cent and 38.4 per cent, respectively. Children are mostly in elementary occupations and are unpaid family workers. The proportion working as employees is limited to 4.1 per cent of all working children.

Up to 40 per cent of cotton picked in 2004 was picked by children. Schoolchildren are still sent out to pick cotton by hand every autumn and the risks of exhaustion, heat stroke, malnutrition and lack of basic hygiene are common among them. Data on the

number of children involved in cotton picking – one of the worst forms of child labour – are not available.

14.3 Legal, policy and institutional framework

Legal framework

The 2003 Law on Ensuring the Sanitary and Epidemiological Safety of the Population, amended in 2008, 2011 and 2013, sets the legal grounds of state policy on health protection and epidemiological safety. This Law sets out the general rights and obligations of persons, private entrepreneurs and legal entities on health protection and epidemiological safety, the basic goal and principles of state policy, and principal activities of the state in pursuing these. It sets out the content of public health surveillance – as a broad activity also involving health promotion, disease prevention and control measures and sanitary-epidemiological expertise. Provision of information to the public and the people's right to a safe environment are also encompassed.

The Law stipulates specific actions that can be required to be taken during public health emergencies. It describes the state surveillance information system and also that of environmental public health monitoring, and stipulates that air and water quality, food safety and waste management activities are subject to sanitary-epidemiological monitoring. The Law sets out the competencies and powers of central and local government authorities and, in particular, the responsibilities, powers and organization of the Service of State Sanitary and Epidemiological Surveillance (SSSES). The sanitary-epidemiological safety of the population is to be provided through a complex of measures, inter alia, the development and implementation of state, national and regional programmes on creating and sustaining healthy living environments and conditions for human lifelong activities, and also coordination of actions with other relevant state bodies. This reflects the legal basis for public health protection, i.e. by acting in a coordinated way on health determinants, in particular environment-related health determinants.

The 2009 Law on Occupational Safety sets the legal basis for and a more modern approach to occupational safety management. The 1997 Labour Code sets forth the rights and obligations of employers and workers. It regulates forms of employment contracts and termination of employment. Currently, a new labour code is being developed.

The 2006 Law on Protection of the Population from Tuberculosis sets the competencies and powers of central and local government, and the organization and provision of TB care. It establishes legal requirements for compulsory examination and treatment of TB patients, veterinary and sanitary epizootic measures to combat TB on livestock farms, statistical observation in the field of protection of the population from TB, as well as social support for TB patients, those under follow-up in TB centres, health workers and employees involved in delivery of TB care.

The 2011 Law on Environmental Protection lists among the principles of environmental protection the priority of protecting the lives and health of the population. Population health is to be taken into account in setting environmental standards and norms and in implementation of state ecological expertise and environmental impact assessment. The Law defines obligations concerning health protection during environmental emergencies and disasters, but does not provide for intersectoral links with the Ministry of Health and Social Protection of the Population.

The 2011 Law on Environmental Information includes information about public health and safety of citizens in the context of environmental information.

The 2012 Law on the Protection of Atmospheric Air has a dual focus, i.e. maintenance, improvement and restoration of ambient air quality as well as prevention and reduction of adverse chemical, physical and biological impacts on it. Assessment and management of ambient air quality with a view to protecting human health and ecosystems is beyond the scope of this Law. The role of the health sector is to define air quality standards and perform sanitary surveillance on air quality.

The 2010 Law on Drinking Water and Drinking Water Supply sets the competencies and powers of central and municipal government as well as the mandates and responsibilities of the authorized government body on drinking water supply. The Law regulates public and private forms of ownership, and also centralized, autonomous and "mobile" types of drinking water supply. Concerning the quality of drinking water, provisions are set on the selection of water sources and treatment methods, continuous control of drinking water quality in centralized supply systems, review and update of the standards every five years, water protection zones, etc. The SSSES is responsible for drinking water quality monitoring and control, as well as – in cooperation

with the state environmental authorities and the authorized state body on the use and protection of waters – control of the drinking water supply. The Law sets the competencies for source water assessment for surface and ground water sources. There are no provisions on restriction of use of water sources and remedial actions.

The 2012 Law on Safety of Food Products aims to protect human life, and consumer as well as animal and plant health, during food processing, transportation, storage and trade, without compromising the environment. It regulates foodstuffs and ingredients, including dietary food, infant food and biological food additives, and also packaging materials. The Law lays down basic principles of food safety, i.e. risk assessment, prevention, control, traceability and consumer protection, with the aim of ensuring a high level of protection of human life and health through state regulation, compliance with food safety standards, production control and testing measures. The Law includes provisions for food safety control, as well as for composition and mandate of a coordination council on food safety – a multisectoral body operating at central level.

The 2010 Law on Veterinary Medicine establishes general legal and organizational requirements for veterinary and sanitary safety of foodstuffs of animal origin, ensuring veterinary and epizootic well-being and livestock quarantine, as well as modalities for conducting the state veterinary control. The Law stipulates mandatory state veterinary control at markets and other places of trade of livestock, food and raw materials of animal origin.

The 2003 Law on Radiation Safety aims at protecting human health and the environment. A number of regulations, norms and guidelines, based on the provisions of the Law, are enforced, e.g. Rules and Norms 01.001-12 "Requirements for ensuring physical safety of radiation sources and radioactive substances storage facilities, revised version", approved by the 2012 Order of the Agency for Nuclear and Radiation Safety under the Academy of Sciences of the Republic of Tajikistan No. 1-121. The new full revision draft of the Law is currently under consultation with other relevant ministries before its submission to the Parliament.

The 2010 Law on Restriction of the Use of Tobacco Products prohibits smoking in public places such as healthcare and education facilities, governmental offices, public transport, indoor offices and private workplaces except in designated smoking areas, which are mandated. The Law does not address

smoking in public places such as catering facilities (restaurants) and drinking facilities (cafes, pubs and bars).

A large number of sanitary rules and norms (SanPiNs) complement the legislation, of which the most recent include:

- Drinking water. Hygiene requirements for the quality of water in centralized water supply systems. Quality control. Sanitary rules and norms SanPiN 2.1.4.004-07. (The norms for drinking water quality from centralized water supply systems are currently under revision following the WHO Guidelines for Drinking-Water Quality);
- Requirements on water quality of non-centralized water supply. Sanitary protection of sources. Sanitary rules and norms SanPiN 2.1.4.005-07;
- Sanitary protection zones of water sources and water supply systems for domestic and drinking purposes Sanitary rules and norms SanPiN 2.1.5.006-07;
- Protection of the population from exposure to electromagnetic fields generated by radio-technical facilities. Sanitary rules and norms SanPiN 2.2.4.014-08.

A number of SanPiNs on food safety are in need of revision in order to ensure implementation and enforcement of the 2012 Law on Safety of Food Products.

Policy framework

At present there is no integrated strategy on environment and health.

Within the health dimension, priority goals of the National Development Strategy for the period until 2030 focus on: establishment of a national food safety system according to global practices and further development of veterinary-sanitary and phytosanitary services; monitoring and promotion of the reduction of water, air and soil pollution; and prevention of food-borne epizootic infectious and parasitic diseases through improving hygiene and sanitation, particularly in rural areas. The key actions imply development and implementation of an integrated approach to health and biosafety under the "one health" concept and the scaling up of primary health care, particularly in rural areas. The Strategy highlights integrated policy measures to address the living environment – an important social and environmental determinant of health. The focus is on providing the population with affordable,

environmentally friendly and healthy housing and communal services, and on strengthening response to natural disasters. Attention is given to the specific needs of women and girls and other vulnerable groups in access to water, sanitation and hygiene services and to gender-specific issues in actions in the face of natural disasters.

The Living Standards Improvement Strategy for the period 2013–2015 (2012 Resolution of the Majlisi namoyandagon of the Majlisi Oli No. 1030) is further advancing the policy agenda by addressing the intersection of environment and development. It puts forward objectives on creating safe environments with respect to air quality and waters, for example, through acting at the source of the problem or in a specific economic sector and promoting the use of EIA. With respect to promoting population health and managing its environment-related determinants, through infectious diseases control and prevention, and access to clean drinking water and communal sewerage systems, for example, policy actions are limited to those inherent to the healthcare and housing and utilities sectors. Well-coordinated actions taken at the level of the economic sectors that "drive" environmental pollution, as well as at the level of risk management, can yield greater societal and economic benefits.

The overarching goal of the National Health Strategy for the period 2010–2020 (2010 Resolution of the Government No. 368) is improvement of the population's health and creation of healthier environments through health system reform and modernization. More specifically, actions are centred on strengthening maternal and child health, reducing the burden of disease, disease control and prevention, and health promotion, as well as tackling health risks such as those related to drinking water and air quality, food safety and workplaces. Building and practical implementation of public health services with essential functions for (i) monitoring the population's health status and trends in order to identify health problems and risk factors, (ii) strengthening laws and regulations for health protection, ensuring the relevant capacities, and (iii) preparing, planning and taking relief measures in the face of public health emergencies, are somehow vaguely specified and lacking action orientation. Furthermore, the public health package providing information on the health impacts of risk factors from the natural, living and working environment, and epidemiological surveillance, is not sufficiently articulated. Specific actions as a part of the health sector reform and modernization to advance the stewardship function – the core of integrating health

aspects into other sectors and policies concerned with ensuring health protection – are rather limited.

Implementation of the National Health Strategy is facilitated by the useful instrument of annual review of progress prepared jointly by the Ministry of Health and Social Protection of the Population and a number of international, foreign and national partners in the framework of an EU-supported project implemented in collaboration with WHO. The most recent review, for the period 2013–2014, has pinpointed that strengthening primary healthcare services across the country faces considerable challenges, especially in rural areas. This in turn affects the infrastructure of the environmental public health component, of which the SSSSES is an intrinsic part, and hinders overall progress.

The Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 (2006 Resolution of the Government No. 514) has as one of its objectives to provide 80 per cent of schools with sanitation by 2015 and 55 per cent with drinking water by 2020.

The Programme of Development of the Housing and Utilities Sector for the period 2014–2018 (2014 Resolution of the Government No. 506) aims at rehabilitation and further construction of water supply and sanitation systems to increase population coverage in households, schools and preschool centres to provide sustainable access to safe and affordable communal water supply and sewerage systems.

The Strategy on Nutrition and Physical Activity for the period 2015–2024 (2014 Resolution of the Government No. 808) focuses on reducing and preventing the double burden of nutrition: from under- and malnutrition (resulting in stunting, micronutrient deficiencies) related to food security, and from non-communicable diseases and disorders (resulting in overweight and obesity) related to unhealthy diet. Priority actions centre on disease prevention through healthy nutrition and physical activity, with particular attention given to gender-specific issues, children's food and feeding, including nutrition at schools and kindergartens, and the needs of other vulnerable groups.

The Strategic Plan on Establishment of a Health Information System for the period 2011–2015 (approved by the 2011 Order No. 579 of the Minister of Health), which aims to establish information support for health management, is being focused predominantly on health care and is of limited use in providing the health sector with arguments to enable

it to act as "steward" advocating for improvements in areas outside the sector's direct control.

The Occupational Safety and Health Programme for the period 2013–2016 (2012 Resolution of the Government No. 684) introduces economic mechanisms for employers to use to provide a healthy and safe work environment, clarify employer–employee relations and institute modern risk management systems. The Decent Work Country Programme of Cooperation between the Republic of Tajikistan and the International Labour Organization for 2015–2017 (2015 Resolution of the Government No. 103) resulted from an intensive consultation process between the Government, Federation of Independent Trade Unions, Union of Employers and ILO.

The Programme of Response to the HIV/AIDS Epidemic for the period 2011–2015 (2010 Resolution of the Government No. 562) aims to provide high coverage of preventive services and HIV testing to key populations, increase anti-retroviral therapy and strengthen infection control in health facilities. The 2015 WHO review of the Programme reported signs of the HIV epidemic increasingly affecting the general population and its recent escalation among very young children, owing to inadequate HIV testing among key populations, late HIV diagnosis and/or start of therapy and inadequate enrolment into therapy.

The State Environmental Programme for the period 2009–2019 (2009 Resolution of the Government No. 123) includes measures of high relevance for public health, which focus on air quality, safe water and waste management, including strengthening ecological control and remediation of industrial pollution hotspots, and also measures such as prevention, risk management and response to natural disasters.

The Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) which aims, during the first phase, at separating production, management and enforcement activities from policymaking, is well advanced. The second phase is being launched to introduce integrated water resources management and the river basin approach throughout the country and, alongside this, set up the necessary intersectoral mechanisms in the form of a national water council to ensure coordinated action on water resources. The integrated management would enable the country to balance different and sometimes conflicting requirements on water resources and achieve maximal benefits for human health and the

environment through a system of river basin management plans.

The Programme of Emergency Preparedness and Radiation Safety for the period 2013–2017 (2012 Resolution of the Government No. 770) lays down the foundations for strengthening the legal and regulatory framework on emergency preparedness and response, with an emphasis on radiation incidents. It also comprises measures on planning by category of potential threat and on the establishment of institutional arrangements, e.g. a crisis management centre, first responders' teams, etc., as well as mechanisms for building the necessary capacity according to international requirements.

Most strategic documents are accompanied by implementation/action plans and include monitoring and evaluation mechanisms, including some indicators (administrative/management indicators and, in some cases, outcome indicators) and estimates of necessary financial resources. This shows the good potential of these documents to underpin health and environmental policy development. However, it is difficult to find information or analytical reports on the status and progress of implementation of the strategic policy documents. In the case of outcome indicators bound to the MDG targets, it is again not possible to gauge the potential effects of specific policy measures. Policy documents have been implemented in parallel with ongoing public administration reforms, and structural changes and institutional reorganizations, following the 2013 Decree of the President No. 12.

Other documents and policy development efforts

The draft national food safety strategy, prepared in 2014 as a road map for the establishment of a food safety control system according to international standards, pinpoints regulatory, organizational and managerial, and technical measures as a coherent set of integrated actions. These encompass the entire food chain from production to consumption spanning different government sectors and involving public and private actors. The draft Strategy has not yet been approved by the Government; some of the measures are included in the Programme of Adaptation of the Economy of the Republic of Tajikistan to Membership of the World Trade Organization (WTO) (2014 Government Resolution No. 691).

In the framework of the WHO-coordinated seven-country initiative on protecting health from climate change, a cross-cutting National Climate Change and

Health Adaptation Strategy and Action Plan of Tajikistan has been developed and is currently undergoing final approval from the Ministry of Health and Social Protection of the Population. International legal frameworks, such as the International Health Regulations (2005) and WHO Guidelines for Drinking-Water Quality, were used to develop measures on communicable disease monitoring and control, and on water safety plans, respectively. These measures focus on protecting health from extreme weather events, improving and strengthening the public health system infrastructure, enhancing surveillance and early warning systems and raising awareness among the population.

Building a national integrated policy framework for sound management of chemicals in the context of the international policy framework the Strategic Approach to International Chemicals Management (SAICM) has seen little progress. A multi-sectoral working group developed a national chemical safety action plan but it was put on hold.

At the Fifth Ministerial Conference on Environment and Health (Parma, 2010), the 53 Member States of the WHO European Region committed themselves to developing national programmes for the elimination of asbestos-related diseases by 2015, in collaboration with WHO and the ILO. As of early 2016, among 16 countries participating in a recent WHO survey, Tajikistan is one of five which have not yet put in place a policy to ban different forms of asbestos, its sole regulation on asbestos being the regional multi-state agreement Interstate Standard GOST 12871-93 that regulates interstate trade and transport of chrysotile asbestos.

Institutional framework

Ministry of Health and Social Protection of the Population

The Ministry of Health and Social Protection of the Population is responsible for development and monitoring of the implementation of health policies, legislation and regulations, and for promotion of the inclusion of health-related actions in other public policies. It is also responsible for monitoring occupational health and control of risk factors in the workplace. It is mandated to provide sanitary-epidemiological surveillance, and also – within its competencies – to take measures on ecological and radiation safety and environmental and health protection. The Ministry also approves procedures on production of health-related statistics and reporting.

Under the Ministry, the Tajik Scientific Research Centre for Preventive Medicine conducts research on communicable and non-communicable diseases and environmental health and nutrition, prepares annual health reports to inform health policy and drafts health-related regulatory documents. The Centre is equipped with relatively modern microbiological laboratories and its projects are mainly financed through participation in tenders of the Presidential fund. The Republican Centre of Nutrition has a food security focus. The Republican Centre for Medical Statistics and Information produces data for the main health and healthcare indicators.

The Service of State Sanitary and Epidemiological Surveillance (SSSES) – an integrated centralized system of entities comprising the Republican Centre for Medical Statistics and Information, three regional centres and 69 centres at district and municipal levels – is the authorized state body responsible for public health protection and epidemiological safety. The core functions of the Service focus on: (i) epidemiological surveillance, monitoring and control of the sanitary-epidemiological situation, including sanitary-quarantine control at border checkpoints; and (ii) control for compliance with sanitary-hygiene norms and regulations of private and public establishments managed by physical or legal persons, as well as control of project documentation of industrial, commercial or other establishments, and enforcement in the event of non-compliance.

The Republican Centre collects national statistics on population health and epidemiological safety and manages national registries of communicable, non-communicable (poisonings) and occupational diseases as a national information resource. It conducts quality control of the statistical reports of the oblast, district and municipal centres, provides technical and methodological support and serves as a training centre.

The oblast, district and municipal centres of the SSSES undertake the core functions in their jurisdictions, and report to the Republican Centre. Their structures and organization vary with size of the population served, but all have three major departments, of sanitary and hygiene inspection, surveillance of communicable diseases and surveillance of very dangerous infectious diseases. Traditionally, the sanitary and hygiene inspection department has covered a broad range of issues, including environmental and occupational issues, along with child and adolescent health and communal hygiene, food hygiene and nutrition, and sanitary-epidemiological expertise and certification.

Laboratories, both microbiological and chemical, complement and support health-related activities: there are four bacteriological and four chemical laboratories at the regional level and 64 bacteriological and 24 chemical laboratories at the municipal and district levels.

The SSSSES carries out surveillance of communicable diseases, including those that are environmentally mediated, i.e. water- and foodborne diseases and food poisoning, but the national system is at a very basic stage of development. It is prone to underreporting as there are no clearly specified data flows and service delivery models in place to integrate all sources of water- and foodborne disease data, including those from primary healthcare centres and hospitals. Deficiencies in laboratory testing of clinical and environmental (e.g. water, food) samples means that diseases are to be reported as belonging to the broader class of acute gastrointestinal infections without detection of the causative agent and its source. Due to difficulty in determining the background disease incidence rate, the majority of local outbreaks remain undetected, as does the source of the outbreak. Vertical data flows (from district to centre) and mainly paper-based reporting, as well as a lack of early reporting tools, essentially limit the reliability and timeliness of the surveillance system.

The SSSSES, through its sanitary and hygiene department, conducts monitoring and control of drinking water quality and the safety of centralized water supply systems and wells in rural areas. This focuses in particular on the level of chlorine at the end-use point and microbiological tests, including pathogen testing, as per the relevant sanitary rules and norms (SanPiNs). Monitoring and control coverage in rural areas is poor, due to a lack of technical capacity, laboratory equipment and transportation. The lack of ownership of the collective water supplies, which belonged to the kolkhoz and sovkhoz farms and some major enterprises after their closure, poses serious concerns for the quality and safety of drinking water, due to their current "orphan" status. The SSSSES also conducts control and inspection of the water supplies as per the SanPiN.

The SSSSES carries out monitoring and control of 12 groups of food products and beverages. The laboratories at district level have rather limited analytical capacity and only 39 bacteriological laboratories are operational. Samples are taken in the event of emergency or following consumer complaint about catering facilities, restaurants, retail premises (supermarkets or shops), bazaars and markets. Sampling and testing of ingredients and raw

materials is also taking place as part of official control of food processing establishments. In the event of emergency, such as food poisoning or a foodborne disease outbreak, the SSSSES investigates and takes appropriate actions. In an emergency related to fresh products of animal origin, the SSSSES is mandated to conduct a joint investigation along with a veterinarian from the State Veterinary Inspection Service (SVIS). At present, the SSSSES conducts very limited food safety tests, most of them bacteriological. Capacity for analyses related to food safety hazards such as heavy metals, toxins, drugs and pesticide residues is very limited; regular monitoring of contaminants in the food chain does not occur at all.

The SSSSES has a high number of laboratories, and there is considerable difference between their diagnostic capabilities at different administrative levels. The laboratories are outdated and do not have appropriate infrastructure; equipment is outdated or broken, and there is a lack of reagents and consumables. Erratic supply of water and electricity without adequate backup is another problem most of the laboratories face, in addition to a lack of required manpower. The microbiological laboratory of the Republican Centre is accredited by the Agency for Standardization, Metrology, Certification and Trade Inspection (Tajikstandard). With the ongoing health sector reform, there is consolidation of laboratory capacity through the integration of sanitary and clinical diagnostic laboratories, taking into account logistics as a key for defining laboratory networks and services. Tajikistan participates in the WHO programme on strengthening laboratory capacity to support national programmes in East Europe and Central Asia.

The SSSSES establishes codes of practice and requirements for food processing and manufacturing facilities, and product specifications, and sets norms for facilities and infrastructure, manufacturing, raw material control, handling, storage and transportation for markets, food catering facilities and restaurants. It is authorized to issue permits for building and establishing new food processing enterprises, markets and retail outlets, and to implement control and inspection activities according to SanPiNs, standards and guidelines from the Soviet era, and some adapted Russian Federation SanPiNs, standards and guidelines.

Effective control requires application of risk analysis and is of primary importance for staff of the SSSSES sanitary and hygiene department. There is a lack of capacity and knowledge in environmental health risk assessment and management within the country.

Furthermore, the surveillance system does not make use of epidemiological methods. Reports contain only aggregated disease incidence data and compliance rates are sometimes not easily available.

The responsibility for occupational health lies with the health sector. The Republican Centre of Occupational Diseases under the Ministry of Health and Social Protection of the Population diagnoses and confirms occupational diseases. With the ongoing health sector reform, the scope of inspections and their implementation mode are being redefined. For example, the monitoring and control of indoor air quality at workplaces by the SSSSES is now conducted only in hospitals, pharmacies and other healthcare facilities. Cooperation between the SSSSES and the Service of State Control on Labour, Employment and Social Protection of the Ministry of Labour, Migration and Employment of the Population has been intensified, including through joint inspections.

Ministry of Agriculture

The State Veterinary Inspection Service (SVIS) under the Ministry of Agriculture is the authorized state body responsible for animal health, prevention and control of zoonotic diseases and control of food of animal origin. It comprises the Service Headquarters, Republican Centre of Epizootics, National Centre of Veterinary Diagnostics and Department of State Veterinary Surveillance at the Borders. It has a vertical infrastructure, with an office in Dushanbe, three oblast offices and 68 stations focused on fighting animal diseases. The laboratory network includes 22 veterinary diagnostic centres under the National Centre and 74 laboratories of veterinary and sanitary expertise located in fresh food markets across the country.

The SVIS surveillance of zoonotic diseases uses vertical (district to national) data flows and is limited by the poor system of control of animals' movement and traceability, insufficient human resources and reagents, and inadequate ICT systems. The SVIS has a mandate to set requirements for codes of practice; to set permit requirements for construction of premises for primary processing, infrastructure and facilities; and to establish mandatory parameters on primary processed food of animal origin, such as microbiological criteria, veterinary drug residues, testing procedures and methodology. Foodborne diseases, especially those caused by parasites, are also controlled by the SVIS.

The SVIS has the primary mandate for food control at fresh markets and bazaars and has dedicated staff

and a laboratory in each of the major ones. At present, the majority of laboratories located in the bazaars have rather limited capability to perform analyses related to food safety; therefore, approval is mostly based on visual and organoleptic checks.

Data from the surveillance of zoonotic disease are collected monthly and analysed by both the SSSSES and SVIS. There are essential gaps in data sharing between the two and a lack of collaborative activities on prevention and control of zoonoses, owing mostly to the inconsistency of data on the incidence of some zoonoses in humans and animals, ad hoc joint investigation of zoonoses in humans, the lack of an adequate early warning system, inadequate interdisciplinary collaboration between both services in health education activities, and inadequate epidemiological data exchange and coordination at district level.

The State Service on Phytosanitary Protection and Plant Quarantine and the State Organization on Plant Protection and Agricultural Chemicals under the Ministry of Agriculture are involved, among other, in food safety activities.

Others

The Ministry of Labour, Migration and Employment of the Population is responsible for technical safety at work. The labour inspectorate has been transformed into an integrated Service of State Control on Labour, Employment and Social Protection and is the state executive agency responsible for control and enforcement of the labour-related legislation among all physical and legal entities, public or private. There is an extensive list of workplace factors, such as indoor air quality and microclimate, noise, vibrations, radiation, toxic substances, etc., to be controlled by the SSSSES, in particular in small factories and enterprises that do not have their own laboratories. Monitoring and control of working conditions in large enterprises are performed by the enterprises' own laboratories and those with more than 1,000 personnel also have an occupational health physician.

The central state executive body responsible for environmental policy implementation is the Committee on Environmental Protection. The Hydrometeorology Agency under the Committee is responsible for the monitoring of hydrometeorological conditions and environmental quality, in particular of ambient air and surface waters, and for conducting weather forecasting, providing alerts on extreme weather events or pollution episodes. There are no databases and

therefore there are several constraints on the availability and accessibility of air quality and climatic data. The Committee and the Main Administration on Geology under the Government are responsible for groundwater protection. Water resources are in the competences of the Ministry of Energy and Water Resources, Ministry of Agriculture and a few other actors (chapter 6).

The Committee on Emergency Situations and Civil Defence under the Government is responsible for coordinating the activities of all authorities involved in disaster preparedness and response, including the health authorities. The health system component of sanitary-epidemiological security and emergency medical care needs considerable strengthening of its preparedness, planning and crisis management aspects.

The Agency for Nuclear and Radiation Safety under the Academy of Sciences is a research institution and the state regulatory authority on radiation safety and environmental radiation monitoring. It carries out diverse activities, including licensing of the use of radioactive substances, approval of regulations and guidance on radiation safety, emergency preparedness and response, registration and control of nuclear materials and sources of ionizing radiation, and inspection of compliance with regulations on radiation safety and licence conditions. The Agency also determines the requirements for employees who have onsite occupational exposure to ionizing radiation sources and other hazards, in the form of both individual and workplace monitoring. Radiological occupational exposure control and assessment is conducted every quarter of the year and is currently provided to 400 professionals in different hospitals under the Ministry of Health and Social Protection of the Population, the Committee on Emergency Situations and Civil Defence under the Government, the Customs Service and the State Enterprise "Radioactive Waste Disposal Site" in Faizabad city. The Agency conducts QA/QC of medical facilities and identifies whether operating facilities are in compliance with radiation safety requirements.

The Agency for Standardization, Metrology, Certification and Trade Inspection (Tajikstandard) checks for compliance with technical regulations, SanPiNs and trade rules. It controls trade, catering trade rules, quality and safety of products and ensuring consumer rights.

Coordination bodies

The Coordination Council on Safety of Food Products (2013 Resolution of the Government No. 495), established in accordance with the 2012 Law on the Safety of Food Products, is a scientific and technical advisory body to the Government on specific decisions and the development of legal acts on food safety. Its composition is meant to ensure the coordination of all authorities involved in food safety. The Council consists of the heads or deputy heads of ministries and agencies with a mandate in safety of food products, as well as representatives of public and research organizations and experts. The Council has become operational and convened its first meeting in the fall of 2014.

A dedicated intersectoral group comprising representatives of the Committee on Emergency Situations and Civil Defence, Agency for Nuclear and Radiation Safety, SSSSES and IAEA has been established to act in the event of a radiological emergency.

Intersectoral collaboration

Working groups composed of experts as well as policymakers from different sectors are often established for the development of policy programmes and legal acts, i.e. to reflect intersectoral collaboration during policy development. Sustainable partnerships involving different sectors in the implementation of policy and legislation on environment and public health are, however, rather limited. Coordination councils put in place to strengthen coordinated actions on cross-cutting issues such as climate change and food and water safety operate at the central level. At the operational level, each authority manages its own laboratory network without coordination and cooperation and without data exchange. The hierarchical organization of various sectors makes effective local intersectoral collaboration on environment and health issues difficult.

Such a multi-agency organizational framework under vertical infrastructure is likely to feature deficiencies in ensuring human health and safety along the entire food chain, producing duplication of effort on some elements while others remain uncovered. The competent authorities have the mandates to set their own requirements and to enforce them using their own laboratory networks, which raises the potential for conflict of interest. Each institution authorized in the field of the safety of foodstuffs has a network of its own at national, regional and district levels, and

numerous laboratory units, and this requires considerable resource investments.

Monitoring and control of environmental health risks and disease surveillance are conducted independently by a large number of institutions and services falling under different administrations and involving complicated vertical infrastructures. The lack of coordination among various monitoring networks and rather limited data sharing significantly hinders their effectiveness in providing reliable, timely data relevant to public health and the environment. Environmental reporting, which is most often in the form of aggregated figures on compliance, does not indicate the magnitude of environmental health risks. Preparation of reports is regarded as the publication of statistics with neither the integration of data and information nor the formulation of strategic conclusions.

Selected measures

The Ministry of Health and Social Protection of the Population and the SSES started a process of incremental uptake of water safety plans (WSPs), to strengthen public health. As an initial step, during the period 2011–2012, WSP facilitators were trained and WSP projects were carried out in two pilot communities – Qaragoch in Hamadoni District and Navobod in Panjakent District. These pilots confirmed the feasibility of implementing WSPs in rural Tajikistan and led to immediate improvements in the water supplies of those communities. A step-by-step field guide has been developed to assist rural communities in implementing WSPs. Several initiatives are emerging to support further scale-up of WSPs in Tajikistan, particularly in rural areas and small towns. The country has set targets for water quality and implementation of good practices in water resource management, in particular to develop WSPs in five cities by 2015 and 30 rural communities by 2017.

Surveillance of typical foodborne diseases and zoonoses is not sufficiently advanced to enable assessment of the magnitude of the public health problem and the likely effectiveness of the health system in their recognition and reporting. Some progress has been made in strengthening prevention and control of foodborne diseases since 2010. Training in prevention of foodborne disease, especially botulism, and in integrated surveillance of foodborne infections with a focus on antimicrobial resistance, took place in 2013. Guidelines on strengthening national surveillance of brucellosis were developed and approved (2015 Order of the

Minister of Health and Social Protection of the Population No. 742).

Training activities have been conducted on the introduction of international food safety standards in the country. GIZ organized a two-year programme (2009–2010) to train local experts on the hazard analysis and critical control points (HACCP) system and to assist enterprises in implementing it. Twenty-two enterprises implemented HACCP, of which ten are now certified. FAO and WHO conducted training on HACCP for the SSES and SVIS. The results from the FAO project "Capacity development in food safety risk management of food processing enterprises and national authorities in the Kyrgyz Republic and the Republic of Tajikistan" (2014–2015) provide a good basis for dissemination of information about good hygiene practices throughout the country.

Overall, harmonization of the legislation to international food quality and safety standards, as well as introduction of HACCP, is still under way.

Infrastructure in healthcare facilities

Water supply, sanitation and hygiene remain major issues for healthcare facilities. An assessment of selected rural health centres (RHCs) conducted by the Ministry of Health in 2013 in preparation for the Tajikistan Health Services Improvement Project funded by the World Bank, suggests that all centres in Khatlon and Sughd Oblasts do not have regular access to safe water and adequate sanitation systems. Water is carried from residential areas and office buildings, increasing the risk of infections from pathogenic bacteria, viruses and parasites. In summer water is boiled using water heaters and in winter it is boiled in minimum quantities using wood-burning stoves. Sanitation systems are typically non-concrete pit privies located in the RHC backyard, which poses significant risks for soil and groundwater contamination. Wastewater from washing, etc. is discharged to open trench drains at the side of the roads.

There are no centralized healthcare waste management facilities or sanitary/secured landfills in Tajikistan. Again, rudimentary waste disposal methods are in use, and the disposal sites typically found on the grounds of RHCs lack safety protection. Almost all RHCs are located close to public and residential buildings and the smoke generated by their burning waste can have adverse health impacts.

In the period 2013–2015, the green hospital project has been implemented in four of Tajikistan's

hospitals with the objective of introducing an efficient, environmentally friendly and hygienic hospital management system. An integrated concept for an environmentally friendly hospital is being developed to guide hospital management in reorganizing infrastructure and planning the necessary investments. The experience gained will serve the Ministry of Health and Social Protection of the Population to promote the integrated concept for hospital infrastructure management on a strategic level and in practice.

14.4 Health-related global and regional agreements and processes

Tajikistan is not a Party to the 1999 ECE/WHO Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes. With support from Norway, intensive activities have taken place during the period 2012–2013 on setting targets and target dates in the context of the Protocol. In consultations involving water resource management and water supply and sanitation stakeholders, the SSSSES and other relevant sectors and stakeholders, targets and target dates were proposed on: (i) drinking water quality compliance for cities, towns and rural settlements; (ii) WSPs being developed for cities, towns and rural settlements; (iii) legislation on the human rights to clean water and communal services; (iv) water-related infectious diseases; (v) access to improved sanitation in urban and rural areas, schools and preschool centres; and (vi) regular national report on drinking water quality, as of 2017. Due to the lack of a political decision on Tajikistan's accession to the Protocol, those targets and target dates were not officially endorsed. Since 2015, Tajikistan works on the revision of targets, with support from Finland.

Tajikistan is a member of the international standards-setting bodies on sanitary and phytosanitary measures, i.e. the FAO/WHO Codex Alimentarius Commission and the World Organization for Animal Health (OIE), and a Party to the International Plant Protection Convention, but its participation has been on an ad hoc basis. The harmonization of Tajik standards with international standards, especially those dealing with food-safety-related parameters, will improve with increased participation in these international standard-setting bodies.

In 2013, Tajikistan ratified the WHO Framework Convention on Tobacco Control. The country's national smoke-free policy measures, which are limited to only restricting smoking, and monitoring

of smoking prevalence in the population, show low compliance with the Convention.

Some of the up-to-date ILO technical conventions of major relevance to health and the working environment are ratified by Tajikistan: the Convention concerning the Protection of Workers against Ionising Radiations, 1960 (No. 115), Convention concerning the Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration, 1977 (No. 148), and Convention concerning Occupational Safety and Health and the Working Environment, 1981 (No. 155). Concerning the reporting obligations, the country has not yet provided the requested reports on Convention No. 148 and Convention No. 155. The Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents, 1974 (No. 139), Convention concerning Safety in the Use of Asbestos, 1986 (No. 162) and Convention concerning Safety in the use of Chemicals at Work, 1990 (No. 170) have not been ratified. In response to its obligations under the ILO Conventions, Tajikistan has put in place a substantial body of national legislation, such as the 2003 Law on the Production and Safe Use of Pesticides and Agrochemicals, the 2003 Law on Radiation Safety and the 2009 Law on Occupational Safety.

The country ratified the ILO Convention concerning Labour Statistics, 1985 (No. 160) in 1993 but does not maintain and report statistics on occupational injuries and time lost on them, and fatalities.

The United Nations has made efforts to support the initiatives of countries in the region, including Tajikistan, in implementing United Nations Security Council Resolution 1540 (2004), which obliges states to legislate to prevent the proliferation of nuclear, chemical and biological weapons. Tajikistan submitted its initial report on implementation of the Resolution to the 1540 Committee in 2012.

Tajikistan joined the Strategic Approach to International Chemicals Management (SAICM), the global policy framework on sound management of chemicals, but has not yet established arrangements for implementing it on an interministerial or inter-institutional basis; the national focal point is within an NGO. The Quick Start Programme set up under the SAICM aims at supporting initial national capacity-building activities for implementation. It includes a voluntary, time-limited trust fund, administered by UNEP. According to the report on the status of projects funded under the Programme as of October 2015, Tajikistan has received funding to

support the implementation of two projects. The first, implemented during the period 2011–2013 together with Belarus, was to enhance capacity building for the development of the national PRTR (chapter 4). The second, three-year project focuses on supporting the implementation of the Globally Harmonized System of Classification and Labelling of Chemicals in Tajikistan, with the United Nations Institute for Training and Research (UNITAR) as executive agency. It started in 2013 and was originally expected to finish in 2015 but experienced delays; a one-year project extension was approved.

Tajikistan's participation in the European Environment and Health process, especially in the technical strand, has been mostly on an ad hoc basis. There are no plans at present to develop a national integrated environment and health programme.

Selected international projects

The seven-country initiative (2009–2013) coordinated by WHO and funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, with a budget of approximately 1.06 million euros for Tajikistan, aimed to protect health from climate change through addressing adaptation, strengthening of health systems and building institutional capacity.

The USAID project "Tajikistan safe drinking water" (2009–2012), with a budget of US\$5.2 million, aimed at increasing access to drinking water for 100,000 people in rural communities and reducing the incidence of water-related diseases through household hygiene interventions with half a million rural residents.

The "Tajikistan Water Supply and Sanitation (TajWSS)" project is funded by the SDC and implemented by Oxfam in Tajikistan in partnership with UNDP. It seeks to improve access to safe drinking water and sanitation in rural areas by improving the sustainability of the water and sanitation sector. Phase I (2009–2013), with a budget of 4 million Swiss francs, effectively contributed to institutional and policy reform in Tajikistan, enhanced collaboration among key stakeholders and provided access to safe drinking water supply for approximately 23,000 people in two districts, Muminabad and Rudaki.

By the end of 2014, Tajikistan had received US\$6.5 million in assistance from the IAEA for various projects, including the proper disposal of uranium waste and efforts to ensure the material's security. Tajikistan's Agency for Nuclear and Radiation

Safety implemented 16 projects and a further four were submitted for the 2014–2015 cycle. Eight projects have been completed and eight others are still active.

14.5 Conclusions and recommendations

There are severe limitations on surveillance of infectious diseases, in particular those related to the environment, such as water- and foodborne diseases, as well as human zoonoses. There are no organizational arrangements with other healthcare institutions to ensure infections are reported to the Service of State Sanitary and Epidemiological Surveillance (SSSES). Upgrading the laboratory network under limited financial resources and having numerous laboratories with varying technical and human capacities requires careful planning to achieve optimal results in disease control. Applying analytical epidemiological methods will provide important insights into disease incidence, e.g. on susceptible population groups, sources of infection and pathways. Maintaining effective links between those involved in detection of pathogens in the water supply and food products, and epidemiologists, is essential for tracking causes, developing early warning systems for outbreaks and taking timely containment measures. Timely and regular exchange of data between the SSSES and the State Veterinary Inspection Service (SVIS) on the incidence of zoonoses in humans and animals is equally important.

Recommendation 14.1:

The Ministry of Health and Social Protection of the Population should:

- (a) *Enhance infectious disease surveillance through introducing integrated service delivery and legally specified data flows to data reporting by primary healthcare centres, hospitals and other healthcare institutions, and ensure training of all those involved in uniform diagnosis of diseases;*
- (b) *Strengthen laboratory networks through cost-effective upgrading of selected laboratories with enhanced capabilities to diagnose a range of infectious diseases and detect bacterial, viral and parasite pathogens in water and food samples;*
- (c) *Improve capacity and skills at national and district levels to apply geographical and analytical epidemiological methods to surveillance and other relevant data to inform and support disease control and prevention;*
- (d) *Establish mechanisms for maintaining links between epidemiologists and microbiologists*

on a daily basis and conducting linkage analyses between microbiological and surveillance data;

- (e) Together with the Ministry of Agriculture, establish mechanisms for maintaining timely and regular exchange of data and information on the incidence of human and animal zoonoses between the Service of State Sanitary and Epidemiological Surveillance and the State Veterinary Inspection Service at national and district levels and for joint investigation of local outbreaks.

Providing sustainable access to safe drinking water and adequate sanitation requires a huge capital investment and must be the target of long-term action in an incremental stepwise process. Careful planning at each stage has to ensure progress in access to water and sanitation while allocating limited resources across the country. Prioritization based on achieving maximal health benefits from reducing water-related risks in the entire population can ensure cost-effective implementation and implies a set of measures to address existing diverse situations concerning access to drinking water sources. For example, improving hygiene and sanitation conditions together with hygiene education can provide, in the short-term, a cost-effective solution in reducing the spread of infections through surface water used as drinking water by considerable numbers of people. The huge investment necessary for the development and extension of sewerage systems requires prioritization, and public buildings such as schools and hospitals should be given top priority.

Recommendation 14.2:

The Ministry of Health and Social Protection of the Population, in cooperation with the relevant government bodies, should:

- (a) Develop and implement programmes to improve hygiene and sanitary conditions, in particular in those villages where there is no piped drinking water supply and where the people use surface water as a source of drinking water;
- (b) Reinforce hygiene education, in particular in remote rural communities;
- (c) Ensure that modernization of water treatment systems and distribution networks is governed by achieving maximum reduction of health risks from microbiological contamination of the drinking water;
- (d) Ensure progressive implementation of the World Health Organization (WHO) water

safety plans in small water supply systems across the country;

- (e) Undertake a nationwide review of sewage collection and sanitary disposal facilities in schools and hospitals in order to prioritize investments.

There are considerable health risks associated with unsafe food and zoonotic diseases, yet monitoring and control of food contamination is not efficient and neither is there capacity for timely detection and prevention of human zoonoses.

Recommendation 14.3:

The Ministry of Health and Social Protection of the Population, in cooperation with the Ministry of Agriculture and other relevant government bodies, should:

- (a) Take actions to decrease foodborne health risks along the entire food chain in order to protect public health;
- (b) Strengthen a risk-based national integrated system on food safety that includes foodborne zoonoses and ensures effective and efficient control throughout the entire food chain;
- (c) Ensure inter-agency coordination to improve food safety control management by developing national procedures for food safety and for improved communication internally, throughout the food chain and internationally;
- (d) Strengthen the capacity of laboratories to conduct food safety analyses according to international standards for all products in Tajikistan and accreditation of the laboratories for these tests;
- (e) Ensure updating of the curricula of various educational institutions, introducing a component on food safety to align them with the requirements of the Codex Alimentarius, including hazard analysis and critical control points (HACCP) system, and including topics relevant to food safety, focusing on risk analysis, risk-based inspection and early warning systems.

The country has a strong demand for modern expertise and more skilled human resources in environmental and health activities. In particular, the capacity of the various institutions involved in environmental and health monitoring, control and regulatory activities to apply risk management has to be improved in order to align the country's prevailing environment and health management practice to modern international requirements.

The Tajik Scientific Research Centre for Preventive Medicine is responsible for preparation of health reports for internal use within the Ministry of Health and Social Protection of the Population. Despite the resource-intensive sanitary-epidemiological surveillance concentrated under the Ministry of Health and Social Protection of the Population, there is no capacity for periodic analytical reports on population health and environmental risks highlighting the effect of preventive activities.

Recommendation 14.4:

The Ministry of Health and Social Protection of the Population should ensure capacity building of the professionals at the Tajik Scientific Research Centre for Preventive Medicine and the Republican Centre for Medical Statistics and Information for assessing and reporting on the population's health status and environmental risks, to inform public authorities and the population.

Tajikistan has ratified most of the health-relevant international conventions. However, it has not acceded to the ECE/WHO Protocol on Water and Health, the first international legally binding instrument on prevention, control and reduction of water-related diseases through sustainable management of water resources. The country has undergone the process of setting national targets according to the Protocol's goals but will not fully benefit from international cooperation in introducing good practice to water management and equitable access to water and sanitation. Furthermore, well-coordinated surveillance and early warning systems established in line with the Protocol would enhance the country's preparedness and response to outbreaks and major threats of water-related diseases.

Chemical safety is an important issue for the environment and health in Tajikistan. The country has only partially benefited from the Strategic Approach to International Chemicals Management (SAICM) initial capacity-building activities. The international cooperation and support available has not been sufficiently used to establish the basis for introducing integrated approaches to chemical

management in the country, i.e. identifying the key institutions, regulatory approaches and inter-agency coordination needs and emerging policy issues, such as highly hazardous pesticides.

The participation of Tajikistan in the European Environment and Health process has been rather ad hoc.

Recommendation 14.5:

The Government should:

- (a) *Take the measures to accede to the ECE/WHO Protocol on Water and Health in order to fully benefit from international assistance in advancing water safety management and in strengthening preparedness and response to outbreaks and incidents of water-related diseases;*
- (b) *Strengthen participation in the Strategic Approach to International Chemicals Management to benefit from the available international expertise and information in taking actions on safe management of chemicals throughout their life cycle;*
- (c) *Enhance sustainable participation in the European Environment and Health process in order to advance partnership between the environment and health sectors and integration of health in other sectors' policies.*

A number of international projects on health and environment are implemented in Tajikistan. The use of international technical assistance mechanisms for implementation of projects targeted at addressing priority issues of adverse impact of the environmental pollution on human health should be continued, with a clear focus on replication of piloted solutions and tools.

Recommendation 14.6:

The Government should use international technical assistance mechanisms in order to implement projects targeted at addressing priority issues of adverse impact of the environmental pollution on human health.

Chapter 15

MANAGEMENT OF DISASTER RISK ASSOCIATED WITH NATURAL AND MAN-MADE HAZARDS

15.1 Current situation

Natural disasters

Tajikistan is affected by geophysical and meteorological hazards. Many of the meteorological disasters are linked to spring thaw and precipitation and consequently occur between March and June. Fog occurs mostly during the cold season of the year. Dust storms are mainly observed in the country's southern desert and semi-desert region and can give rise to haze. The number of days with dust storms and haze in the country has declined in recent years due to an increase in irrigated land and a reduction in the intrusion of cold air masses from the west and north-west.

An overview of the number of natural disasters, and associated fatalities, in Tajikistan between 2005 and 2014 is provided in table 15.1.

Over the last 10 years, the most frequent natural hazards in Tajikistan have been avalanches (550 events) and mudflows (457 events), followed by small earthquakes (314 events), landslides and rockfalls (84 events) and floods (72 events). Natural disasters typically have an impact at the local level, affecting households, communities and villages, and occasionally affect a larger part of a district. Approximately 85 per cent of the country is threatened by mudflows, with 32 per cent considered to be in a high mudflow risk zone. Disaster data disaggregated by gender are not publicly available.

Prolonged droughts and severe cold occur less frequently but have an impact on a large proportion of the population. Severe weather can contribute to food insecurity and vulnerability as it may have an impact on the country's hydropower energy production and affect agricultural outputs, an example of which is the compound water-food-energy crisis of 2007–2008 (box 15.1).

The whole country is located in a high- to very-high-risk zone of earthquakes with intensities of VIII–IX at 5 per cent exceedance in 50 years, corresponding to a return period of 475 years. Dushanbe is located close to two major fault lines. The expected return

period for intensity IX and VIII earthquakes in the capital is estimated at 1,995 and 447 years, respectively. An intensity IX earthquake is conservatively estimated to result in a projected 55,000 fatalities in Dushanbe. The latest catastrophic earthquakes occurred in the country in 1949 (Hait earthquake, more than 28,000 fatalities) and 1989 (Gissar earthquake which caused a landslide in an area where sediment was weakened by irrigation water, leading to around 300 casualties).

The Rapid Emergency Assessment and Coordination Team (REACT) Inter-Agency Contingency Plan lists epidemics as one of the deadliest hazards in Tajikistan, with an average of 12 human fatalities per event over the last 11 years. In 2010, a polio epidemic affected hundreds of people, claiming 12 lives and causing permanent disability to others.

In 2007, 36,041 hectares of crops were damaged by locusts. Annual costs of battling locusts amount to approximately US\$1 million. No comprehensive data on agricultural damage by pests is available.

An overview of the economic damage associated with natural disasters between 2005 and 2014 is provided in table 15.1. The highest economic losses for the period 2005–2014 are related to mudflows (average annual losses of US\$194.9 million), followed by earthquakes (US\$33.8 million), floods (US\$30 million) and snowfall/frost (US\$24 million). Data on economic losses are unreliable, in part due to the large variability in the types of events and damage, and in part due to the fact that the loss calculations focus on structural damage and do not cover loss of services and goods/stocks, nor of non-fixed assets such as livelihoods and other income generation modalities.

Natural disaster risk is likely to increase as a result of climate change, due to variation in precipitation patterns, the retreat of glaciers and increased occurrence of floods, mudflows and extreme weather events. According to the World Bank, Tajikistan is ranked highest among European and Central Asian countries in terms of vulnerability and the least able to adapt to climate change.

Table 15.1: Natural disasters, 2005–2014

	Disasters, number	Fatalities, number	Economic damage, US\$ thousand
Earthquakes	314	7	33 831
Floods	72	0	30 053
Mudflows	457	114	194 959
Avalanches	550	111	8 256
Landslide, rockfalls	84	55	3 248
Droughts	1	0	47
Wind	55	4	1 480
Snowfall	76	5	24 041
Heavy rains, thunderstorms	54	8	5 159
Severe cold weather	2	2	8 509
Epidemics	10	5	145
Epizootics	1	0	0
Other	12	6	76

Source: Committee on Emergency Situations and Civil Defence, 2015.

Note: Only reported natural disasters are reflected. US\$ values adjusted for annual exchange rate.

Box 15.1: Compound water-food-energy crisis of 2007–2008

The compound crisis, which occurred in Tajikistan in 2007–2008, reflects the effects of a combination of shocks on existing vulnerabilities. An exceptionally long and cold winter, coupled with a critical energy shortage, frozen crops, agricultural losses, floods and landslides, amplified the impact of each. The heavy snowfall (245 per cent above average) and frozen rivers damaged water and electrical supply systems. This led to a dramatic decrease in electricity supply from the Nurek HPP. In total, two million people were affected. In autumn of the same year, the crisis was aggravated by increasing food prices and drought affecting 800,000 people. The compound crisis led to economic losses of more than US\$250 million, representing 7 per cent of Tajikistan's GDP.

Source: Tajikistan: Country situation assessment, Working Paper, Regional Environment Centre for Central Asia, 2015.

Man-made (technological) disasters

Data on industrial and chemical accidents and transport accidents involving hazardous materials are not systematically collected by the Committee on Emergency Situations and Civil Defence under the Government and were not available at the time of the review.

Roads are particularly susceptible to landslides and avalanches, with the consequent risk of accidents involving hazardous materials. While avalanche and mudflow risk still remains high, the improvements in road infrastructure over the last 10 years are a positive development. Accidents related to the transport of hazardous goods are reportedly rare.

Chemical or industrial accidents have not occurred in recent years except for a number of explosions. These reportedly had limited local impact and were related to the handling of chlorinating agents. Natural-hazard-triggered technological accidents (natech accidents) can be caused by heavy rains, floods or earthquakes. The fact that many of the

legacy and mining sites are located close to watercourses increases the risk of environmental contamination. The potential impact of other hazards, such as earthquakes, floods or heavy rain, on legacy sites, such as historical radioactive waste storage facilities, has not been assessed by the relevant authorities.

15.2 Legal, policy and institutional framework

Legal framework

The country's disaster management legal framework consists of a set of overarching laws related to emergency management and civil defence, complemented by specialized laws for various sectors and types of emergencies. The 1995 Constitutional Law on the Legal Regime of the State of Emergency sets out the general rules for the introduction of a state of emergency, including in the event of disaster, and the associated powers of the Government in such a case. Detailed provisions on disaster management are provided in the 2004 Law on Protection of the Population and Territories from

Natural and Man-made Emergencies and the 2004 Law on Civil Defence. The 2006 Resolution of the Government No. 611 describes the functions, competences and institutional structure of the Committee on Emergency Situations and Civil Defence as the institution responsible for managing and coordinating disaster-related activities aimed at prevention, preparedness and mitigation. The 2005 Law on Emergency Rescue Services, Emergency Rescue Units and the Status of Rescuers sets out the duties and status of rescue forces and rescuers.

The 2014 Resolution of the Government No. 833 details the organization and functioning of the Uniform State System for Emergency Prevention and Response. The Uniform System is set up through a number of subsystems approved by relevant ministries, as well as a system of commissions on emergency situations at national, regional, district/town and facility levels. Coordination mechanisms for the Uniform System are yet to be set in place.

The 2011 Law on Environmental Protection includes a chapter on environmental emergencies, detailing preparedness and response requirements. All enterprises, whether public or private, that can cause damage to the environment and human health in the event of an emergency, are required to have action plans for environmental emergencies and maintain special units for response to environmental emergencies. The 2011 Law on Environmental Monitoring establishes requirements for environmental monitoring at sites included in the state register of dangerous production facilities.

Climate change adaptation and disaster risk reduction (DRR) are not explicitly taken into account in these laws, the associated by-laws and construction standards and norms (so-called SNiPs). However, prevention of, and preparedness for, specific types of disaster is given in sector-specific legislation. For example, in 2008, 2009 and 2012, the amendments to the 2000 Water Code introduced flood mitigation and flood response into the country's legislation. This is not the case for other types of disaster such as earthquake, severe weather event or avalanche. The 2010 Law on the Safety of Hydrotechnical Infrastructure provides detailed responsibilities with regard to safety planning for dams and flood protection infrastructure (chapter 1).

Industrial safety and industrial accident preparedness and response provisions are envisaged in the 2004 Law on Industrial Safety of Dangerous Production Facilities, which also provides for the establishment of a state register of dangerous production facilities.

The Law comprehensively outlines operators' responsibilities, which include the development of an industrial safety declaration and associated risk assessments and the development of emergency preparedness and response procedures. The 2003 Law on Radiation Safety outlines the protection of lives, health and property, as well as the environment, from the harmful effects of ionizing radiation.

Even though Tajikistan acceded to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) in 2011, the concept of hazardous materials and substances is not detailed in the transport legislation.

A number of concepts relevant for the assessment of epidemiological and animal health risk are provided in the 2003 Law on Ensuring the Sanitary-Epidemiological Safety of the Population. The Law describes the system of state sanitary and epidemiological supervision. The 2010 Law on Veterinary Medicine sets out measures for ensuring animal health and epizootic welfare and protection of the population against diseases common to animals and humans. The 2012 Law on Plant Protection establishes the need for a variety of measures and tools to address potential negative impacts of pests, diseases and weeds.

Land use and planning are regulated by the 2008 Law on Land Management and by the 1996 Land Code. They aim to create conditions for sustainable land use and establish conditions for the protection of lands from water and wind erosion, flooding, waterlogging, salinization, pollution and other deterioration. The 2009 Law on Soil Protection and the 2013 Law on Pastures contain provisions for sustainable land management and soil protection.

The 2010 Law on the Red Crescent Society of Tajikistan establishes the role and rights of this organization in emergency response.

Policy framework

The 2007 National Development Strategy for the period until 2015 considered disaster management purely from the perspective of environmental protection. Subsequently, disaster risk management (DRM) has not been well integrated into sectoral development or reform programmes. Among other measures to further develop the DRM system, the 2016 National Development Strategy for the period until 2030 provides for the integration of natural and climate-related disaster risk reduction in the management of economic sectors.

The 2010 National Disaster Risk Management Strategy for the period 2010–2015 (National DRM Strategy) (2010 Resolution of the Government No. 164) guides overall DRM in the country. The Strategy contains five components based on the Hyogo Framework for Action 2005–2015. Overall coordination of implementation of the Strategy and of emergency responses is delegated to the Committee on Emergency Situations and Civil Defence. Annual reports on its implementation are provided by the Committee on Emergency Situations and Civil Defence to the Government. A full evaluation of the Strategy and is expected to be available in 2016. The Strategy complements and integrates DRM measures that have been provided in previous programmes and action plans approved by the Government, e.g. the 2003 National Action Plan on Climate Change Adaptation and the 2006 National Environmental Action Plan (NEAP).

Options for developing a new disaster management strategy under the Sendai Framework for Disaster Risk Reduction 2015–2030 are currently being explored.

Work to develop a national action plan on chemical, biological, radiological and nuclear (CBRN) preparedness and response was initiated in 2015 with the support of EU CBRN Centres of Excellence and the United Nations Interregional Crime and Justice Research Institute.

The 2012 Programme of Emergency Preparedness and Radiation Safety for the period 2013–2017 provides an overview of the operational response in the event of a threat or occurrence of a radiation emergency situation. The Programme is established under the overall Uniform State System for Emergency Prevention and Response and has been adopted to meet IAEA requirements for radiation emergency preparedness and response.

The links between the National DRM Strategy and ongoing climate change adaptation work appear to be weak. While projects implemented under the Pilot Programme for Climate Resilience (PPCR) work to increase climate resilience, they mainly focus on governmental environmental agencies. A process to develop a sector-specific national adaptation plan for DRR has been initiated at the request of the Committee on Environmental Protection. Establishing a strong coordination mechanism between the Committee on Emergency Situations and Civil Defence and the Committee on Environmental Protection is key if this is to be successful. The Committee on Environmental Protection is still not substantially involved in the implementation of the

National DRM Strategy nor in the development of the Uniform State System for Emergency Prevention and Response, despite the fact that DRR issues, such as the monitoring of natural processes related to disaster risk, are within the Committee's mandate.

When it comes to sectoral plans and strategies, such as for water management and agriculture reform, DRR and climate change adaptation are still not systematically included. While the National DRM Strategy foresaw the development of specific disaster preparedness and response plans, e.g. for floods, landslides, droughts, severe weather, frost and epidemics, this has not been carried out. Yet there is no detailed provision on the obligation of ministries and other governmental agencies in this regard, nor any information on the structure or content of such plans.

In 2013, the Ministry of Economic Development and Trade adopted a procedure for the development and implementation of regional and district/town programmes of socioeconomic development. Environment, climate change and disaster recovery aspects are included in these programmes, which have a separate chapter on DRR and preparedness for response. As of late 2015, disaster risk has been included in 43 of the 65 programmes of socioeconomic development. The implementation of these programmes is typically dependent on provision of external donor support.

Institutional framework

The highest national structure responsible for emergency response is the State Commission on Emergency Situations (2015 Resolution of the Government No. 799). It is chaired by the Head of the Government and brings together most governmental authorities (ministries, committees and agencies) with relevant competences. The Division of Defence and Rule of Law at the Executive Office of the President acts as the Commission Secretariat. The Commission is replicated at the regional and district levels, where it is chaired by the heads of local executive authorities. Such commissions are responsible for coordinating disaster management and ensuring coherent action by the various bodies involved in disaster risk preparedness and response at their respective levels.

The Committee on Emergency Situations and Civil Defence (Regulation approved by 2006 Resolution of the Government No. 611) provides protection for the population, economic infrastructure and territories from disasters. It also organizes and carries out activities that prepare the population to prevent

natural and man-made disasters and mitigate their impact.

The Committee on Emergency Situations and Civil Defence is responsible for the Uniform State System for Emergency Prevention and Response and, for this purpose, develops state policies and regulations. Institutions involved in the various elements of emergency prevention and response under the Uniform System are described in table 15.2. The detailed roles, functions, authorities and responsibilities of all operating parts, ministries and national organizations acting within the framework of the Uniform System have yet to be laid down by legislation. Some sectoral activities related to DRM, such as mitigation of the impacts of agricultural pests and weeds, or of transport accidents, seem not to be included in the overview of the Uniform System. Additionally, some relevant institutions, such as the Agency for Nuclear and Radiation Safety under the Academy of Sciences, do not seem to be involved in planning activities within the Uniform System. For other institutions, the division of responsibilities is not clear. One example is that the Committee on Environmental Protection is responsible for the surveillance of potentially hazardous objects while the Committee on Emergency Situations and Civil Defence is responsible for monitoring chemically and radiologically hazardous objects.

The Information Management and Analytical Centre (IMAC) under the Committee on Emergency Situations and Civil Defence was established in 2005. It analyses, stores and exchanges available data on emergency situations. It has GIS capacities, conducts hazard and risk assessments, assesses damage caused by disasters and develops maps. The Committee on Emergency Situations and Civil Defence also has a training and methodological centre that delivers training courses at national, regional and local levels.

The Republican Crisis Management Centre and its regional centres have been set up under the Committee with the aim to strengthen coordination in the event of an emergency situation and also to receive and dispatch emergency notifications. The Republican Chemical and Radiometric Laboratory operates under the Committee. The Search and Rescue Unit under the Committee is composed of around 40 rescuers at the national level and 6–12 rescuers at each of the Committee's regional bodies. At the national level, the Unit has a few hazmat rescuers within its teams. While information on the current gender composition of the rescue teams is not available, previous projects on search and rescue,

such as the 2006 mission of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA)/United Nations Disaster Assessment and Coordination (UNDAC), and the UNDP/Swedish Rescue Services Agency/Swiss Agency for Development and Cooperation (SDC) project in 2008–2010, have proposed the strengthening of efforts to increase the number of women among rescuers.

The territorial bodies of the Committee are under double subordination, reporting to both the central level and local executive authorities. Their capacities vary from one to the other.

Local authorities have responsibility for protection of the population and territories from emergencies, as well as the implementation of government resolutions related to environmental protection, sanitary-epidemiological safety and radiation. Indirectly, they are also empowered to work on disaster prevention, through their role – as given in separate laws – to ensure necessary measures for land management, livestock disease prevention, and forest and environmental protection.

Fire safety is handled by the Main Department for Fire Safety under the Ministry of Interior. It comprises five regional departments. Due to their location and round-the-clock availability, fire services can also respond to other emergencies, such as oil spills, but, reportedly, only engage in rescues involving fires.

Additional chemical, biological, radiological and nuclear expertise is available in the Agency for Nuclear and Radiation Safety under the Academy of Sciences, the State Veterinary Inspection Service under the Ministry of Agriculture, the Hydrometeorology Agency and the institutes of the Academy of Sciences. The military units of Tajikistan are under the Ministry of Defence, but can be used in emergency situations if requested by the Committee on Emergency Situations and Civil Defence.

The Ministry of Economic Development and Trade chairs an Expert Group on Monitoring and Early Warning for Disasters. The Group consists of representatives of 17 governmental agencies and has been meeting monthly since 2009. It shares data on social, economic and natural hazards with the Monitoring and Early Warning Centre under the Ministry of Economic Development and Trade, producing a monthly monitoring and early warning report.

Table 15.2: Institutions involved in emergency preparedness and response

Institution	Functions
Ministry of Interior	a. Public order and crime prevention b. Fire prevention and firefighting
Ministry of Defence	a. Radiation, chemical and biological protection of the Armed Forces b. Engineering protection of the Armed Forces
Ministry of Agriculture	a. Protection of farm animals and plants in emergency situations
Ministry of Economic Development and Trade	a. Accounting and control of the use of humanitarian aid
Ministry of Health and Social Protection of the Population	a. Medical and biological protection of the population in emergency situations b. Social protection of the population in emergency situations c. Monitoring and laboratory control over the epidemiological situation
Ministry of Education and Science	a. Preparing the population for emergencies
Ministry of Labour, Migration and Employment of the Population	a. Evacuation and ecological migration
Ministry of Energy and Water Resources	a. Flood prevention; dam safety b. Energy supply in emergency situations
Ministry of Industry and New Technologies	a. Industrial security in emergency situations
Ministry of Transport	a. Transportation services for emergency situations b. Transportation services for evacuation in emergency situations c. Search and rescue provision of flights in Tajikistan d. Search and rescue provision of rail transport in Tajikistan
Ministry of Finance	a. Financial security in emergency situations
State Committee on Land Management and Geodesy	a. Ensuring public land in safe areas and mapping areas of risk in emergency situations
Committee on Emergency Situations and Civil Defence under the Government	a. Monitoring, laboratory control and prediction of emergencies b. Control of radiation and chemically dangerous objects c. Organization and coordination of search and rescue services d. Reception and distribution of humanitarian aid for emergency situations
Committee on Environmental Protection under the Government	a. Surveillance and monitoring of the environment and potentially hazardous objects (areas) b. Monitoring, evaluation and forecasting of hazardous weather and geophysical phenomena and environmental pollution
Committee on Architecture and Construction under the Government	a. Engineering protection in emergencies b. Restoration of special facilities in the area of emergency
Committee on Television and Radio under the Government	a. Informing the public in emergency situations
Agency for State Material Reserves	a. State material reserve for emergency management b. Trade and supply in emergency situations
Forestry Agency under the Government	a. Protection of forests from fires and from pests and diseases
Agency of Land Reclamation and Irrigation under the Government	a. Protection against floods and shore protection works
Communication Service under the Government	a. Alerts, communications and IT infrastructure
Academy of Sciences	a. Seismic monitoring and testing the effects of large earthquakes b. Radiation safety and radioecology c. Research support to the Unified State System
Gosgortekhnadzor	a. Control and technical expertise in emergency situations
Main Administration on Geology under the Government	a. Monitoring the status of mineral resources: groundwater monitoring and monitoring of dangerous geological exogenic processes
State Unitary Enterprise "Tajikgosstrakh"	a. Insurance coverage in emergency situations
SUE KMK	a. Communal and technical support in emergency situations

Source: 2014 Resolution of the Government No. 833.

The National Platform for Disaster Risk Reduction (2012 Resolution of the Government No. 98) under the State Commission on Emergency Situations, is a consultative advisory body, coordinating the work of ministries, committees, agencies and other

organizations working in disaster management and developing recommendations for DRR policy. Key stakeholders, such as the Ministry of Economic Development and Trade, are not included in the National Platform. International organizations

participate in the National Platform as observers. Given that its structure is set by Government decree, it is difficult to update its membership, even though partners clearly see the need for this. Since its establishment, the National Platform has achieved limited results, and is very much dependent on donor support for its functioning.

International humanitarian assistance to small and medium-scale emergencies in Tajikistan is provided through the Rapid Emergency Assessment and Coordination Team – REACT, set up in 2000. It is composed of the Government (represented by the Committee on Emergency Situations and Civil Defence and other agencies), donors, the United Nations and other international organizations, as well as local and international NGOs involved in early warning, mitigation and risk reduction, preparedness, response and recovery. REACT has around 60 partners. It is chaired by the Committee and the United Nations Resident Coordinator, with staffing support provided to the REACT Secretariat by UNDP and OCHA. In the event of a large-scale disaster, international humanitarian assistance can be provided in accordance with international treaties and based on the request of the country.

In Sughd Oblast, a regional REACT is operational, chaired by the regional Committee on Emergency Situations and Civil Defence and with secretariat functions carried out by the Youth Group for Protection of the Environment. Regional REACTs are yet to be established in other disaster-prone regions such as Khatlon, Rasht and Gorno-Badakhshan Autonomous Oblast. Sectoral coordination groups for education, food security and nutrition and WASH, operate within REACT. While the REACT structure has proven its worth in a number of disasters, it is currently in a state of transition with – reportedly – decreased ownership of the Committee.

According to the legislation establishing the Uniform State System for Emergency Prevention and Response, all participating institutions are required to participate in quarterly meetings and provide updates on their work. No evidence was provided that these meetings do take place. Also, it is not clear how the work under the Uniform System links to existing coordination platforms.

Implementing partners of the Disaster Preparedness Programme (DIPECHO) of the European Commission's Humanitarian Aid and Civil Protection Department organize regular coordination meetings.

Financing

Implementation of the 2010 National DRM Strategy is financed through international grants and loans, and from budgetary funds allocated annually to the relevant ministries. Government funds have reportedly been allocated to flood control measures, anti-hail activities and land reclamation, as well as to (limited) operations and maintenance. REACT partners have also been asked to report to the Committee on Emergency Situations and Civil Defence on the amount of funds committed to DRR activities, but the reporting was not systematic. Generally, monitoring of the implementation of the National DRM Strategy from the Committee's side has been poor, and the envisioned finances seem not to have materialized. The funding for the implementation of the Emergency and Civil Protection Development Programme for the period 2009–2014 (2008 Resolution of the Government No. 527) was envisioned to be US\$43 million. The amount of committed resources is not clear.

The fund for mitigation of emergency activities (1994 Resolution of the Government No. 126) was established in 1994 and comes from 10 per cent of depreciation amounts paid by business enterprises active in the country. Information on expenditures of the fund is not available.

Disaster preparedness and response is also financed from the following sources:

- Contingency fund, replenished annually from the national budget;
- Emergency stocks and material reserves;
- Ministries', agencies' and local governments' financial reserves and material resources;
- Stocks managed by in-country international organizations, the United Nations and the Red Crescent/Red Cross;
- Bilateral assistance by neighbouring countries in the region;
- The private sector, banks, chambers of commerce and individual entrepreneurs.

DRR activities are also financed through private/community allocations, e.g. through fees for irrigation and through hashar donations in the form of goods and labour. Sometimes, private businesses support community infrastructure projects.

The financing of DRR activities is hampered by the global financial crisis, the limited interest of the Ministry of Finance in taking out loans, weak monitoring of how funds are spent, poor financial management and lack of banking capacity.

The insurance mechanisms are distrusted and not in common use, although the 2010 Law on Insurance allows the use of insurance in case of damage caused by disasters.

The National DRM Strategy lists loans and microcredits as a possible channel for addressing disaster loss. People affected by disasters can apply for low-interest loans, up to a limited amount. The legislation on banking and microfinance organizations directly prohibits credit and microfinancing institutions from engaging in insurance activities.

15.3 Disaster risk management

Instruments for risk assessments

Hazard identification

Numerous data collection and monitoring systems on hazard identification exist within respective governmental bodies for the various types of natural and man-made disasters (box 15.2). Hazard maps exist at the district and lower levels, but there is no comprehensive and unified database on natural and man-made hazards. Data collection – and limited analysis – is conducted by individual government departments, committees and agencies.

Coordination among various agencies involved in hazard identification appears to be limited. The information available from various agencies is not well coordinated, not used for mapping or risk analysis and not shared with other governmental bodies for prevention and preparedness purposes. Initial discussions have been held on the possibility

of IMAC consolidating existing hazard maps that are available in other institutions into a national hazard atlas, but no concrete steps have been taken to date. The combination of competencies available within various structures would support the development of a common hazard map and subsequent disaster risk atlas. Limitations in terms of information sharing seem to be hindering collaboration in this area. The maps are also limited in terms of scale, meaning that maps developed at the national level are not detailed enough for local-level risk management.

The Third National Communication to the UNFCCC (2014) includes a national-level map of extreme weather and natural disasters (map 15.1).

Risk assessment and monitoring

At the national level there is no uniform approved methodology for disaster risk assessment.

With the support of UNDP and involvement of national and international stakeholders, a standardized national risk assessment methodology was developed in 2012. The methodology was tested, peer reviewed and revised, and piloted in three districts in 2015. As of late 2015, the Committee on Emergency Situations and Civil Defence was finalizing the methodology, after which it will be approved and used for conducting risk assessments at the district, lower and local levels. The lack of information at the local level, e.g. regarding the value of housing and facilities, as well as the lack of technical capacity within the Committee, coupled with the lack of mutually agreed cooperation modalities among governmental entities, is a challenge for its implementation.

Box 15.2: Hazard identification maps and databases

The Committee on Emergency Situations and Civil Defence's IMAC hosts national maps on, among other matters, seismic risk, landslide risk, erosion risk and land use, which are available online.

Seismic maps are available at the Institute of Geology, Seismic Construction and Seismology under the Academy of Sciences and the Geophysical Service of the Republic of Tajikistan.

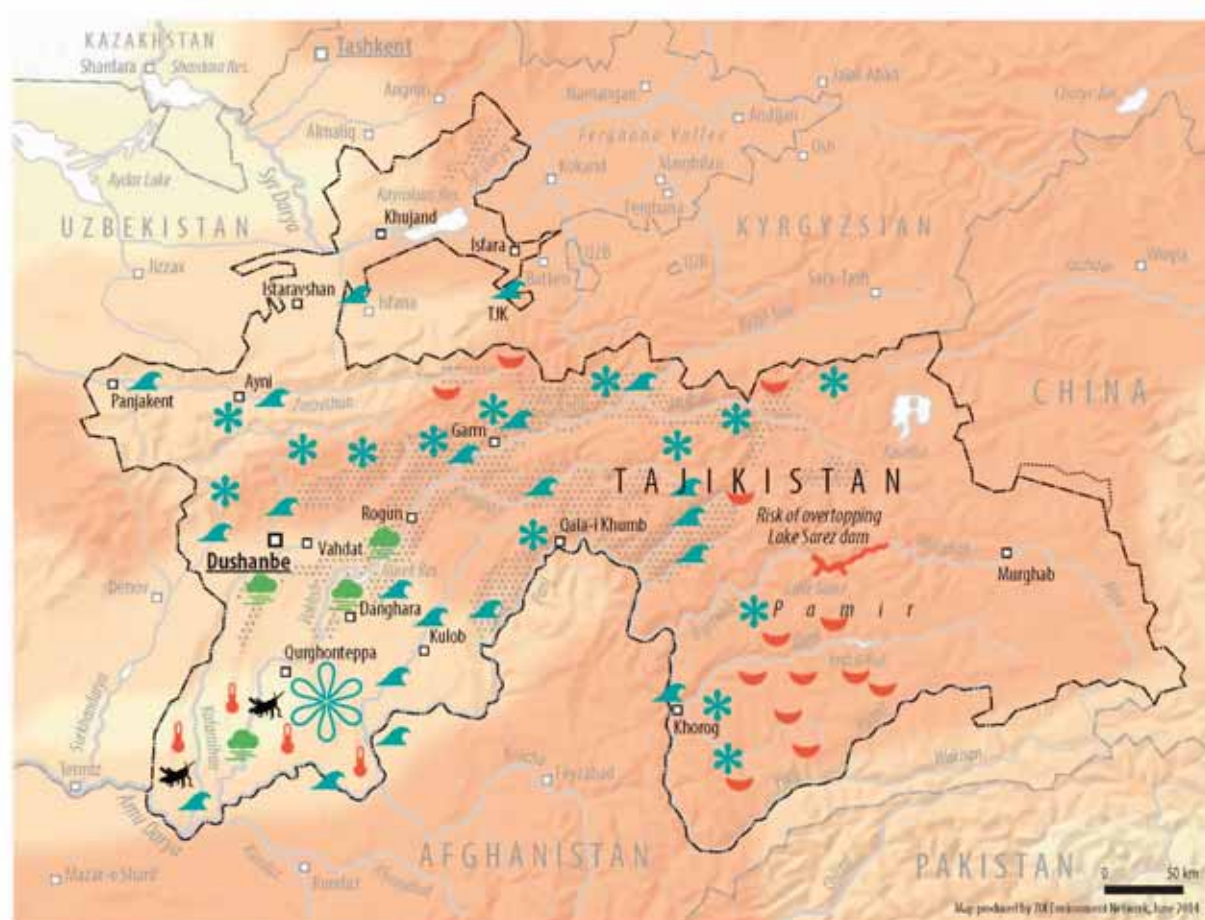
The Main Administration on Geology maintains maps on wells and groundwater composition and the State Committee on Land Management and Geodesy, with the support of the Design and Research Institute "FAZO" and the Design Institute on Land Management "Tojikzaminsoz", hosts land registry maps.

The state register of hazardous objects lists facilities handling chemicals, which are monitored by the Service of State Surveillance over Safety in Industry and Mining under the Government.

The Ministry of Industry and New Technologies keeps the List of facilities storing and handling hazardous chemicals.

The Committee on Environmental Protection maintains a database on environmental permits, with information on type of industry and emissions, and plans to include information on mining operations. There is also the inventory of legacy sites, including radiological hazard sites.

Map 15.1: Extreme weather and natural disasters



Extreme weather and natural disasters

Seismic risk

- very high
- high
- moderate

- Risk of landslides
- Risk of flooding and mudflows
- Risk of major avalanches
- Increase in heat waves and number of days with high temperature

- Harsh winters causing compound crisis
- Glacial lakes and lake outburst flood risk areas
- Locust invasions
- Decrease in the number of days with dust storms and hailstorms

Source: The map was produced by Zoï Environment Network for 2014 Third National Communication of the Republic of Tajikistan to the UNFCCC.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

At the local level, international organizations and NGOs have conducted risk assessments according to methodologies developed within the various organizations. Community-based risk assessments have been conducted by multiple organizations and now, reportedly, cover almost the entire country. While the risk assessment process and the risk maps produced have been very well valued at the local level, it is hard to definitely compare the results between oblasts and districts due to the differences in approaches used. Also, the results are not

systematically collected, although IMAC, in principle, is responsible for the establishment and maintenance of a working depository for risk data. When available, a standardized risk assessment methodology under the ownership of the relevant national authority would address this issue. Community-based risk assessment processes are important, however, for raising awareness at the local level, and allow authorities to better consider the issue of vulnerability, going beyond physical, structural and economic parameters.

Photo 15.1: Houses destroyed by the earthquake (December 2015) in Kudara village, Bartang valley, GBAO



Various agencies, ministries and facilities are responsible for conducting detailed risk assessments and monitoring on individual hazards. For example, the Ministry of Energy and Water Resources is responsible for assessing flood risk related to HPPs and for the safety of hydrotechnical infrastructure.

The Environmental and Social Impact Assessment for the Rogun Dam, conducted with international support, included an assessment of geological and seismic hazards and risks associated with climate change and climate variations. It investigated matters such as glacial melting, changes in flow regime (volumes, seasonal variation), sediment transport and resedimentation.

According to the 2000 Water Code, radioactive and chemical waste and other environmentally hazardous substances are to be taken into account in flood prevention programmes at national and local levels.

Industrial and mining risks are covered through the permitting and monitoring processes of a number of authorities. The coordination and collaboration between these appears to be limited, e.g. no joint inspections of hazardous objects, including industrial facilities and mining operations, are carried out.

Seismic risk mapping, including modelling and forecasting earthquake resistance and potential damage using modern technology, is not conducted on a systematic level. The Institute of Geology, Seismic Construction and Seismology under the Academy of Sciences has developed a seismic monitoring system using 17 analogue stations and one digital station located in Varzob. The Geophysical Service, established in 2008, is also responsible for seismological observations and monitoring of nuclear sites. In 2010, the Service received seven digital broadband seismic stations with satellite communication systems, some of which are located in areas with hydro dams. Though the two seismic monitoring institutions are located under the same institution, collaboration and information-exchange arrangements remain limited.

Missions to assess geohazards, including the risk of glacial lake outburst floods, have been undertaken, of which the most intensely studied is Lake Sarez (box 15.3).

Preparedness and early warning

DRM in Tajikistan is primarily focused on response. However, under the Uniform State System for

Emergency Prevention and Response, the Committee on Emergency Situations and Civil Defence and other mandated authorities are required to forecast emergency situations, collect, process and exchange information, develop and implement technical prevention programmes, organize training, prepare the population, raise awareness, establish emergency response reserves, monitor, implement insurance mechanisms, prepare for evacuations and recovery, conduct statistical reporting and investigate causes of accidents and disasters. The detailed translation of

these preparedness obligations into the various roles, responsibilities, legal mechanisms and guidelines has yet to be realized.

Early warning mechanisms have been set up for meteorological events, such as heavy rains, fog, prolonged cold and high river water levels. Warnings of prolonged high temperatures are provided, and could become more relevant, given the possibility of climate change resulting in increased maximum temperatures and their increased duration.

Box 15.3: Lake Sarez

Lake Sarez, formed by a landslide triggered by an earthquake, is a 56 km long lake with a volume of 17 billion m³ of water located in the Pamirs. There is concern that the dam would fail through seepage in an earthquake or as a result of landslides, causing the dam to overtop, which would cause massive damage to the 5.5 million people living downstream. A number of risk assessments have been conducted to assess the stability of the lake banks, and an early warning system has been set up. While a number of mitigation measures have been proposed, including using the water for hydropower and irrigation, these are expensive and no solution has yet been agreed upon.

The Committee on Emergency Situations and Civil Defence is responsible for satellite monitoring of the dam and of corresponding early warning systems, which have been set up with the support of international actors, including the World Bank. Additionally, projects have been implemented at the local level with the aim to reduce the risk posed by the lake. Activities undertaken include construction of irrigation channels to reduce water seepage in order to reduce landslide risk, installation of emergency communication equipment at village level, establishment of safe havens and provision of emergency stockpiles.

Photo 15.2: Tents for temporary accommodation of the victims of the earthquake (December 2015) in Nisur village, Bartang valley, GBAO



The Hydrometeorology Agency develops four-day forecasts that are shared with all government agencies. The Committee on Emergency Situations and Civil Defence occasionally develops its own forecasts and issues warnings. While information sharing between the Hydrometeorology Agency and the Committee reportedly works well, the forecasts and warnings of the two institutions are not always in line. Meteorological alerts are shared with local governments through the Ministry of Interior, from the Committee of Emergency Situations and Civil Defence to its regional bodies, and with agricultural associations and, through them, to farmers through the Ministry of Agriculture and its regional and district bodies. It has been proposed to set up automatic early warning systems through mobile networks, but this is not supported by all actors.

A Monitoring and Early Warning Centre supported by donor funding has been set up in 2010 under the Ministry of Economic Development and Trade. A similar early warning coordination and reporting model has been replicated in the Khatlon Oblast and it has been proposed that it will be expanded to other regions. The continuation of the Monitoring and Early Warning Centre under the Ministry of Economic Development and Trade in the future is unclear. If the Centre is discontinued, this would impact multi-sectoral collaboration for early warning and disaster response preparedness and related activities and decrease commitment and ownership to these activities from the Government's side. Social and economic vulnerabilities are key to understanding risk and trends. In this regard, it is also vital to monitor indicators related to food insecurity, unemployment and remittance revenues – as has been done by the Centre. The simplification of the Centre reports for use at local level should be considered.

From January to March, the Committee's regional and district bodies carry out visual observations in areas of high flood and mudslide risk. This information is then transferred to the relevant institution – the Main Administration on Geology in the case of landslides – for further analysis and assessments.

All hydropower stations have early warning and alert systems, from which information is submitted to Barki Tojik's central control room. Similarly, irrigation facilities have dispatch personnel/centres, which notify the central authorities in the event of accident.

The Committee on Emergency Situations and Civil Defence and its regional and local bodies carry out simulations and training for disaster response.

OCHA, the United Nations Children's Fund (UNICEF), the United Nations World Food Programme, the French NGO ACTED, Save the Children and others have supported transboundary disaster response simulations with Kyrgyzstan. At the community level, emergency drills and evacuations have been supported by international and national organizations and NGOs, as well as the Red Crescent Society.

Local authorities have a substantial responsibility for disaster preparedness, e.g. in relation to managing flood risk through strengthening riverbanks and canals. Water users are obliged to prevent and respond to water-related accidents such as the destruction of banks, waterlogging and floods. While decentralization is an important step in linking local action to risk management, local authorities typically do not have the financial resources to manage or reduce risk.

Response

The country's Uniform State System for Emergency Prevention and Response was set up in 2014 and operates under the modes of daily operations, high alert or emergency. According to the Uniform System, commissions on emergency situations are set up at the national, regional, district and facility levels and are responsible for decision-making and coordination in the event of emergency. The necessary transport, rescue, firefighting, medical, technical and other support, as well as material reserves and communication systems, can be used by commissions in such an event. Local level authorities/commissions have the primary responsibility for response, supported by the higher level authorities in the event of an emergency exceeding their capacity. The Committee on Emergency Situations and Civil Defence and its regional bodies support the commissions by coordinating the rescue operations and delivering relief assistance in disaster situations.

A unified emergency telephone number, supported by the Republican Crisis Management Centre, was set up in 2011 but, according to reports, does not have enough staff or capacity to be operational around the clock.

The Search and Rescue Unit of the Committee on Emergency Situations and Civil Defence responds to a wide range of emergency events, typically conducting around 400 operations annually, ranging from road accidents to earthquake and mudslide response (box 15.4).

Box 15.4: Responding to mudslides

In July 2015, high temperatures led to rapid melting of snow and glacier ice that resulted in mudslides in Gorno-Badakhshan Autonomous Oblast and the Rasht district. Heavy rains, combined with melting glaciers, also caused mudflows in Tajikabad district. The response was challenging, as multiple locations throughout the country were affected simultaneously, mainly in hard-to-reach areas where communities were facing multiple deprivations. On 21 July, the Government called upon the international community resident in the country, declaring the need for support and emergency assistance to the disaster-affected population. An Initial Rapid Assessment was conducted by REACT in order to identify the needs of the affected population, estimated to be 7,000 people. REACT issued a Relief and Early Recovery Plan costing US\$3.8 million. However, no funding was made available to implement the Plan.

Search and rescue capacities are also available at the local level, where international and national NGOs have been supporting the creation of trained community-based groups able to conduct basic search and rescue work. Individuals can thus participate in emergency response, provided they have participated in relevant training and received a certificate. While community-based groups have played a key role in response, they are not formally integrated into official disaster response planning processes.

The State Commission on Emergency Situations, supported by the Committee on Emergency Situations and Civil Defence, calculates economic losses using an outdated methodology. The calculated losses are based on either 50 per cent or 100 per cent damage and are generally considered to be underestimated. For example, the value of houses is based on their original cost as registered, not on the cost of constructing a new house. On the positive side, the loss and damage assessments are nearly always acted upon, even for small-scale disasters. Assessments are not publicly available and the follow-up on assessments is not transparent.

REACT partners base their humanitarian response on inter-agency needs assessments undertaken using the Multi-cluster/sector Initial Rapid Assessment methodology. The REACT assessment team generally includes a representative of the Committee on Emergency Situations and Civil Defence. International and national organizations involved in disaster response recognize the problems involved in having two separate assessment processes, which underlines the importance of establishing a harmonized approach, not only during the assessment process but also during the identification of needs and provision of relief.

15.4 Instruments for disaster risk reduction*Regulatory instruments*

DRR measures are implemented through environmental permits, construction norms and

standards, land use zoning and guidelines concerning water use and irrigation. Of these, the construction permitting process is the most detailed and widely implemented.

Land use zoning

Land use zoning is an important mechanism for DRR and urban development. The 1996 Land Code mandates public authorities to conduct seismic zoning. It also specifies the establishment of the state land cadastre with information on environmental, geotechnical, seismic and hydrogeological parameters. Bodies under the State Committee on Land Management and Geodesy are developing land cadastres, but the cartographical information is not uniform.

The 2012 Code on Urban Planning has helped streamline the construction and architectural regulation of the country and outlines, as one of the main objectives of urban planning, the protection of the population from natural and man-made disasters. The Code also provides that the rights of landowners can be restricted when this is needed for flood protection. The Code outlines the content of the state urban planning cadastre, which also includes environmental, seismic, hydrogeological and infrastructure parameters.

The Code also establishes that settlement plans are to be developed in accordance with the country's overall socioeconomic development plans and are to take into account exposure to natural and man-made disasters. Local programmes of socioeconomic development are to take into account measures to protect the population from natural and man-made disasters, and also to account for climatic factors. Equally, sectoral development plans, such as for electricity, transport, irrigation and water supply, are to take disaster risk into account.

While the Code is a significant improvement in setting the legal basis for using zoning for DRR, it is too early to say to what extent the legislation will be

implemented. Work on the development of relevant SNiPs still needs to be undertaken.

Environmental Impact Assessment

In the case of environmental impact assessment (EIA) (chapter 2), the developer is required to include information on the prevention of accidents and compliance with land planning regulations. Facilities requiring EIA are grouped into four hazard categories, from I (high risk) to IV (local impact). Environmental legislation obliges operators of facilities to develop environmental emergency preparedness plans and maintain response readiness. Climate change scenarios are not specifically included in the assessment process. Rather, documentation is evaluated in terms of its alignment with the principles of sustainable development and green growth.

Structural measures

DRR activities related to slope stabilization, through structural measures or the planting of trees, have taken place as part of individual programmes or projects. The State Committee on Land Management and Geodesy is responsible for measures related to land and pasture management, which can contribute to risk reduction. Such measures are not systematized and are not described in detail in any subsidiary legislation.

Awareness measures

Activities related to DRM knowledge and awareness, including training, are undertaken by relevant institutions within their own mandates and sectors. The Committee on Emergency Situations and Civil Defence has a training and methodological centre that delivers training according to a programme set up for various categories of government staff. This includes training for the heads of educational institutions, ministries, authorities and service organizations.

International and national organizations, including NGOs, are actively involved in education and awareness-raising on various DRM topics. These activities are generally undertaken as a part of different projects and initiatives, and are generally neither harmonized nor always sustainable.

The inclusion of DRR as a separate topic in school curricula has been proposed, but is not yet implemented; instead, it is covered under general safety topics. Specific campaigns have targeted children and schools.

15.5 Global and regional agreements related to disaster risk reduction

Tajikistan has committed to the Sendai Framework for Disaster Risk Reduction 2015–2030, the successor to the Hyogo Framework for Action 2005–2015, and participates in global platform meetings.

The country is part of the Shanghai Cooperation Organisation, through which capacities for national, transboundary and regional disaster response are being strengthened.

Through the CIS and the Collective Security Treaty Organization, the country is involved in emergency preparedness work, including simulation exercises.

Discussions on Tajikistan joining the Central Asia Centre for Emergency Situations and Disaster Risk Reduction established by Kazakhstan and Kyrgyzstan in 2012 and inaugurated in 2016, are ongoing.

Tajikistan is not a member of the International Search and Rescue Advisory Group (INSARAG) and is not represented in the United Nations Disaster Assessment and Coordination (UNDAC) team. The country did, however, participate in the INSARAG Global Meeting in 2015.

In 2011, Tajikistan acceded to both the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

Tajikistan is not a Party to the ECE Convention on the Transboundary Effects of Industrial Accidents. In 2005, it committed to implementing the Convention by participating in the High-level Commitment Declaration (CP.TEIA/2005/12). Tajikistan is participating in the Assistance Programme under the Convention, although there is room for enhancing such participation. The country has not nominated national focal point(s) and competent authority/authorities for the Convention. Also, it has not nominated point(s) of contact for industrial accident notification and mutual assistance to the Industrial Accident Notification system. Tajikistan has not yet prepared a national self-assessment and action plan, for which the Benchmarks in the implementation of the Convention, with indicators and criteria, are available.

Bilateral agreements and preparedness measures exist with a number of countries, the key partners being Afghanistan, Belarus, China, Kazakhstan, Kyrgyzstan, Switzerland and the Russian Federation.

15.6 Role of international community and civil society organizations

A large number of projects and activities on DRR supported by the United Nations and international organizations have been implemented in the last 10 years. DRM was incorporated in the United Nations Development Assistance Framework 2010–2015 under the pillars of Quality Basic Services; Food and Nutrition Security; and Clean Water, Sustainable Environment and Energy. In the 2016–2020 Framework, DRM falls under Outcome 6: "People in Tajikistan are more resilient to natural and man-made disasters and benefit from improved policy and operational frameworks for environmental protection and sustainable management of natural resources".

International banks, including the ADB, EBRD and World Bank, have large DRR-related programmes and are participating in the PPCR. UNDP addresses disaster preparedness, recovery and risk reduction through the Disaster Risk Management Programme, originally established in 2003 and now in its third phase. UNICEF works on disaster risk education and community-based DRR, and is also a significant contributor to response through REACT. The World Food Programme is active in response, leading the food security and nutrition part of REACT. The United Nations Office for Disaster Risk Reduction (UNISDR) bases its efforts on the Hyogo and Sendai Frameworks and support to the National Platform for Disaster Risk Reduction. OCHA supports the Government and international humanitarian community on preparedness for response. WHO has worked on climate change and health and is a key partner in response. OSCE works on environmental management, sustainable water management and DRR.

GIZ works on land and water management, addressing DRR as part of sustainable natural resources management. SDC works on DRR, water management and glacial lakes and has incorporated risk management into its Tajikistan development strategy. USAID targets agricultural communities and water users to improve food security and access to water. The Government of Finland is working with the Main Administration on Geology on geohazard identification. FOCUS Humanitarian Assistance is the primary preparedness and response partner working in Gorno-Badakhshan Autonomous Oblast, undertaking hazard vulnerability assessments and natural hazard mitigation projects. ACTED works at the community level to improve disaster relief and support preparedness. Save The Children provides disaster relief and works with communities in Khatlon and Sughd Oblasts. The Tajikistan–

Afghanistan border area is the focus of Mission East, which works to reduce the risk of natural disasters by implementing community-based mitigation and preparedness measures. Oxfam has undertaken activities related to climate change adaptation and DRR. Welthungerhilfe has equipped villages with emergency communication systems in the framework of natural DRM projects. Caritas combines livelihood benefits with DRR by pursuing synergies between income generation and sustainable natural resources management. CESVI supports local and institutional capacity development for managing disaster risk in transboundary watersheds. Mercy Corps works on community-level projects focusing on water and land use.

United Nations agencies are working on preparedness according to the Inter-Agency Standing Committee Emergency Preparedness for Response approach, determining key risks and ensuring the implementation of minimum and, where necessary, advanced preparedness actions. Preparations are underway for Tajikistan to conclude a Model Customs Facilitation Agreement, a bilateral agreement allowing the expedition of aid to the country in the event of a disaster.

The Red Crescent Society has a strong role in community-based DRR and response. National NGOs active in the area of DRR and/or climate change adaptation include the Centre for Climate Change and Disaster Reduction, Youth Group for Protection of the Environment, Mountain Societies Development Support Programme and Little Earth.

The Pilot Programme for Climate Resilience (PPCR) is a multilateral targeted programme under the Strategic Climate Fund, one of two funds within the framework of the Climate Investment Funds. Its objective is to pilot and integrate measures related to climate change into development planning. In Tajikistan, it is overseen by the Executive Office of the Deputy Prime Minister. In the period 2009–2012, the Programme identified priorities within the most vulnerable sectors and developed an investment plan for climate resilience. Six projects are currently under implementation, with the support of the ADB, EBRD and World Bank. The total PPCR grant for these priorities amounts to US\$62 million, with another US\$31 million provided through other grants and in-kind contributions and US\$55 million in loans. Projects focus on technical capacity building in the Committee on Environmental Protection, support to the Hydrometeorology Agency, strengthening the energy sector, sustainable land management and supporting small businesses. A national adaptation strategy linked to the PPCR is

currently under development. The PPCR coordination structure also deals with key DRR issues such as riverbank improvement, but is closed to all except PPCR implementing partners.

15.7 Conclusions and recommendations

Over the past 10 years, a lot of effort has been put into strengthening the disaster risk management (DRM) system in Tajikistan. Through the National Disaster Risk Management Strategy and the National Platform for Disaster Risk Reduction, disaster risk reduction (DRR) has become a known concept in the country. However, the practical work of key institutions, such as the Committee on Emergency Situations and Civil Defence, still centres on response. The lack of concrete progress on DRR is in part due to a lack of leadership and coordination.

The Committee on Emergency Situations and Civil Defence does not have sufficient authority to properly coordinate the risk reduction measures of other state institutions. This is exemplified by the fact that the National Disaster Risk Management Strategy for the period 2010–2015 was not fully financed or implemented. Nevertheless, the inclusion of DRM in local programmes of socioeconomic development is one of a number of achievements.

Existing disaster risk coordination platforms are limited in their scope. The National Platform for Disaster Risk Reduction does not include all relevant government authorities or partners, even though its expert group does meet and contributes to coordination at a technical level. The early warning reporting mechanism set up under the Ministry of Economic Development and Trade is a good initiative that strengthens multisectoral collaboration on risk monitoring and preparedness.

Recommendation 15.1:

The Government should strengthen coordination roles on risk management and revitalize existing coordination structures, namely by:

- (a) *Ensuring the participation of all relevant government authorities, as well as the private and civil sectors and academia, in the National Platform for Disaster Risk Reduction;*
- (b) *Revisiting existing response coordination mechanisms at the strategic and operational levels, and empowering national and local authorities, civil society and international organizations to develop and implement strategic response plans;*
- (c) *Improving the system of multisectoral collaboration for early warning and disaster*

response preparedness at the national and regional levels.

There still seems to be limited real coordination between work on climate change adaptation work conducted by the Committee on Environmental Protection and DRM work, including the implementation of the Uniform State System for Emergency Prevention and Response by the Committee on Emergency Situations and Civil Defence. Climate change adaptation is addressed through projects of the PPCR, but does not seem to be well coordinated with the work of the Committee on Emergency Situations and Civil Defence. Establishing a strong coordination mechanism at a high political level, between the Committee on Emergency Situations and Civil Defence and the Committee on Environmental Protection, is key, if efforts to link climate change adaptation and DRR are to be successful.

Recommendation 15.2:

The Government should increase the effectiveness of national disaster risk management and climate change adaptation efforts by:

- (a) *Actively promoting synergies between the Committee on Environmental Protection and the Committee on Emergency Situations and Civil Defence;*
- (b) *Formally cross-linking coordination platforms;*
- (c) *Developing joint/aligned plans and strategies.*

The lack of coordination and ownership has led to limited uptake of risk reduction measures in sectoral policies and tools, even in cases where risk management is included in legislation. The recently introduced 2014 Resolution of the Government No. 833 establishing responsibilities under the Uniform State System for Emergency Prevention and Response is a good attempt to harmonize sectoral disaster management initiatives. However, the Uniform System has yet to be put into concrete action through the clarification of duties and responsibilities and development of concrete mechanisms for collaboration. The Uniform System seems to partly overlap with, or duplicate, existing laws and regulations, e.g. those related to industrial risk management, including the monitoring of hazardous objects. Other types of emergencies, such as transport accidents and radiation safety, are excluded from the Uniform System.

Another key issue hindering the transition to risk management is the fragmented approach to

knowledge management. Risk information is not systematically managed, with vertical silos hindering information sharing between authorities and across sectors. A lot of risk information is classified and not shared among government bodies, and much less with partners and the general public. Gender-disaggregated disaster data are not publicly available.

Recommendation 15.3:

The Committee on Emergency Situations and Civil Defence should strengthen its approach to risk management by:

- (a) *Setting up a coordination mechanism for data collection and information sharing between relevant entities, including a uniform data platform based on existing data, which should also address the gaps;*
- (b) *Making data accessible online to stakeholders at the national and local levels;*
- (c) *Collecting gender-disaggregated data;*
- (d) *Reviewing and enforcing sectoral legislation to harmonize it with the Uniform State System for Emergency Prevention and Response;*
- (e) *Strengthening coordination with the Committee on Environmental Protection and other relevant government entities, e.g. by organizing joint inspections of hazardous objects, including industrial facilities and mining operations;*
- (f) *Approving and applying harmonized risk assessment and loss, damage and needs assessment methodologies, in coordination with national and local stakeholders;*
- (g) *Strengthening the monitoring of break-through prone glacier lakes.*

Many good efforts by donors and international and national NGOs have been implemented at the local level, where community awareness of risk has increased. Search and rescue teams, and volunteers, are responding to disasters and saving lives. At the national level, the lack of ownership, political will and technical and financial capacity is hindering the sustainability of the work of these partners. In the event of a large-scale disaster demanding international support, it is clear that the country would face immense challenges. The country does not take enough advantage of existing programmes and networks to strengthen preparedness and readiness. While information on the current gender composition of the rescue teams is not available, previous projects on search and rescue called for the

strengthening of efforts to increase the number of women among rescuers.

Recommendation 15.4:

The Government should build on the work and experiences of other countries on risk management by participating in the work of the International Search and Rescue Advisory Group and by increasing the number of women in search and rescue work.

Tajikistan is not a Party to the ECE Convention on the Transboundary Effects of Industrial Accidents. In 2005, it committed to implementing the Convention by participating in the High-level Commitment Declaration. Tajikistan is a beneficiary country of the Convention's Assistance Programme and there is room for enhancing its participation in the Assistance Programme and other activities under the auspices of the Convention to enable its accession to the Convention in the future.

Recommendation 15.5:

The Government should build on the work and experiences of other countries on industrial risk management by:

- (a) *Nominating a national focal point(s) and competent authority/authorities for the Convention on the Transboundary Effects of Industrial Accidents;*
- (b) *Ensuring the continuous involvement of the relevant bodies in activities under the Convention and, notably, under the Assistance Programme;*
- (c) *Nominating point(s) of contact for industrial accident notification and mutual assistance to the Industrial Accident Notification system under the Convention;*
- (d) *Engaging in national capacity building activities to strengthen institutional structures and policymaking on industrial accident prevention, preparedness and response;*
- (e) *Preparing a national self-assessment and action plan, using the Benchmarks for the implementation of the Convention with indicators and criteria to identify challenges in its implementation and possible needs for further assistance;*
- (f) *As soon as appropriate capacities for implementation are available, acceding to the Convention.*

ANNEXES

Annex I: Implementation of the recommendations in the second Environmental Performance Review

Annex II: Participation of Tajikistan in multilateral environmental agreements

Annex III: Key data and indicators available for the review

Annex IV: Millennium Development Goals indicators, 2000–2015

Annex V: List of major environment-related legislation

Annex VI: Results of the For Future Inland Transport Systems (ForFITS) tool

Annex I

IMPLEMENTATION OF THE RECOMMENDATIONS IN THE SECOND ENVIRONMENTAL PERFORMANCE REVIEW³

Chapter 1: Policymaking framework for environmental protection and sustainable development

Recommendation 1.1:

The Government should:

- (a) *Ensure that appropriate financial resources for the approved strategies, programmes and plans for environmental protection and sustainable development are allocated under the central and local budgets and ensure efficient use of foreign aid and support;*
 - (b) *Establish an efficient and transparent mechanism to monitor and assess the implementation of the strategies, programmes and plans.*
- (a) The recommendation has been partially implemented. The strategies and programmes usually describe financing needs, of which a very minor part is secured at the moment of adoption of a strategic document. Many strategies and programmes in the environmental area remain significantly underfunded. At the same time, measures are in place to ensure efficient use of foreign aid and support (e.g. the Foreign Aid Report and other activities of the State Committee on Investments and Management of State Property).
 - (b) The recommendation has been largely implemented. The mechanism to monitor and assess the implementation of the strategies, programmes and plans is in place. The reports on implementation of programmes are regularly submitted and in some cases the Government adopts follow-up resolutions, including measures aimed at streamlining implementation. The follow-up governmental resolutions are publicly available, while the reports themselves are not directly available in the national legal database ("Adlia"). Therefore, there is much room for improving the efficiency and transparency of the mechanism.

Recommendation 1.2:

To improve the current situation in law-making and with effective and timely implementation of laws related to environmental protection and natural resources, the Government should:

- (a) *Improve the coordination of the legislative initiatives and transparency of the lawmaking process at the national level;*
- (b) *Review existing environmental legislation to identify shortcomings in secondary legislation and ensure their drafting and adoption;*
- (c) *Request ministries, committees and agencies to combine law-making with the harmonization of principles and provisions and more consistency in the legal framework and with planning of effective further implementation of initiated laws;*
- (d) *Improve the procedure for the drafting and approval, by competent ministries, committees or agencies, of regulations to newly adopted laws, with timelines that are practicable and consistent with public participation requirements;*
- (e) *Coordinate intersectoral work of governmental agencies.*

Some efforts have been made to implement this recommendation, in particular with regard to items (b), (c) and (e). At the same time, the quality of legislation related to environmental protection and natural resources remains low. The mechanism of the legal expertise (review) of draft laws and other legal acts is in place but

³ The second review of Tajikistan was carried out in 2010.

does not seem to function properly. The procedure for mandatory review by concerned agencies (and, therefore, the Committee on Environmental Protection) of draft legal acts is in place. However, it is not clear to what extent the Committee on Environmental Protection actually uses this procedure for the purpose of including environmental aspects in sectoral legislation and whether the Committee can have an impact on draft legislation coming from sectoral ministries.

Recommendation 1.3:

The Government should:

- (a) *Raise the status of the Committee on Environmental Protection to that of a ministry to enable the national environmental authority to fulfil its mandate,*
- (b) *Until this decision is made, ensure the Committee on Environmental Protection's active participation in the coordination of intersectoral and intergovernmental cooperation on environmental protection and sustainable development at national level to ensure environmental protection and promote sustainable development.*
- (c) *Upon proposal by the Committee on Environmental Protection, approve internal restructuring of the Committee in order to establish a department on air protection, water and waste management to promote proper environmental permitting and to avoid conflict of interest in issuing permits and checking their enforcement by one and the same structure.*

This recommendation has been partially implemented.

The low status of the Committee on Environmental Protection, which is not part of the Government, does not allow the Committee to effectively coordinate the activities of all governmental authorities on environmental issues and ensure environmental protection and promotion of sustainable development in various sectors.

Since mid-2015, almost all competences for environmental permitting have been transferred to the central apparatus of the Committee on Environmental Protection; prior to that, most of the waste management permits and some air emission permits were granted by the Committee's oblast and district divisions. This formally separated the permitting and inspection activities that were often previously combined at the oblast and district levels. The oblast divisions and district and town offices/units are still involved in preparing the permit dossiers (e.g. checking the draft limit values) but the formal decisions are taken and the permits themselves are granted by the central apparatus of the Committee.

Chapter 2: Compliance and enforcement mechanisms

Recommendation 2.1:

The Government should develop a transparent mechanism to ensure implementation of environmental policies, strategies, plans, and legislation with the focus on environmental performance.

The recommendation has been partially implemented. No mechanism to ensure implementation of environmental policy documents and legislation was created. Several elements of such a mechanism are being introduced, though. The 2015 Law on Inspections of Business Entities, which entered in force in mid-2016, is more focused on environmental performance: it strengthens the risk-based approach to inspections and introduces new inspectors' performance assessment indicators. However, no list of high-risk facilities was developed by the Government.

The compliance monitoring activity is intense but its focus is mainly outside the environmental performance of the industrial sector. Inspectors spend their time on checking microenterprises or small agricultural farms regarding environmental payments and petty issues instead of focusing on potentially harmful facilities, many of them industrial. The main performance indicator is the increase in the number of checks compared with the previous period. Environmental inspectors do not dispose of sector-specific guidance materials and checklists. Thus, while the risk-based approach was legally proclaimed, no change occurred in practice.

Recommendation 2.2:

The Committee on Environmental Protection should ensure that data on the results of its inspections and law enforcement activities are analysed, reported and made publicly available for further utilisation in decision-making and updating of strategies, policies, programmes and plans.

The recommendation was partly implemented.

Monthly inspection reports are prepared for the Committee on Environmental Protection and local authorities. Every quarter, inspection results are discussed during the Committee's Board meetings. Statistical information on the inspections and law enforcement activities is still collected and kept separately by various Committee units (air, water resources, lands and waste treatment, flora and fauna).

Inspection reports are not publicly disclosed. General indicators of inspection work are published annually in environmental bulletins issued by the Committee on Environmental Protection (as well as by some oblast divisions of environmental protection) in a limited number of copies. The structure of inspection statistics is not well aligned with types of inspection mentioned in the 2015 Law on Inspections of Business Entities, thus analysis of adherence to this law is complicated. The presentation format is not tailored to the general public; nor is it adapted for utilization in decision-making. The analysis of data is limited to turning data into meaningful information.

Recommendation 2.3:

The Committee on Environmental Protection should improve existing procedures, including through observation of certain stages and time frames, ensure collection and recording of written comments, and also improve control within the EIA procedure (both within OVOS and within the process of acceptance of the documentation for the State Ecological Expertise).

The recommendation was partly implemented.

The 2012 Law on Ecological Expertise, the 2012 Procedures for conducting state ecological expertise (SEE) and the 2014 Procedures for the organization and conduct of environmental impact assessment (EIA) streamlined the mechanism of environmental assessment of projects. They brought several procedural adjustments, such as introducing more flexibility in the duration of SEE, which is now linked to the complexity of projects. The EIA Procedures have been differentiated in relation to the project risk. Public participation is described in the EIA Procedures in more detail, as is the content of the EIA report. However, several aspects (e.g. the role of the competent authority in EIA) still remain unclear and procedural guidance on EIA is lacking.

The current assessment system does not envisage either screening or scoping as specific procedural steps of EIA concluded by a decision of the competent authority. Deciding on the need for EIA (screening) and determining the scope and content of environmental assessment (scoping) are now totally within the responsibility of the project proponent. There is no formal requirement for dialogue between the proponent and the public authorities on these matters. In fact, the competent authority is now totally dissociated from the EIA. Previously, the authority had a role to play in EIA scoping since the proponent was requested to agree with it the content of the EIA report.

Recommendation 2.4:

The Committee on Environmental Protection should promote the practice of involvement of the public more actively in the environmental impact assessment and State ecological expertise procedures as well as in discussion of policies, programmes and plans relating to the environment, inter alia, through publication of guidance documents, training for officials and NGOs, providing consultations to NGOs and citizens.

The recommendation has been partially implemented.

The spectre of legal opportunities for public participation in EIA/SEE procedures as well as in the discussion of environment-related policies has been widened in the period 2012–2014. The public participation element of EIA has been described in more detail in the 2014 Procedures on EIA. The EIA reports for category I projects, for example, have to contain a non-technical summary. These reports are available for review by the population who may be affected by the project. The minimum duration of public consultation was set at 30 days since its

announcement by the local executive authorities. Concerned citizens can request public hearings of a specific EIA report.

The 2012 Law on Ecological Expertise strengthened another element of public participation, the public ecological expertise. Also, the Law introduced the right of the public associations to recommend their representatives for participation in SEE.

The practical implementation of legal opportunities for public consultation on environmental assessments remains very weak. Public participation is mainly limited to large projects co-financed by international actors. Not a single public ecological expertise was undertaken, due to lack of public initiative, limited resources and limited knowledge of procedural and legal requirements. The low environmental awareness of both the general public and the public authorities, and the lack of relevant mechanisms for participation in cases of public ecological expertise and proposing representatives from the public to participate in SEE, are at the origin of this situation.

Chapter 3: Monitoring, information, public participation and education

Recommendation 3.1:

The Government should ensure adequate funding for monitoring networks and for the development of monitoring programmes through:

- (a) *The implementation of the Programme for the Restoration of Hydrometeorological Stations and Hydrometeorological Posts for the period 2007–2016 in order to provide reliable environmental data for decision-making as well as for further dissemination to the public;*
- (b) *The modernization of the laboratories of the Centre for Analytical Control.*

This recommendation has not been implemented. Financing under relevant state programmes was insufficient for strengthening the monitoring networks and development of monitoring programmes. The conditions of the monitoring networks remain poor and monitored substances have not been expanded significantly. This has worsened to some extent, in particular as concerns the equipment of the Centre for Analytical Control and some regional laboratories of the Hydrometeorology Agency.

Recommendation 3.2:

The Committee on Environmental Protection should give more priority on processing, analysing, disseminating and publishing environmental information and resume publication of state of the environment reports.

This recommendation has been partially implemented. The Committee on Environmental Protection is giving greater priority to disseminating and publishing environmental information through its website, information bulletins, newsletter and journal, as well as organizing journalists who specialize in environmental topics. The work of the Environmental Information Centre within the Committee has been strengthened and it works in close cooperation with the national Aarhus Centre. However, the most recent state of the environment report dates from 2011.

Recommendation 3.3:

The Government should ensure that the programme on environmental education and plan on implementation of education for sustainable development are adopted and are financially secured.

This recommendation has been partially implemented. The State Comprehensive Programme of Development of the Environmental Awareness and Education of the Population for the period until 2020 (2015 Resolution of the Government No. 178) is considered to be a plan for implementation of education for sustainable development. However, the financing of planned measures under this Programme is not foreseen. The Programme does not indicate even required financial resources for implementation.

Recommendation 4.5 (from the first EPR of Tajikistan):

The State Committee for Environmental Protection and Forestry should prepare, for submission to the Government and, thereafter, to the Majlisi Oli, amendments to the Law on Ecological Expertise to streamline its provisions with those of the Aarhus Convention. Particular attention should be given to:

- Clarifying the accessibility of environmental information;
- Informing the public about applications for projects which require ecological expertise; setting deadlines for supplying information; setting timeframes for different phases of public participation;
- Clarifying the definition of the public concerned which should be informed;
- Involving the public in the State ecological expertise.

Pending the adoption of such amendments, the State Committee for Environmental Protection and Forestry should issue detailed guidelines on public participation for its ecological expertise branches using international experience, including the guidelines on public participation prepared under the Convention on Environmental Impact Assessment in a Transboundary Context.

See implementation of recommendations 2.3 and 2.4.

Chapter 4: Implementation of international agreements and commitments

Recommendation 4.1:

The Government should ensure sufficient financial resources for the autonomous implementation of multilateral environmental agreements and other environmental agreements' strategies, on the ground through Tajikistan's own priority programmes which meet Tajikistan's own specific needs from ratified multilateral environmental agreements.

The Committee on Environmental Protection should propose actions aimed at a progressive reduction of the foreign assistance dependency and at the same time promote a learning-by-doing approach, taking advantage of the expertise offered by foreign assistance technical plans and in the context of country-led approaches.

The recommendation was not implemented. Tajikistan continued to rely on international assistance in implementation of the multilateral environmental agreements and other environmental agreements' strategies. No efforts to reduce dependency on foreign assistance were taken.

Recommendation 4.2:

The Committee on Environmental Protection in cooperation with other relevant authorities should assess the costs and benefits of and promote the ratification of the following environmental agreements:

- (a) *Convention on International Trade in Endangered Species of Wild Fauna and Flora;*
- (b) *Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;*
- (c) *Convention on the Protection and Use of Transboundary Watercourses and International Lakes and its Protocol on Water and Health;*
- (d) *Convention on the Transboundary Effects of Industrial Accidents;*
- (e) *Convention on Long-range Transboundary Air Pollution;*
- (f) *Protocol on Pollutants Release and Transfer Registers to the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice.*

The recommendation has been partially implemented. Tajikistan became a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora and to the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 2016. It has participated in a number of activities and projects under all other multilateral environmental agreements mentioned in this recommendation. The Committee has promoted the country's accession to the Convention on Long-range Transboundary Air Pollution and the Protocol on Pollutants Release and Transfer Registers.

Recommendation 4.3:

The Government should:

- (a) *Finalize the accession procedure to the Espoo Convention on Environmental Impact Assessment in a Transboundary Context by duly informing the Convention Depositary;*

- (b) *Identify the competent authority(ies) and its (their) functions and competency, and amend the effective law with provisions regarding the transboundary environmental impact assessment procedure in order to duly implement the Espoo Convention.*

The recommendation was not implemented. The Government of Tajikistan did not deposit the instrument of accession with regard to the Espoo Convention on Environmental Impact Assessment in a Transboundary Context. Moreover, Tajikistan stepped back from the provisions on transboundary impact in the 2012 Law on Ecological Expertise and within the 2014 Procedures of Environmental Impact Assessment. Transboundary aspects of the new developments have been reduced to the minimum in the new legislation, without providing any details, e.g. on the notification procedure; requirements on consultations between the parties to an EIA report; and requirements on the final decision concerning the project and submitting it, together with its justification, to the affected Party.

Recommendation 4.4:

In view of the ratification of the Convention on the Transboundary Effects of Industrial Accidents, the Government should:

- (a) *Ensure the continuous involvement of the relevant bodies in activities under the Convention and notably under the Assistance Programme;*
 (b) *Ensure that the relevant bodies make use of the benchmarks for the implementation of the Convention to identify challenges in the implementation of the Convention and possible needs for further assistance activities.*

The recommendation was not implemented.

Chapter 5: Economic instruments and expenditures for environmental protection

Recommendation 5.1:

The Committee on Environmental Protection, in cooperation with other relevant stakeholders, should carry out a special study of the existing system of pollution charges and fines with objective view to:

- (a) *Focusing the system on a few major air and water pollutants;*
 (b) *Defining adequate, technically feasible, air pollution and surface water quality standards;*
 (c) *Raising incentives for pollution abatement and control by means of an adequate combination of environmental standards and economic instruments;*
 (d) *Ensuring that revenues from pollution charges cover at least the associated administrative costs of policy design and effective implementation.*

The recommendation was not implemented.

Recommendation 5.2:

The Committee on Environmental Protection, in cooperation with other relevant stakeholders, should review charges for the use of flora and fauna with a view to make them supportive of nature protection.

The recommendation has been partially implemented. Charges for use of flora and fauna are partly indexed to inflation.

Recommendation 5.3:

The Government and its competent bodies for tariffs applied to utility services, waste services, and irrigation services should:

- (a) *Ensure that tariffs are gradually approaching levels that allow, in combination with a high collection rate of bills, to recover production costs, including an adequate profit rate to finance investments;*
 (b) *Introduce clearly defined and transparent policy measures for providing targeted social support measures that ensure adequate access of the poorest and vulnerable parts of the population to these services;*

- (c) *Promote the progressive installation of meters, notably as regards water use, in households and enterprises, including farms, for monitoring consumption.*

The implementation of this recommendation is ongoing. Some progress has been made with moving towards more cost-reflective tariffs. There has also been progress with the installation of water meters in urban areas, but not in rural areas. The Government is preparing a countrywide scheme for providing targeted social assistance designed also to ensure affordability of communal services tariffs for lower income groups.

Recommendation 5.4:

The Government, in cooperation with its competent bodies, notably the Committee on Environmental Protection, the Ministry of Finance and the Ministry of Economic Development and Trade, should:

- (a) *Include environmental protection within the medium-term expenditure framework and give greater priority to environmental spending;*
 (b) *Define, in cooperation with major Government spending units, medium-term priorities and objectives for environmental policy across major sectors of the economy and prepare estimates of associated costs and benefits that would be used in the preparation of the medium-term expenditure framework;*
 (c) *Take measures designed to mobilizing private sector resources for environmental protection based on a more effective application of the polluter-pays and user-pays principles.*

The recommendation was not implemented. Overall progress with extending the Medium-Term Expenditure Framework to all line ministries has been slow.

Recommendation 5.5:

The Committee on Environmental Protection in cooperation with other competent bodies, such as the Ministry of Finance and the Ministry of Economic Development and Trade, should:

- (a) *Review the management and operations of environmental funds;*
 (b) *Assess the potential advantages of consolidating environmental funds into a much smaller number, if not a single fund;*
 (c) *Publish an annual report on the activities and achievements of environmental funds.*

The recommendation was not implemented. There is little transparency with regard to the expenditures of the environmental funds at the national and local levels.

Chapter 6: Climate change

Recommendation 6.1:

The Government should consider establishing a body on climate change issues to inter alia:

- (a) *Address climate change issues;*
 (b) *Procure studies on climate change impacts in different sectors;*
 (c) *Coordinate and monitor adaptation and mitigation activities;*
 (d) *Coordinate fund mobilization for climate change;*
 (e) *Raise awareness on adaptation and technology transfer issues at different levels;*
 (f) *Ensure the integration of climate change issues into strategies policies, programmes, plans and investment projects.*

This recommendation has been largely implemented. The Committee on Environmental Protection is in charge of coordinating policy development on climate change issues. The Hydrometeorology Agency includes the Centre for Studies on Climate Change and the Ozone Layer in charge of scientific, research and coordination activities. The Hydrometeorology Agency is responsible for all reporting under the UNFCCC. Also, the PPCR has its coordination mechanism, which includes an Inter-Ministerial Committee.

Recommendation 6.2:

The Government should:

- (a) *Develop a national adaptation strategy as well as a low-emission development strategy in line with the recent strategies developed on relevant topics;*
- (b) *Ensure financial and human resources for the implementation of these strategies and continue fund mobilization for adaptation and mitigation actions.*

The implementation of this recommendation is ongoing. The National Action Plan on Climate Change Adaptation (2003 Resolution of the Government No. 259) is formally still valid. A national strategy on adaptation to climate change is under preparation. Financing for implementation of climate change adaptation and mitigation measures is provided through the PPCR and various international projects.

Recommendation 6.3:

The authorities dealing with climate change issues should:

- (a) *Raise the level of expertise at the national, regional and municipal levels, through capacity-building and training programmes;*
- (b) *Carry out awareness-raising campaigns on climate change risks, mitigation and adaptation to climate change in cooperation with NGOs and community-based institutions.*

The implementation of this recommendation is ongoing, primarily through the activities of the Hydrometeorology Agency's Centre for Studies on Climate Change and the Ozone Layer, PPCR and various international projects.

Recommendation 6.4:

The Government should strengthen the capacities of observations and monitoring on meteorology, hydrology, and glaciers by ensuring

- (a) *The development of a network of automatic hydrological gauges and early warning systems, particularly in the upper reaches of river basins prone to formation of mudflows and floods;*
- (b) *The information transfer and exchange systems.*

This recommendation was not implemented. There is still a lack of production of proper hydrometeorological and glacier data and this poses difficulties in terms of the country's integration into the Global Observing System. There is no funding for such production under the 2006 Programme for the Recovery of Meteorological and Hydrological Stations Posts for the period 2007–2016 and the Programme for Studying and Preserving Glaciers for the period 2010–2030.

Recommendation 6.5:

In order to produce a more robust inventory of Greenhouse Gases, the Government should ensure:

- (a) *Availability of financial and human resources for the development of a reliable system of monitoring and registering of Greenhouse Gases;*
- (b) *Cooperation between key players in the statistical reporting related to the country's Greenhouse Gases inventory.*

This recommendation has been partially implemented. Monitoring and registry of GHGs is still carried out when national communications under the UNFCCC are being prepared with the assistance of relevant UNDP projects. Statistical books on environmental protection provide data on emissions of GHGs from the Second National Communication under the UNFCCC.

Chapter 7: Sustainable management of water resources

Recommendation 7.1:

The Ministry of Land Reclamation and Water Resources should:

- (a) *Implement the guiding principles and activities under the water sector reform developed in the cooperation with Food and Agriculture Organization of the United Nations (FAO) and other international organizations;*

- (b) *Support the start of the European Union Water Initiative National Policy Dialogue on Integrated Water Resources Management (IWRM) as a forum for the high-level inter-sector communication on the development and implementation of the water sector reform and as a vehicle for donor activities' coordination;*
- (c) *Set up guidelines for flood risk assessment and calculation of protective measures.*
- (d) *In cooperation with Ministry of Energy and Industry, draw up management rules for water reservoirs and involve all stakeholders;*
- (e) *Analyze existing water protected areas and, where appropriate, initiate pilot projects for setting appropriated water protection areas for groundwater, which is used for drinking water;*
- (f) *Ensure that flood prevention programmes follow common rules and take into consideration the integration of forestry, agriculture and settlement issues;*
- (g) *Ensure that management of water reservoirs is balanced and avoid giving single priority to power generation.*

This recommendation has been partially implemented, mostly due to delays in approval of the water sector reform. The Programme of Water Sector Reform for the period 2016–2025 was adopted much later than expected. Since 2011, the Steering Committee of the National Policy Dialogue on IWRM serves as a platform for regular intersectoral discussions on water sector priorities with a focus on IWRM. The Government has included water resources issues in its key policy targets. In the case of energy-oriented reservoir management, agricultural food production is often affected.

Recommendation 7.2:

The Government should ensure appropriate planning activities of water works as well as renovation and extension of existing water sector infrastructure, taking into account the needs to elaborate well-optimized technical solutions, including pre-treatment needs to the industrial wastewater treatment.

The implementation of this recommendation is ongoing. There are examples of appropriate planning activities of water works as well as renovation of existing water sector infrastructure, taking into account the need to elaborate well-optimized technical solutions (box 11.3).

Recommendation 7.3:

The Committee on Environmental Protection should encourage developers to include erosion and natural risks prevention when carrying out an environmental impact assessment.

Both the 2014 EIA Procedures and the previous 2006 EIA Procedures provided only general requirements for the content of the EIA documentation and made no specific reference to erosion or natural risks prevention. In the period 2006–2014, EIA scoping was subject to coordination with the environmental authority, i.e. the Committee on Environmental Protection. The 2014 EIA Procedures contain no formal requirement for dialogue between the proponent and the public authorities on this matter: scoping is now totally within the responsibility of the project proponent. Therefore, the possibility for the Committee to "encourage the developers to include erosion and natural risks prevention when carrying out an environmental impact assessment" has been further restricted.

Recommendation 7.4:

The Ministry of Land Reclamation and Water Resources, in cooperation with the water users associations, the Ministry of Health and other relevant stakeholders, should ensure that the rehabilitation of irrigation and drainage networks is accompanied by training and guidelines to farmers for improved water economy and sustainable farming.

This recommendation was partially implemented in the form of training organized through international projects.

Recommendation 7.5:

The Government should:

- (a) *Raise awareness of the population on water issues by organizing campaigns in cooperation with relevant stakeholders, NGOs and international organizations;*

(b) *Ensure capacity-building and appropriate training at all levels of water management.*

This recommendation was partially implemented in the form of training and capacity-building organized through international projects.

Recommendation 7.6:

The Ministry of Land Reclamation and Water Resources, the Khojagii Manziliyu Kommunal, the Ministry of Education, and the Committee on Environmental Protection should revise vocational training in water issues and increase capacity-building, fully utilize internal skills and experiences (i.e. out of pilot projects).

This recommendation was partially implemented in the form of training and capacity-building organized through international projects.

Chapter 8: Waste management

Recommendation 8.1:

In order to improve the management of municipal waste, the Committee on Environmental Protection, in cooperation with municipalities and the State Unitary Enterprise Khojagii Manziliyu Komunal, should:

- (a) *Finalize the draft national waste management strategy and its action plan with concrete funding plans for their implementation and promote their adoption;*
- (b) *Develop secondary legislation for municipal waste management at the national and municipal level, with special attention to the regulation on waste segregation, waste recycling and disposal practices;*
- (c) *Develop the system of separate collection of recyclable waste;*
- (d) *Further develop a system of regional disposal sites and allocation of suitable land.*

The implementation of this recommendation is ongoing.

- (a) A national waste strategy is under preparation but it is not yet finalized.
- (b) Some secondary legislation on waste was developed and adopted at national and municipal levels. However, waste segregation and waste recycling are not a priority.
- (c) Some progress was achieved, although Tajikistan generally lacks recycling infrastructure, except for recycling of scrap metals and paper.
- (d) The Committee started to collect information on individual sites and international donors are developing waste infrastructure in several towns.

Recommendation 8.2:

The State Property Committee, in cooperation with the Committee on Environmental Protection, should include environmental clauses in contracts in case of privatization or change of ownership of industries, and identify possibilities and elaborate concrete plans for remediation of industrial wastes with new owners.

This recommendation was implemented. The Committee on Environmental Protection facilitated the introduction of a mandatory environmental audit before privatization. This audit includes assessment of waste management and accumulated waste.

Recommendation 8.3:

The Agency for Nuclear and Radiation Safety at the Academy of Sciences should pursue the implementation of the International Atomic Energy Agency projects and identify opportunities for financing modernization and remediation measures by involving international donors as well as new owners of privatized companies in the mining sector.

The implementation of this recommendation is ongoing. The National Concept on Rehabilitation of Uranium Waste Tailings for the period 2014–2024 presents a strategy for remediation of radioactive waste tailings and dumps. Remediation projects started and will continue.

Recommendation 8.4:

The Committee on Environmental Protection should:

- (a) Cooperate and exchange practical experience with countries, which have already improved their situation in management of obsolete pesticides;
- (b) Approach donors for assistance with investment projects for improvement of obsolete pesticides storage.

The implementation of this recommendation is ongoing.

- (a) Tajikistan participates in regional activities under the Stockholm Convention on Persistent Organic Pollutants.
- (b) Two pesticide storage sites were upgraded. A team for pesticide packaging and transport was trained.

Recommendation 8.5:

The Ministry of Health, in cooperation with the Committee on Environmental Protection, should ensure that the following medical waste-related issues are included in the Waste Management Strategy:

- (a) Clear definition of responsibilities at national as well as at local level for hospital waste management;
- (b) Introduction and enforcement of monitoring and reporting of this waste;
- (c) Setting out of appropriate and suitable methods for storage, transport and disposal of this waste.

The recommendation was not implemented, except for (c), which is in progress.

- (a) No changes to the institutional responsibilities in healthcare waste were identified.
- (b) Generation of waste from the health sector is not recorded. No national data on healthcare waste are published.
- (c) The implementation of this recommendation is ongoing. The situation is beginning to improve in Dushanbe, mainly under the influence of international projects aimed at upgrading healthcare facilities.

Chapter 9: Biodiversity, forestry and protected areas

Recommendation 9.1:

The Committee on Environmental Protection should improve the policy, legal and institutional basis as well as increase human and financial capacity for the joint management of forest and other natural resources, and encourage the establishment of positive economic incentives and long-term user rights for sustainable natural resource use among traditional resource users.

The implementation of this recommendation is ongoing. The joint forest management approach, previously tested under several pilot projects implemented with the support of international donors, is now reflected in the 2011 Forest Code. Little information is available on the progress achieved so far; however, enhancing the joint management of forests is planned for the coming years. According to the draft strategy for the development of the forestry sector for the period 2016–2030, the increase in the number of households contracted for "joint forest management" from the current 721 to 3,500 shall be one of the Strategy's indicators, and the corresponding draft action plan for 2016–2020 includes action No. 5 on involvement of the local population in the Joint Forest Management schemes (with a budget accounting for 2 per cent of the total).

Recommendation 9.2:

The Committee on Environmental Protection should establish a participatory monitoring system for priority elements of biodiversity and forest resources involving State agencies, the Academy of Sciences, NGOs, other experts and international organizations, building on the multi-stakeholder collaboration during the ongoing revision of the Red List of Tajikistan.

The recommendation was not implemented. An effective participatory biodiversity monitoring system, as well as carrying out the complex forest resources inventory, was not established. Therefore, no reliable, updated and accurate data or information are available for biodiversity and forest management planning, quota-setting and prioritization of measures to be taken.

Recommendation 9.3:

The Government should:

- (a) *Develop the management and monitoring of all types of protected areas in a coordinated way;*
- (b) *Support the Committee on Environmental Protection to develop and implement management and financing plans for all Protected Areas;*
- (c) *Build the necessary capacity for their implementation among individual protected area administrations.*

- (a) This part of the recommendation was not implemented.
- (b) This part of the recommendation has been partially implemented. For some protected areas, five-year management plans were developed. However, due to budgetary constraints, progress in the development of management plans (together with financial plans for their implementation) for all protected areas is very slow, being to a large extent dependant on the availability of external financial support.
- (c) This part of the recommendation has been partially implemented. In the absence of adequate budgetary resources, capacity-building programmes are not carried out systematically. Some individual protected area administrations received training as part of the country's participation in international projects.

Recommendation 9.4:

The Committee on Environmental Protection in cooperation jointly with forest resource users and businesses, should develop, seek financial resources for implementation and implement, a nationwide reforestation programme that aims at biologically viable forests and a better fuel wood supply to rural communities, while addressing the key pressures on the country's forest resources.

The recommendation was partially implemented. A draft strategy for the development of the forestry sector for the period 2016–2030 and corresponding draft action plan for its implementation in the first five years (2016–2020) were drafted. Both documents were developed with the participation of the various agencies and ministries concerned, international organizations and NGOs. The reforestation programme is an important component of the Strategy, while expenditures on reforestation-related activities account for some 25 per cent of the planned budget necessary for the implementation of the action plan for the period 2016–2020. However, according to the available draft documents, the state budget and other sources are currently in a position to ensure only 14.8 per cent of the required funds, while the source of the remaining 85.2 per cent of the desired budget remains unknown.

Recommendation 9.5:

The Government should take all measures to assess and conserve the biodiversity typical of Central Asian mountains, bearing in mind that the country has been recognized as a global hotspot of Central Asian mountain biodiversity.

The recommendation has been partially implemented. A number of new legal acts have been adopted, establishing the legal basis for future activities. A considerable number of policies, strategies and state programmes have been adopted, and new ones for the subsequent period commencing in 2016 have recently been drafted and submitted for adoption. At the same time, the influence of the above laws, strategies and programmes on the sustainability of resource use, conservation status of biodiversity and condition of forests might be disputable, as the country is still lacking capacities to ensure their adequate implementation. In general, no significant progress towards mitigating pressures on biodiversity and forest resources has been achieved within the reporting period.

Chapter 10: Human health and the environment

Recommendation 10.1:

The Ministry of Health, in cooperation with other relevant Government bodies, should promote the establishment of cross-governmental groups to identify and address risks from climate change for the health priorities of water safety and food security.

The recommendation has been partly implemented. In the framework of the seven-country initiative "Protecting health from climate change" (2009–2013), assessment of the vulnerability of and climate change health impacts on the population of Tajikistan was conducted. It served as a basis for the development of a cross-cutting draft national climate change and health adaptation strategy and action plan of Tajikistan that was submitted to the Ministry of Health and Social Protection of the Population in 2012 but has not yet been endorsed. Overall, some progress has been made in the development of the basis for action. There is no mechanism in place for the

implementation of specific activities of an intersectoral nature to benefit both public health and the environment.

Recommendation 10.2:

The Ministry of Health, in cooperation with other relevant Government bodies should:

- (a) *Ensure the quality of the disease surveillance system;*
- (b) *Identify areas of different diagnostic procedures and data collection to improve surveillance and engage in training of health professionals;*
- (c) *Improve monitoring for drinking water quality, including in rural areas.*

The recommendation has been partly implemented. Overall, very limited progress has been made in monitoring health and the environment despite the legally binding requirements for monitoring and evaluation of policy implementation. Current monitoring does not provide an indication of the magnitude of environmental health risks or the size of the population affected or potentially "at risk". Neither does it provide information about changes in the risks as a result of interventions.

Recommendation 10.3:

The Ministry of Health should:

- (a) *Develop a national water safety strategy and implement the WHO Water Safety Plan nationwide;*
- (b) *Undertake a nationwide review of water supply and safety and the sanitation sector in rural and district hospitals, and develop a national plan to improve the quality of water and sanitation in hospitals;*
- (c) *Revise national water quality standards according to WHO guidelines;*
- (d) *Ensure comprehensive coverage of microbiological sampling, to increase coverage of water treatment and supply;*
- (e) *Develop and implement integrated Water Safety Plans in accordance with the international norms for water services;*
- (f) *Proceed with a resilience assessment of water supply and sanitation services in line with the methodology developed by WHO, and drawing on the Guidance on Water Supply and Sanitation in Extreme Weather Events.*

This recommendation has not yet been fully implemented. Overall, progress has been made: modern approaches to water management and water safety ensuring health protection have been introduced through a number of strategic and regulatory documents:

- (a) The country has set targets on water quality and implementation of good practices to water resource management, but a national water safety strategy that puts population health at the centre of the policy agenda has not been developed. The Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020 (2006 Resolution of the Government No. 514) targets the increase of water supply coverage in urban and rural areas. The Programme of Water Sector Reform for the period 2016–2025 (2015 Resolution of the Government No. 791) introduces IWRM and the river basin management approach and sets out the necessary measures and inter- and intrasectoral mechanisms and institutional arrangements to address topic-specific and cross-cutting issues.

Several initiatives are emerging to support uptake of the Water Safety Plan (WSP) in Tajikistan, particularly in rural and small town areas. Targets for development of the WSP in small towns and rural communities were set but progress towards achieving them has been slow, due to the lack of a legally binding framework to foster national policy dialogue and, until very recently, the lack of a national coordination mechanism on water resource management.

- (b) Assessment of water supply and sanitation was conducted in a sample of rural health centres, and these remain key issues for healthcare facilities. The rural hospital sites revealed a deteriorating infrastructure of water treatment and supply systems, as well as sanitation services, which potentially put patients at risk. From 2013 until 2015, the green hospital project has been implemented in four of Tajikistan's hospitals with the objective of introducing an efficient, environmentally friendly and hygienic hospital

management system. There are no targets on water supply and sanitation in healthcare facilities, and a national plan to improve the quality of water and sanitation in those facilities was not developed.

- (c) The national drinking water quality standards are currently being revised in accordance with the WHO guidelines and the revision is expected to come out in 2017.
- (d) Coverage of microbiological sampling of water treatment and supply is not reported and it is very likely that comprehensive coverage of the sampling, i.e. up to 100 per cent, has not been achieved. The situation in rural areas is particularly unsatisfactory.
- (e) Development and implementation of integrated water safety management systems in accordance with international norms for water safety services has seen limited progress, in particular in relation to the use of the few performance indicators for service operators (ISO 24510-10:2007). The components on water quality sampling (ISO 5667-5:2006) and management of drinking water utilities under crisis conditions (IWA 6:2008) have not been introduced. During 2012–2013, intensive activities have taken place on setting targets and target dates in the context of the Protocol on Water and Health (chapter 14).
- (f) Assessment of the resilience of water supply and sanitation services to extreme weather events was conducted in the framework of the seven-country initiative "Protecting health from climate change" (2009–2013). Measures have been put forward as a part of the draft national climate change and health adaptation strategy and draft action plan, which focus on protecting health from extreme weather events, improving and strengthening the public health system infrastructure, enhancing surveillance and early-warning systems and raising awareness among the population. The draft national climate change and health adaptation strategy is still awaiting endorsement by the Ministry of Health and Social Protection of the Population.

Recommendation 10.4:

The Government should:

- (a) *Establish a centre of food safety education and training for professionals and the general public;*
- (b) *Strengthen monitoring of food contamination in the food chain and surveillance of food-borne disease.*

Some progress has been made. Implementation of international food quality and safety standards and harmonization of the legislation is still under way:

- (a) A centre of food safety education and training for professionals and the general public has not been established;
- (b) Strengthening the monitoring of contamination in the food chain has been partially implemented. As a consequence of WTO membership and related requirements, some of the national standards for food contaminants have been revised. Official controls are still weak and can compromise food quality and safety; the hazard analysis and critical control points (HACCP) system has not yet been introduced in the country. Surveillance of some food-borne diseases of zoonotic origin, such as brucellosis, has been strengthened.

Recommendation 10.5:

The Government should:

- (a) *Promote the establishment of a Department for Monitoring and Evaluating Health Outcomes within the Nuclear and Radiation Safety Agency;*
- (b) *Align legislation on radiation with international safety standards;*
- (c) *Ensure the proper disposal of radioactive medical waste.*

- (a) The recommendation has, to a large extent, been implemented. Within the Technical Service Department of the Agency for Nuclear and Radiation Safety there are two sections dealing with health: the Occupational Exposure Control Service and the Patient Exposure Control Service. No department deals with monitoring and evaluating health outcomes.

- (b) The implementation of this recommendation is ongoing. The regulatory framework in the area of radiation is being improved and harmonized with international safety standards. The regulatory framework in the area of the handling of waste from former uranium mining is also being strengthened. Overall, good progress has been made with respect to the regulatory and institutional framework.
- (c) The recommendation has not yet been implemented. Disposal of radioactive medical waste has not improved: it continues to be disposed of through the main sewerage system.

Recommendation 10.6:

The Ministry of Health, in cooperation with other relevant Government bodies, should undertake an implementation analysis of the current National Environmental Health Action Plan and develop a new one, which will include inter alia a chapter on children's environmental health to reflect the priorities identified by CEHAPE.

The recommendation has not been implemented. At present there is no integrated strategy on environment and health. The overarching goal of the National Health Strategy for the period 2010–2020 is improvement of the population's health and creation of healthier environments through health system reform and modernization. The National Strategy on Child and Adolescent Health for the period until 2015 focuses on maternal and child health protection and addresses socio-economic and other determinants, leaving environmental matters beyond its scope. The State Environmental Programme for the period 2009–2019 is taking social and economic imperatives into consideration by defining specific measures to improve environmental status, with the aim to safeguard the population's health and recognizing the need for coordinated environmental sanitary-epidemiological monitoring. An implementation analysis of the National Environmental Health Action Plan, which ended in 2010, has not been conducted.

Recommendation 10.7:

The Ministry of Health, in cooperation with other relevant Government bodies, should establish and improve occupational health services and the registration of occupational diseases.

Partial implementation has taken place, with limited progress, in particular in redefining the scope of inspections and their implementation mode between the Service of State Sanitary and Epidemiological Surveillance (SSSES) and the Service of State Control on Labour, Employment and Social Protection. In 2012, Tajikistan ratified the ILO Labour Statistics Convention, 1985 (No. 160). There is no information system on work-related accidents and injuries, nor on occupational diseases; such statistics have not been systematically produced. There is underreporting of occupational health issues, reflecting the lack of a strengthened occupational health service.

*Annex II****PARTICIPATION OF TAJIKISTAN IN
MULTILATERAL ENVIRONMENTAL AGREEMENTS***

Year	Worldwide agreements	Tajikistan	
		Year	Status
1958	(GENEVA) Convention on the Continental Shelf		
1958	(GENEVA) Convention on Fishing and Conservation of the Living Resources of the High Seas		
1958	(GENEVA) Convention on the Territorial Sea and the Contiguous Zone		
1958	(GENEVA) Convention on the High Seas		
1960	(GENEVA) Convention concerning the Protection of Workers against Ionising Radiations (ILO 115)	1993	Ra
1961	(PARIS) International Convention for the Protection of New Varieties of Plants		
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage		
	1997 (VIENNA) Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage		
1968	(LONDON, MOSCOW, WASHINGTON) Treaty on the Non-Proliferation of Nuclear Weapons (NPT)	1995	Ac
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties		
1971	(RAMSAR) Convention on Wetlands of International Importance Especially as Waterfowl Habitat	2001	Ac
	1982 (PARIS) Amendment	2001	Ac
	1987 (REGINA) Amendments		
1971	(GENEVA) Convention on Protection against Hazards from Benzene (ILO 136)		
1971	(LONDON, MOSCOW, WASHINGTON) Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof		
1972	(PARIS) Convention concerning the Protection of the World Cultural and Natural Heritage	1992	Su
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter		
	1996 (LONDON) Protocol		
1972	(LONDON, MOSCOW, WASHINGTON) Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	2005	Ac
1972	(LONDON) International Convention on the International Regulations for Preventing Collisions at Sea		
1972	(GENEVA) International Convention for Safe Containers		
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild Fauna and Flora	2016	Ac
	1979 (BONN) Amendment		
	1983 (GABORONE) Amendment		
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)		
	1978 (LONDON) Protocol relating to the International Convention for the Prevention of Pollution from Ships		
	1997 (LONDON) Protocol to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto		
1974	(GENEVA) Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (ILO 139)		
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration (ILO 148)	1993	Ra
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	2001	Ac
	1995 (THE HAGUE) African/Eurasian Migratory Waterbird Agreement (AEWA)		
	1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)		
1980	(NEW YORK, VIENNA) Convention on the Physical Protection of Nuclear Material	1996	Ac
1981	(GENEVA) Convention Concerning Occupational Safety and Health and the Working Environment (ILO 155)	2009	Ra
1982	(MONTEGO BAY) Convention on the Law of the Sea		
	1994 (NEW YORK) Agreement related to the Implementation of Part XI of the Convention		
	1995 (NEW YORK) Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks		
1985	(GENEVA) Convention Concerning Occupational Health Services (ILO 161)		
1985	(VIENNA) Convention for the Protection of the Ozone Layer	1996	Ac
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	1998	Ac
	1990 (LONDON) Amendment to Protocol	1998	Ac
	1992 (COPENHAGEN) Amendment to Protocol	2009	Ac
	1997 (MONTREAL) Amendment to Protocol	2009	Ac
	1999 (BEIJING) Amendment to Protocol	2009	Ac
1986	(GENEVA) Convention Concerning Safety in the Use of Asbestos (ILO 162)		
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	2011	Ac
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	2011	Ac

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

Worldwide agreements		Tajikistan	
Year		Year	Status
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1995 Ban Amendment 1999 (BASEL) Protocol on Liability and Compensation	2016	Ac
1990	(GENEVA) Convention concerning Safety in the use of Chemicals at Work (ILO 170)		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation		
1992	(RIO DE JANEIRO) Convention on Biological Diversity	1997	Ac
	2000 (MONTREAL) Cartagena Protocol on Biosafety	2004	Ac
	2010 (NAGOYA) Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization	2013	Ra
	2010 (NAGOYA - KUALA LUMPUR) Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety		
1992	(NEW YORK) United Nations Framework Convention on Climate Change	1998	Ac
	1997 (KYOTO) Protocol	2008	Ac
	2015 (PARIS) Paris Agreement	2016	Si
1993	(ROME) Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas		
1993	(PARIS) Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction	1995	Ra
1994	(VIENNA) Convention on Nuclear Safety		
1994	(PARIS) United Nations Convention to Combat Desertification	1997	Ac
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2007	Ac
1997	(NEW YORK) Convention on the Law of Non-navigational Uses of International Watercourses		
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage		
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	1998	Si
2001	(STOCKHOLM) Convention on Persistent Organic Pollutants	2007	Ra
2001	(LONDON) Convention on Civil Liability for Bunker Oil Pollution Damage		
2003	(GENEVA) WHO Framework Convention on Tobacco Control	2003	Ac
2004	(LONDON) Convention for the Control and Management of Ships' Ballast Water and Sediments		
2013	(KUMAMOTO) Minamata Convention on Mercury		

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

Regional and subregional agreements		Tajikistan	
Year		Year	Status
1957	(GENEVA) European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	2011	Ac
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts		
1968	(PARIS) European Convention - Protection of Animals during International Transport (revised in 2003)		
	1979 (STRASBOURG) Additional Protocol		
1969	(LONDON) European Convention on the Protection of the Archaeological Heritage (revised in 1992)		
1976	(STRASBOURG) European Convention for the Protection of Animals Kept for Farming Purposes		
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats		
1979	(GENEVA) Convention on Long-range Trans-boundary Air Pollution		
	1984 (GENEVA) Protocol - Financing of Co-operative Programme (EMEP)		
	1985 (HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%		
	1988 (SOFIA) Protocol - Control of Emissions of Nitrogen Oxides		
	1991 (GENEVA) Protocol - Volatile Organic Compounds		
	1994 (OSLO) Protocol - Further Reduction of Sulphur Emissions		
	1998 (AARHUS) Protocol on Heavy Metals		
	1998 (AARHUS) Protocol on Persistent Organic Pollutants		
	1999 (GOTHENBURG) Protocol to Abate Acidification, Eutrophication and Ground-level Ozone		
1991	(ESPOO) Convention on Environmental Impact Assessment in a Transboundary Context		
	2001 (SOFIA) First Amendment		
	2003 (KIEV) Protocol on Strategic Environmental Assessment		
	2004 (CAVTAT) Second Amendment		
1992	(HELSINKI) Convention on the Protection and Use of Transboundary Watercourses and International Lakes		
	1999 (LONDON) Protocol on Water and Health		
	2003 (MADRID) Amendments to Articles 25 and 26		
1992	(HELSINKI) Convention on the Transboundary Effects of Industrial Accidents		
	2003 (KIEV) Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters		
1993	(OSLO and LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(LISBON) Energy Charter Treaty	1997	Ra
	1994 (LISBON) Protocol on Energy Efficiency and Related Environmental Aspects	1997	Ra
	1998 Amendment to the Trade-Related Provisions of the Energy Charter Treaty		

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

Regional and subregional agreements		Tajikistan	
Year		Year	Status
1998	(AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	2001	Ac
	2003 (KIEV) Protocol on Pollutant Release and Transfer Register	2003	Si
	2005 (ALMATY) Amendment on GMOs		
1998	(STRASBOURG) Convention on the Protection of Environment through Criminal Law		
1998	(BISHKEK) Agreement on the Use of Water and Energy Resources in Syr Darya Basin	1999	Si
2000	(FLORENCE) Convention on European Landscape		
2006	(ASHGABAT) Framework Convention on Environmental Protection for Sustainable Development in Central Asia	2006	Si
2006	(SEMIPALATINSK) Treaty on a Nuclear-Weapon-Free Zone in Central Asia	2009	Ra

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Climate Change											
Greenhouse gas emissions (total of CO ₂ , CH ₄ , N ₂ O, CFC, etc.) expressed in CO ₂ eq.											
- Total aggregated emissions (1 000 t) without LULUCF	7 876.0	8 458.0	7 630.0	7 675.0	8 266.0	8 184.0	..	..	..	..	..
- Total aggregated emissions (1 000 t) with LULUCF	5 812.0	6 372.0	5 540.0	5 588.0	6 176.0	6 092.0	..	..	..	..	..
- per capita (t CO ₂ eq/capita)	0.4	0.4	0.5	0.4	0.4	0.4	0.4	..	..	..	..
- per unit of GDP (t CO ₂ eq/1 000 US\$ (2005) PPP)	..	..	..	..	..	..	..	..	..	..	..
- by sector (1 000 t)											
Energy	1 941.0	2 747.0	1 789.0	1 846.0	1 420.0	1 273.0	..	..	..	..	..
Energy industries	59.0	335.0	178.0	141.0	180.0	98.0	..	..	..	..	..
Manufacturing industries and construction	210.0	630.0	373.0	471.0	370.0	328.0	..	..	..	..	..
Transport	497.0	598.0	385.0	314.0	372.0	406.0	..	..	..	..	..
Other sectors	1,091.0	1,100.0	790.0	857.0	456.0	420.0	..	..	..	..	..
Other	..	..	..	..	..	..	..	..	..	..	..
Fugitive emissions	84.0	84.0	63.0	63.0	42.0	21.0	..	..	..	..	..
Industry	788.0	811.0	815.0	735.0	633.0	656.0	..	..	..	..	..
Solvent and other product use	..	..	..	..	..	..	..	..	..	..	..
Agriculture	4 643.0	4 396.0	4 501.0	4 569.0	5 667.0	5 709.0	..	..	..	..	..
Land use, land use change and forestry (LULUCF)	-2 064.0	-2 086.0	-2 090.0	-2 087.0	-2 090.0	-2 092.0	..	..	..	..	..
Waste	504.0	504.0	525.0	525.0	546.0	525.0	..	..	..	..	..
Other	..	..	..	..	..	..	..	..	..	..	..
- Total CO ₂ emissions (without LULUCF) (1 000 t) of which											
Carbon dioxide (CO ₂)	2,645.0	3,474.0	2,541.0	2,518.0	2,011.0	1,908.0	..	..	..	..	..
Nitrous Oxide (N ₂ O)	2,480.0	2,170.0	2,170.0	1,860.0	2,790.0	2,790.0	..	..	..	..	..
Methane (CH ₄)	131.0	134.0	139.0	157.0	165.0	166.0	..	..	..	..	..
Perfluorocarbons (PFCs)	..	..	..	..	..	..	..	..	..	..	..
Hydrofluorocarbons (HFCs)	..	..	..	..	..	..	..	..	..	..	..
Sulfur hexafluoride (SF ₆)	..	..	..	..	..	..	..	..	..	..	..
- Total CO ₂ emissions (with LULUCF) (1 000 t) of which											
Carbon dioxide (CO ₂)	581.0	1,388.0	451.0	431.0	-79.0	-184.0	..	..	..	..	..
Nitrous Oxide (N ₂ O)	2,480.0	2,170.0	2,170.0	1,860.0	2,790.0	2,790.0	..	..	..	..	..
Methane (CH ₄)	131.0	134.0	139.0	157.0	165.0	166.0	..	..	..	..	..
Perfluorocarbons (PFCs)	..	..	..	..	..	..	..	..	..	..	..
Hydrofluorocarbons (HFCs)	..	..	..	..	..	..	..	..	..	..	..
Sulfur hexafluoride (SF ₆)	..	..	..	..	..	..	..	..	..	..	..
Ozone layer											
Consumption of ozone-depleting substances (ODS) (t of ODS)	3.5	3.6	3.8	3.9	2.6	2.8	2.9	3.0	2.3	..	..

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Transportation											
Freight transport demand (million ton km)											
by mode											
train	..	..	..	..	..	..	..	..	..	..	..
road transport	..	1 220.1	1 274.4	1 274.0	1 282.0	808.0	703.0	555.0	..	..	..
water transport	..	..	..	..	..	..	..	..	..	..	..
air transport	..	..	..	..	..	..	..	..	..	..	..
Number of passenger vehicles (including taxis)	3.7	2.4	3.6	4.8	5.9	1.0	1.5	1.6	0.5	0.5	..
Average age of passenger car fleet (years)	..	..	..	..	..	..	..	..	..	..	..
..
Waste											
Total waste generation	..	..	..	..	..	..	..	..	..	..	..
of which											
Hazardous waste (1 000 t)	..	..	..	..	..	..	..	..	..	..	..
Non-hazardous industrial waste (1 000 t)	..	..	..	..	..	..	..	..	..	..	..
Municipal waste (1 000 m ³)	..	..	..	..	..	..	..	..	..	..	..
of which from households (1 000 m ³)	..	..	..	..	..	..	..	..	..	..	..
Demography and Health											
Total population (million inhabitants)	6.8	7.0	7.1	7.3	7.4	7.6	7.8	8.0	8.2	8.4	..
Birth rate (per 1 000)	26.4	26.7	28.0	27.9	26.8	29.4	28.7	27.8	25.9	27.8	..
Total fertility rate	3.3	3.3	3.6	3.6	3.6	3.6	3.6	3.8	3.8	..	..
Mortality rate (per 1 000)	4.6	4.6	4.8	4.5	4.4	4.4	4.4	4.3	3.9	4.0	..
Infant mortality rate (deaths/1 000 live births)	65.1	..	46.0	..	34.0	34.0	34.0	34.0	..	..	..
Life expectancy at birth (years)	70.6	71.8	71.7	72.2	72.8	72.5	72.5	72.8	73.4	73.4	..
Female life expectancy at birth (years)	73.2	74.4	74.0	74.8	75.3	74.4	74.1	74.6	75.3	75.4	..
Male life expectancy at birth (years)	68.1	69.3	69.4	69.7	70.5	70.8	70.9	71.1	71.6	71.6	..
Population aged 0-14 years (% of total)	37.7	37.0	36.4	36.2	35.9	35.6	35.5	35.2	34.8	34.6	..
Population ages 15-64 (% of total)	57.4	58.2	58.8	59.0	59.5	59.7	59.8	60.1	60.3	60.4	..
Population ages 65 and above (% of total)	4.9	4.9	4.8	4.7	4.7	4.7	4.7	4.7	4.9	5.0	..
Use of improved drinking water source											
- Total population (%)	64.6	65.6	66.6	67.6	68.6	69.7	70.7	71.7	72.7	73.7	73.8
- Urban (%)	92.6	92.6	92.7	92.7	92.8	92.8	92.9	93.0	93.0	93.1	93.1
- Rural (%)	54.5	55.9	57.2	58.6	59.9	61.3	62.7	64.0	65.4	66.7	66.7
Access to improved sanitation											
- Total population (%)	92.1	92.4	92.7	93.0	93.4	93.7	94.0	94.4	94.7	95.0	95.0
- Urban (%)	92.9	93.0	93.1	93.2	93.3	93.4	93.5	93.6	93.7	93.8	93.8
- Rural (%)	91.7	92.2	92.6	93.0	93.4	93.8	94.2	94.6	95.1	95.5	95.5

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Telecommunications											
Fixed telephone lines per 100 inhabitants	4.1	..	4.1	3.9	4.7	4.8	4.9	4.9	5.2	5.2	..
Cellular subscribers per 100 population	3.9	30.9	30.0	50.5	65.8	77.9	80.9	81.5	91.8	95.1	..
Personal computer in use per 100 population	..	..	..	..	..	..	..	..	..	..	..
Internet users per 100 population	0.3	3.8	7.2	8.8	10.1	11.6	13.0	14.5	16.0	17.5	..
Education											
Literacy rate (%)	..	..	..	..	..	..	..	..	..	..	..
Literacy rates of 15-24 years old, both sexes (%)	..	..	..	..	..	..	..	..	..	..	..
Gender Inequality											
Share of women employment in the non-agricultural sector (%)	..	..	..	..	..	..	..	..	..	..	..
Gender Parity Index in	..	..	..	..	..	..	..	..	..	..	..
- Primary education enrolment (ratio)	0.97	0.96	0.97	0.97	0.97	0.97	0.97	0.98	..	..	..
- Secondary education enrolment (ratio)	0.83	0.83	0.84	0.87	0.89	0.87	0.88	0.90	..	..	..
- Tertiary education enrolment (ratio)	0.48	0.49	0.50	0.51	0.53	0.53	0.52	0.52	0.56	0.61	..

Source: Committee on Environmental Protection, Agency of Statistics, 2016.

MILLENNIUM DEVELOPMENT GOALS INDICATORS, 2000-2015

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Target 1.A: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day																
1.1 Proportion of population below \$1.25 (PPP) per day																
Population below \$1.25 (PPP) per day, percentage				35.40	20.70			12.20		6.50						
Population below national poverty line, total, percentage				72.40				53.10		47.20						
Population below national poverty line, urban, percentage				68.80				49.30		41.80						
Population below national poverty line, rural, percentage				73.80				54.40		49.20						
Purchasing power parities (PPP) conversion factor, local currency unit to international dollar	0.51	0.68	0.75	0.86	0.89	0.93	0.99	1.09	1.26	1.35	1.41	1.54	1.59			
1.2 Poverty gap ratio																
Poverty gap ratio at \$1.25 a day (PPP), percentage				10.00	4.70			4.40		1.30						
1.3 Share of poorest quintile in national consumption																
Poorest quintile's share in national income or consumption, percentage				7.90	7.80			7.40		8.40						
Target 1.B: Achieve full and productive employment and decent work for all, including women and young people																
1.4 Growth rate of GDP per person employed																
Growth rate of GDP per person employed, percentage	7.77			- 0.91	- 6.45	23.92	5.73	7.15	7.25	20.94						
1.5 Employment-to-population ratio																
Employment-to-population ratio, both sexes, percentage				50.90	58.40											
Employment-to-population ratio, men, percentage				59.00	69.10											
Employment-to-population ratio, women, percentage				43.10	47.80											
1.6 Proportion of employed people living below \$1.25 (PPP) per day																
Proportion of employed people living below \$1 (PPP) per day, percentage				32.50	18.70			13.00		5.90						
1.7 Proportion of own-account and contributing family workers in total employment																
Proportion of own-account and contributing family workers in total employment, both sexes, percentage										47.10						
Proportion of own-account and contributing family workers in total employment, women, percentage										41.10						
Proportion of own-account and contributing family workers in total employment, men, percentage										51.80						

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from hunger																
1.8 Prevalence of underweight children under-five years of age																
Children under 5 moderately or severely underweight, percentage						14.90		15.00		8.30			13.30			
Children under 5 severely underweight, percentage						4.30		6.00					3.70			
1.9 Proportion of population below minimum level of dietary energy consumption																
Population undernourished, percentage	38.80	39.50	41.00	42.60	43.10	42.30	40.50	39.00	38.20	38.00	37.40	36.80	35.90	35.00	34.00	33.20
Population undernourished, millions	2.40	2.50	2.60	2.80	2.90	2.90	2.80	2.80	2.80	2.80	2.90	2.90	2.90	2.90	2.90	2.90
Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling																
2.1 Net enrolment ratio in primary education																
Total net enrolment ratio in primary education, both sexes	94.50	94.30	96.20	96.90	97.40	97.40	97.30	96.40	97.90	98.00	98.20	98.10	98.90		95.60	
Total net enrolment ratio in primary education, boys	97.70	98.00	98.60	99.00	99.20	99.10	99.20	98.00	99.40	99.40	99.50	99.50	99.50		96.30	
Total net enrolment ratio in primary education, girls	91.10	90.40	93.70	94.80	95.50	95.70	95.20	94.80	96.20	96.50	96.80	96.50	96.50		94.90	
2.2 Proportion of pupils starting grade 1 who reach last grade of primary																
Percentage of pupils starting grade 1 who reach last grade of primary, both sexes	95.50	98.80	98.80	98.80	98.00	99.40	99.00	99.20	98.70	98.90	98.90	98.00	98.00			
Percentage of pupils starting grade 1 who reach last grade of primary, boys									98.20	98.60	99.10	96.90	96.90			
Percentage of pupils starting grade 1 who reach last grade of primary, girls									99.20	99.20	98.70	99.20	99.20			
Primary completion rate, both sexes	91.30	95.60	96.80	94.90	91.70	101.00	104.30	92.40	94.60	97.70	101.00	102.60	97.60		98.20	
Primary completion rate, boys										99.20	102.20	104.10	98.90		98.70	
Primary completion rate, girls										96.00	99.70	101.00	96.20		97.70	
2.3 Literacy rate of 15-24 year-olds, women and men																
Literacy rates of 15-24 year olds, both sexes, percentage	99.80												99.90			
Literacy rates of 15-24 year olds, men, percentage	99.80												99.90			
Literacy rates of 15-24 year olds, women, percentage	99.80												99.90			
Women to men parity index, as ratio of literacy rates, 15-24 years old	1.00												1.00			
Target 3.A: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015																
3.1 Ratio of girls to boys in primary, secondary and tertiary education																
Gender Parity Index in primary level enrolment	0.93	0.93	0.96	0.96	0.96	0.97	0.96	0.97	0.97	0.97	0.97	0.97	0.98		0.99	
Gender Parity Index in secondary level enrolment	0.86	0.83	0.82	0.83	0.84	0.83	0.83	0.84	0.87	0.89	0.87	0.88	0.90			
Gender Parity Index in tertiary level enrolment	0.45	0.41	0.43	0.44	0.46	0.48	0.49	0.50	0.51	0.53	0.53	0.52	0.52	0.56	0.61	

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
3.2 Share of women in wage employment in the non-agricultural sector	23.20	23.70	24.10	23.80	23.10	22.90	21.50			28.90						
3.3 Proportion of seats held by women in national parliament																
Seats held by women in national parliament, percentage	3	15	13	13	13	13	18	18	18	18	18	19	19	19	16	17
Total number of seats in national parliament	181	60	63	63	63	63	63	63	63	63	63	63	63	63	63	59
Seats held by men in national parliament	176	51	55	55	55	55	52	52	52	52	52	51	51	51	53	49
Seats held by women in national parliament	5	9	8	8	8	8	11	11	11	11	11	12	12	12	10	10
Target 4.A: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate																
4.1 Under-five mortality rate																
Children under five mortality rate per 1 000 live births	93.50	87.10	80.80	74.90	69.80	65.40	61.80	58.90	56.60	54.50	52.70	51.00	49.30	47.70		
4.2 Infant mortality rate																
Infant mortality rate (0-1 year) per 1 000 live births	74.70	70.10	65.50	61.30	57.50	54.30	51.60	49.50	47.70	46.10	44.70	43.40	42.10	40.90		
4.3 Proportion of 1 year-old children immunized against measles																
Children 1 year old immunized against measles, percentage	88.00	88.00	89.00	91.00	92.00	85.00	82.00	85.00	86.00	89.00	94.00	98.00	94.00	92.00		
Target 5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio																
5.1 Maternal mortality ratio																
Maternal mortality ratio per 100 000 live births	68.00	69.00	58.00	48.00	46.00	46.00	39.00	38.00	37.00	37.00	35.00	35.00	34.00	34.00	33.00	32.00
5.2 Proportion of births attended by skilled health personnel																
Births attended by skilled health personnel, percentage	71.10					83.40		88.40			87.70		87.40			
Target 5.B: Achieve, by 2015, universal access to reproductive health																
5.3 Contraceptive prevalence rate																
Current contraceptive use among married women 15-49 years old, any method, percentage	33.90					37.90		37.10					27.90			
Current contraceptive use among married women 15-49 years old, modern methods, percentage	27.30					33.10		31.70					25.70			
Current contraceptive use among married women 15-49 years old, condom, percentage	0.40					1.40		1.30					2.20			
5.4 Adolescent birth rate																
Adolescent birth rate, per 1 000 women	37.30					27.30					47.00					
5.5 Antenatal care coverage (at least one visit and at least four visits)																
Antenatal care coverage, at least one visit, percentage	71.30					77.10		88.80					78.80			
Antenatal care coverage, at least four visits, percentage								49.40					52.50			

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Target 6.B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it																
6.5 Proportion of population with advanced HIV infection with access to antiretroviral drugs																
Antiretroviral therapy coverage among people with advanced HIV infection, percentage (lower bound)										6.20	9.20	13.20				
Antiretroviral therapy coverage among people with advanced HIV infection, percentage										10.70	15.20	21.60				
Antiretroviral therapy coverage among people with advanced HIV infection, percentage (upper bound)										17.70	24.00	33.30				
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (lower bound)										13.30	15.30					
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (mid point)																
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (upper bound)											37.60	48.10				
Target 6.C: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases																
6.6 Incidence and death rates associated with malaria																
Notified cases of malaria per 100 000 population													2.00			
Malaria death rate per 100 000 population, all ages													0.00			
Malaria death rate per 100 000 population, ages 0-4													0.00			
6.7 Proportion of children under 5 sleeping under insecticide-treated bednets																
Children under 5 sleeping under insecticide-treated bed nets, percentage						1.00										
6.8 Proportion of children under 5 with fever who are treated with appropriate anti-malarial drugs																
Children under 5 with fever being treated with anti-malarial drugs, percentage						2.00							2.10			
6.9 Incidence, prevalence and death rates associated with tuberculosis																
Tuberculosis prevalence rate per 100 000 population (mid-point)	461.00	456.00	443.00	421.00	392.00	361.00	324.00	288.00	253.00	221.00	193.00	171.00	154.00	142.00		
Tuberculosis prevalence rate per 100 000 population (lower bound)	226.00	226.00	223.00	215.00	202.00	189.00	171.00	155.00	134.00	116.00	99.00	86.00	76.00	70.00		
Tuberculosis prevalence rate per 100 000 population (upper bound)	780.00	766.00	737.00	694.00	643.00	587.00	525.00	465.00	409.00	359.00	318.00	283.00	258.00	239.00		

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
8.8 Agricultural support estimate for OECD countries as a percentage of their gross domestic product Agriculture support estimate for OECD countries as percentage of their GDP Agriculture support estimate for OECD countries, million US\$																
8.9 Proportion of ODA provided to help build trade capacity ODA provided to help build trade capacity, percentage																
8.10 Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative) Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative)																
8.11 Debt relief committed under HIPC and MDRI Initiatives Debt relief committed under HIPC initiative, cumulative million US\$ in end-2009 NPV terms Debt relief delivered in full under MDRI initiative, cumulative million US\$ in end-2009 NPV terms					6.20	5.10	3.60	2.90	6.20	6.00	6.70	5.20	6.20			
8.12 Debt service as a percentage of exports of goods and services Debt service as percentage of exports of goods and services and net income																
Target 8.E: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries																
8.13 Proportion of population with access to affordable essential drugs on a sustainable basis Population with access to essential drugs, percentage																
Target 8.F: In cooperation with the private sector, make available the benefits of new technologies, especially in information and communications																
8.14 Fixed-telephone subscriptions per 100 inhabitants Fixed-telephone subscriptions per 100 inhabitants Fixed-telephone subscriptions					3.94 286 940	4.12 280 200	3.94 286 940	4.12 292 730	3.94 286 940	4.66 347 260	4.82 367 693	4.86 380 000	4.91 393 000	5.18 425 000	5.24 440 700	
8.15 Mobile-cellular subscriptions per 100 inhabitants Mobile-cellular subscriptions per 100 inhabitants Mobile-cellular subscriptions					50.49 3 673 520	3.89 265 000	30.92 2 150 000	29.99 2 132 770	50.49 3 673 520	65.79 4 900 000	77.89 5 940 842	80.92 6 324 000	81.51 6 528 000	91.83 7 537 100	95.13 7 999 100	
8.16 Internet users per 100 inhabitants Internet users per 100 inhabitants Internet users Personal computers per 100 inhabitants Personal computers					8.78	0.30	3.77	7.20	8.78	10.07	11.55	13.03	14.51	16.00	17.49	

Source: United Nations site for the MDG Indicators, 2016.

*Annex V****LIST OF MAJOR ENVIRONMENT-RELATED
LEGISLATION***

The Constitution of the Republic of Tajikistan of 6 November 1994 with amendments made on 26 September 1999 and 22 June 2003

Codes

Water Code of the Republic of Tajikistan dated 29 November 2000
Code on Urban Planning of the Republic of Tajikistan dated 28 December 2012
Housing Code of the Republic of Tajikistan dated 12 December 1997
Land Code of the Republic of Tajikistan dated 13 December 1996
Forest Code of the Republic of Tajikistan dated 2 August 2011
Tax Code of the Republic of Tajikistan dated 17 September 2012
Criminal Code of the Republic of Tajikistan dated 21 May 1998
Code on Misdemeanours of the Republic of Tajikistan dated 31 December 2008
Civil Code of the Republic of Tajikistan (part 1 dated 30 June 1999, part 2 dated 11 December 1999, part 3 dated 1 March 2005)
Labour Code of the Republic of Tajikistan dated 15 May 1997

Constitutional Laws

"On the Government of the Republic of Tajikistan" dated 12 May 2001
"On the legal regime of the state of emergency" dated 3 November 1995
"On Gorno-Badakhshan autonomous oblast" dated 30 July 2007
"On local public administration bodies" dated 17 May 2004
"On issues of administrative and territorial division of the Republic of Tajikistan" dated 19 March 2013

Laws

"On specially protected natural areas" dated 26 December 2011
"On environmental protection" dated 2 August 2011
"On environmental audit" dated 26 December 2011
"On environmental information" dated 25 March 2011
"On environmental monitoring" dated 25 March 2011
"On environmental education of the population" dated 29 December 2010
"On ecological expertise" dated 16 April 2012
"On waste from production and consumption" dated 10 May 2002
"On charity" dated 22 April 2003
"On natural monopolies" dated 5 March 2007
"On collection, preservation and rational use of genetic resources of cultivated plants" dated 1 August 2012
"On the safety of hydrotechnical infrastructure" dated 29 December 2010
"On the safety of food products" dated 1 August 2012
"On safety" dated 28 June 2011
"On biological farming and production" dated 22 July 2013
"On biological safety" dated 1 March 2005
"On hydrometeorological activity" dated 2 December 2002
"On mountainous regions of the Republic of Tajikistan" dated 22 July 2013
"On public procurement of goods, operations and services" dated 3 March 2006

- "On state support to the agro-industrial complex of the Republic of Tajikistan" dated 5 March 2007
- "On state forecasts, concepts, strategies and programmes of socioeconomic development of the Republic of Tajikistan" dated 8 December 2003
- "On state regulation of production and use of some oil products" dated 30 July 2007
- "On state regulation to ensure the fertility of agricultural land" dated 15 July 2004
- "On public-private partnership" dated 28 December 2012
- "On dehkan farms" dated 15 March 2016
- "On road traffic" dated 4 November 1995
- "On wildlife" dated 5 January 2008
- "On the collection of scrap and waste of ferrous and non-ferrous metals" dated 28 February 2004
- "On the protection of breastfeeding" dated 22 December 2006
- "On protection of the population and territories from natural and man-made emergencies" dated 15 July 2004
- "On protection of the population from tuberculosis" dated 22 December 2006
- "On state protection and support of entrepreneurship" dated 26 July 2014
- "On plant protection" dated 16 April 2012
- "On land management" dated 5 January 2008
- "On concessions" dated 26 December 2011
- "On the licensing of certain types of activities" dated 17 May 2004
- "On international treaties of the Republic of Tajikistan" dated 11 December 1999
- "On individual farms" dated 8 December 2003
- "On the moratorium on inspection of business entities engaged in production" dated 3 July 2012
- "On traditional medicine" dated 9 December 2004
- "On subsoil resources" dated 20 July 1994
- "On oil and gas" dated 18 March 2015
- "On normative legal acts" dated 26 March 2009
- "On the production and safe use of pesticides and agrochemicals" dated 22 April 2003
- "On drinking water and drinking water supply" dated 29 December 2010
- "On pastures" dated 13 March 2013
- "On food safety" dated 29 December 2010
- "On industrial safety of dangerous production facilities" dated 28 February 2004
- "On poultry farming" dated 21 July 2010
- "On radiation safety" dated 1 August 2003
- "On permitting" dated 2 August 2011
- "On reproductive health and reproductive rights" dated 2 December 2002
- "On fishery, fishing and protection of fish resources" dated 19 September 2013
- "On ensuring the sanitary-epidemiological safety of the population" dated 8 December 2003
- "On the public administration system of the Republic of Tajikistan" dated 16 April 2012
- "On secondary vocational education" dated 8 August 2015
- "On technical standards" dated 19 May 2009
- "On transport safety" dated 3 July 2012
- "On transport" dated 29 November 2000
- "On tourism" dated 3 September 1999
- "On emergency rescue services, emergency rescue units and the status of rescuers" dated 1 March 2006
- "On roads and road activities" dated 10 May 2002
- "On water user associations" dated 21 November 2006
- "On investment" dated 12 May 2007
- "On the use of nuclear energy" dated 9 December 2004
- "On renewable energy sources" dated 12 January 2010
- "On ensuring the environmental safety of road transport" dated 8 August 2015
- "On education" dated 22 July 2013

"On radioactive waste management" dated 22 July 2013
"On public associations" dated 12 May 2007
"On restriction of the use of tobacco products" dated 29 December 2010
"On the responsibility of parents for children's education" dated 2 August 2011
"On hunting and the hunting sector" dated 26 July 2014
"On the protection of atmospheric air" dated 28 December 2012
"On the protection of public health" dated 15 May 1997
"On the protection and use of flora" dated 17 May 2004
"On soil protection" dated 16 October 2009
"On the protection of plant varieties" dated 3 November 2010
"On conformity assessment" dated 2 August 2011
"On coal" dated 3 July 2012
"On power networks" dated 10 May 2002
"On energy" dated 29 November 2000
"On energy saving and energy efficiency" dated 19 September 2013
"On public requests" dated 14 December 1994
"On veterinary medicine" dated 29 December 2010
"On the moratorium on inspection of small and medium business entities in the Republic of Tajikistan" dated 26 March 2009
"On other obligatory payments to the budget" dated 28 July 2006
"On the Red Crescent Society of Tajikistan" dated 12 January 2010
"On state guarantees of equal rights and equal opportunities for men and women" dated 1 March 2005
"On occupational safety" dated 19 May 2009
"On standardization" dated 29 December 2010
"On inspections of business entities" dated 25 December 2015
"On state secrets" dated 26 July 2014
"On informatization" dated 6 August 2001
"On state statistics" dated 12 January 2010
"On the civil service" dated 5 March 2007
"On public finances of the Republic of Tajikistan" dated 28 June 2011
"On maintenance of apartment buildings and on home owners associations" dated 5 August 2009
"On privatization of state property" dated 16 May 1997
"On insurance" dated 29 December 2010
"On the Chamber of Commerce and Industry of the Republic of Tajikistan" dated 22 May 1998
"On the Technology Park" dated 21 July 2010
"On Civil Defence" dated 28 February 2004

Decrees of the President

Decree of the President of the Republic of Tajikistan No. 12 dated 19 November 2013 "On improvement of the structure of public executive authorities of the Republic of Tajikistan"

Decree of the President of the Republic of Tajikistan No. 862 dated 22 April 2010 "On the Agency of Statistics under the President of the Republic of Tajikistan"

Decree of the President of the Republic of Tajikistan No. 181 dated 17 March 2014 "On approval of the Regulations of the Executive Office of the President of the Republic of Tajikistan"

Decree of the President of the Republic of Tajikistan No. 653 dated 24 April 2009 "On additional measures on the economical use of energy and energy saving"

Decree of the President of the Republic of Tajikistan No. 1287 dated 17 February 2004 "On accession to the Economic Commission for Europe Convention on Environmental Impact Assessment in a Transboundary Context"

Decree of the President of the Republic of Tajikistan No. 356 dated 19 December 2007 "On creation of the Consultative Council on Improvement of the Investment Climate under the President of the Republic of Tajikistan"

Decree of the President of the Republic of Tajikistan No. 637 dated 17 March 2009 "On creation of the National Legislation Centre under the President of the Republic of Tajikistan"

Decree of the President of the Republic of Tajikistan No. 288 dated 27 November 2014 "On amendments to the Decree of the President of the Republic of Tajikistan No. 637 dated 17 March 2009"

Resolutions of the Government

Resolution of the Government of the Republic of Tajikistan No. 643 dated 2 November 2015 "On measures of implementation of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer"

Resolution of the Government of the Republic of Tajikistan No. 324 dated 16 July 1997 "On measures to improve hunting management on the territory of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 387 dated 2 August 2010 "On approval of the Regulations on the Red Book of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 388 dated 21 September 2000 "On approval of the Regulations on the procedure to ensure state control over the condition, use, restoration, preservation and protection of forests in the Republic of Tajikistan"

Resolution of the Government of Tajikistan No. 294 dated 15 July 1997 "On approval of the Regulations on state control over the use and preservation of land in the Republic of Tajikistan"

Resolution of the Government of Tajikistan No. 172 dated 3 April 2007 "On approval of the Regulations on the specifics of the licensing of selected types of activities, revised version"

Resolution of the Government of the Republic of Tajikistan No. 190 dated 18 March 2014 "On the Procedures of elaboration of territorial planning schemes of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 542 dated 2 October 2012 "On approval of the Procedures of elaboration and maintenance of state ecological information resources"

Resolution of the Government of the Republic of Tajikistan No. 680 dated 31 December 2011 "On approval of the Procedures of accounting/metering in the drinking water supply sector"

Resolution of the Government of the Republic of Tajikistan No. 679 dated 31 December 2011 "On approval of the Procedures of state control and inspection of drinking water supply"

Resolution of the Government of the Republic of Tajikistan No. 187 dated 13 March 2014 "On the Procedures of organization and implementation of state expertise of urban planning documentation"

Resolution of the Government of the Republic of Tajikistan No. 26 dated 3 January 2014 "On the Procedures of elaboration of consolidated urban planning schemes of some territories of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 297 dated 3 May 2014 "On the Procedures of elaboration of sectoral development schemes of territories of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 525 dated 2 December 2006 "On approval of the Rule of formation, expertise, approval, financing and realization of scientific and scientific-technical programmes and projects, financed from the state budget of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 429 dated 3 July 2014 "On the rules for certification of workplaces on working conditions"

Resolution of the Government of the Republic of Tajikistan No. 104 dated 1 March 2012 "On defining the authorized state body for the organization and carrying out of ecological monitoring"

Resolution of the Government of the Republic of Tajikistan No. 189 dated 24 April 2008 "On the Committee on Environmental Protection under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 150 dated 3 March 2014 "On the Committee on Architecture and Construction under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 256 dated 29 April 2015 "On Model regulation of preschool educational institution in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 132 dated 28 February 2014 "On the Forestry Agency under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 360 dated 30 May 2015 "On the Hydrometeorology Agency"

Resolution of the Government of the Republic of Tajikistan No. 125 dated 27 February 2014 "On the Agency of Land Reclamation and Irrigation under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 227 dated 3 May 2010 "On the Anti-Monopoly Service under the Government of the Republic of Tajikistan"

- Resolution of the Government of the Republic of Tajikistan No. 617 dated 28 December 2006 "On the Main Administration on Geology under the Government of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 89 dated 2 March 2013 "On issues related to tenders for subsoil use"
- Resolution of the Government of the Republic of Tajikistan No. 611 dated 28 December 2006 "On the Committee on Emergency Situations and Civil Defence under the Government of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 495 dated 2 November 2013 "On the Coordination Council on Food Products"
- Resolution of the Government of the Republic of Tajikistan No. 290 dated 2 July 2013 "On the Council on Public–Private Partnership"
- Resolution of the Government of the Republic of Tajikistan No. 477 dated 3 December 2002 "On measures of implementation of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer" (ceased to be in force with the passing of Resolution of the Government of the Republic of Tajikistan No. 643 dated 2 November 2015 "On measures of implementation of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer")
- Resolution of the Government of the Republic of Tajikistan No. 626 dated 2 November 2015 "On creation of the State Institution 'National Accreditation Centre'"
- Resolution of the Government of the Republic of Tajikistan No. 187 dated 2 November 2015 "On the Ministry of Finance of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 191 dated 26 April 2008 "On the Ministry of Agriculture of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 589 dated 28 December 2006 "On the Ministry of Economic Development and Trade of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 145 dated 3 March 2014 "On the Ministry of Education and Science of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 148 dated 3 March 2014 "On the Ministry of Health and Social Protection of the Population of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 147 dated 3 March 2014 "On the Ministry of Industry and New Technologies of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 592 dated 28 December 2006 "On approval of the Regulations on the Ministry of Interior of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 587 dated 28 December 2006 "On the Ministry of Justice of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 250 dated 6 May 2011 "On the Ministry of Transport of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 149 dated 3 March 2014 "On the Ministry of Energy and Water Resources of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 601 dated 9 September 2014 "On the National Council on Development of Education under the Government of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 98 dated 1 March 2012 "On creation of the National Platform for Disaster Risk Reduction of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 620 dated 29 October 2015 "On creation of the National Commission on Irrigation and Drainage"
- Resolution of the Government of the Republic of Tajikistan No. 452 dated 31 August 2012 "On defining the specially authorized state body for environmental audit"
- Resolution of the Government of the Republic of Tajikistan No. 571 dated 5 December 2013 "On defining the specially authorized state body for the organization and carrying out of environmental monitoring"
- Resolution of the Government of the Republic of Tajikistan No. 545 dated 2 October 2012 "On defining the specially authorized state body in the field of environmental protection"
- Resolution of the Government of the Republic of Tajikistan No. 697 dated 3 December 2012 "On the Procedures for conducting state ecological expertise"
- Resolution of the Government of the Republic of Tajikistan No. 253 dated 3 June 2013 "On the List of facilities and types of activity for which the development of materials of environmental impact assessment is mandatory"
- Resolution of the Government of the Republic of Tajikistan No. 132 dated 27 February 2009 "On the State Institution 'National Centre on Implementation of Commitments under the Stockholm Convention on Persistent Organic Pollutants'"

Resolution of the Government of the Republic of Tajikistan No. 834 dated 31 December 2014 "On creation of the National Coordination Council on Public Health and Social Protection of the Population under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 499 dated 31 August 2012 "On accession of the Republic of Tajikistan to the Transparency Initiative in Mining"

Resolution of the Government of the Republic of Tajikistan No. 456 dated 31 August 2012 "On the Tax Committee under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 586 dated 4 September 2014 "On the Service for State Surveillance over Architecture and Construction"

Resolution of the Government of the Republic of Tajikistan No. 134 dated 7 April 1999 "On approval of the Regulations on the State Forestry Guard of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 511 dated 1 August 2014 "On the Service of State Surveillance over the Safety of Hydrotechnical Facilities"

Resolution of the Government of the Republic of Tajikistan No. 791 dated 31 December 2014 "On the Procedure of organization of the unified state environmental monitoring system and on the state register of environmental monitoring objects in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 225 dated 3 May 2010 "On the State Committee on Land Management and Geodesy of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 152 dated 3 March 2014 "On the Service of State Surveillance over Safety in Industry and Mining under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 186 dated 3 April 2007 "On the Service of State Sanitary and Epidemiological Surveillance"

Resolution of the Government of the Republic of Tajikistan No. 281 dated 29 May 2010 "On the Republican Commission on Flood Prevention"

Resolution of the Government of the Republic of Tajikistan No. 90 dated 27 February 2010 "On approval of the Structure and Regulations of the Scientific and Technical Coordination Council under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 587 dated 4 September 2014 "On the Service of Licensing of Urban Planning Activities"

Resolution of the Government of the Republic of Tajikistan No. 590 dated 28 December 2006 "On the State Committee on Investments and Management of State Property of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 626 dated 17 November 2009 "On the ban on the sale of incandescent light bulbs on the territory of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 833 dated 31 December 2014 "On the organization and functioning of the Uniform State System of the Republic of Tajikistan for Emergency Prevention and Response"

Resolution of the Government of the Republic of Tajikistan No. 799 dated 30 December 2015 "On the State Commission on Emergency Situations of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 482 dated 3 December 2004 "On approval of the Regulations on state control of radiation safety"

Resolution of the Government of the Republic of Tajikistan No. 581 dated 4 September 2014 "On the List of infrastructure objects and social services to which the Law of the Republic of Tajikistan 'On public-private partnership' does not apply"

Resolution of the Government of the Republic of Tajikistan No. 289 dated 2 July 2013 "On creation of the State Institution 'Centre for Implementation of Public-Private Partnership Projects'"

Resolution of the Government of the Republic of Tajikistan No. 471 dated 2 December 2005 "On approval of the Regulations on the Interagency Council on Ensuring Radiation Safety"

Resolution of the Government of the Republic of Tajikistan No. 436 dated 2 July 2015 "On documents regulating to questions of the safety of hydraulic structures"

Resolution of the Government of the Republic of Tajikistan No. 216 dated 2 May 2008 "On monitoring and evaluation of the implementation of mid-term poverty reduction strategies in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 73 dated 2 February 2009 "On the Long-term Construction Programme for Small Hydroelectric Power Plants for the period 2009–2020" (ceased to be in force with the passing of the Resolution of the Government of the Republic of Tajikistan No. 795 dated 30 December 2015 "On the Programme on Renewable Energy Development and Construction of Small Hydropower Plants for the period 2016–2020")

Resolution of the Government of the Republic of Tajikistan No. 789 dated 31 December 2014 "On the Procedures for requesting the mandatory environmental audit"

Resolution of the Government of the Republic of Tajikistan No. 509 dated 1 August 2014 "On the Procedures for the organization and conduct of environmental impact assessment"

- Resolution of the Government of the Republic of Tajikistan No. 550 dated 29 August 2015 "On the Procedures on organization and maintenance of the register of environmental auditors and environmental audit organizations"
- Resolution of the Government of the Republic of Tajikistan No. 126 dated 2 April 2005 "On excise taxes on selected goods manufactured in the Republic of Tajikistan and imported into the territory of the Republic of Tajikistan" (ceased to be in force with the passing of the Resolution of the Government of the Republic of Tajikistan No. 102 dated 15 February 2014 "On setting up excise taxes on selected goods manufactured in the Republic of Tajikistan and imported into the territory of the Republic of Tajikistan")
- Resolution of the Government of the Republic of Tajikistan No. 450 dated 25 October 2003 "On the customs tariff of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 21 dated 28 January 2015 "On the outcomes of socioeconomic development of the Republic of Tajikistan in 2014 and objectives for 2015"
- Resolution of the Government of the Republic of Tajikistan No. 93 dated 2 March 2013 "On the List of agricultural equipment, production and technical equipment, and its component items, forming the uniform technological set imported into the territory of the Republic of Tajikistan, exempted from value added tax and custom duties"
- Resolution of the Government of the Republic of Tajikistan No. 517 dated 30 December 2005 "On amendments to the Resolution of the Government of the Republic of Tajikistan No. 477 dated 3 December 2002"
- Resolution of the Government of the Republic of Tajikistan No. 210 dated 12 May 1999 "On approval of the Regulations for calculation of the cost of goods (works, services) in enterprises and organizations of the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 790 dated 31 December 2014 "On the manner and amount of compensation for damage caused to the forest fund and other objects of flora and fauna by natural persons and legal entities"
- Resolution of the Government of the Republic of Tajikistan No. 546 dated 2 November 2007 "On approval of the charges for the conduct of legally important activities and the payments for the issuing of permits for the use of natural and other available resources"
- Resolution of the Government of the Republic of Tajikistan No. 69 dated 1 March 2012 "On the report of the Chair of the Committee on Environmental Protection under the Government of the Republic of Tajikistan on the implementation of the State Programme on Development of Specially Protected Natural Areas for 2005–2015"
- Resolution of the Government of the Republic of Tajikistan No. 610 dated 31 October 2009 "On the Procedure for compensation of the costs of provision of information by public authorities"
- Resolution of the Government of the Republic of Tajikistan No. 234 dated 30 April 2011 "On approving the Rules for using the municipal water supply and sewerage systems in the Republic of Tajikistan"
- Resolution of the Government of the Republic of Tajikistan No. 463 dated 4 October 2013 "On defining the specially authorized state body for protection of air quality"
- Resolution of the Government of the Republic of Tajikistan No. 205 dated 30 April 2012 "On defining the specially authorized state body for waste management"
- Resolution of the Government of the Republic of Tajikistan No. 486 dated 1 August 2014 "On defining the specially authorized state body for fish farming, fishing and protection of fish resources"
- Resolution of the Government of the Republic of Tajikistan No. 696 dated 30 December 2009 "On approval of the Charter of motor transport of the Republic of Tajikistan"
- Resolution of the Council of Ministers of the Republic of Tajikistan No. 126 dated 19 March 1994 "On the procedure of planning, calculating and use of the fund for mitigation of emergency activities in the Republic of Tajikistan"
- Resolution of the Council of Ministers of the Republic of Tajikistan No. 619 dated 23 December 1993 "On approval of the Procedures for determination of fees and their maximum limits for environmental pollution and waste disposal"
- Resolution of the Government of the Republic of Tajikistan No. 435 dated 3 June 2014 "On defining the specially authorized state body for forestry, hunting and specially protected natural areas"
- Resolution of the Government of the Republic of Tajikistan No. 344 dated 30 May 2015 "On amendments and additions to the Resolution of the Government of the Republic of Tajikistan No. 189 dated 24 April 2008"
- Resolution of the Government of the Republic of Tajikistan No. 15 dated 27 January 2015 "On defining the specially authorized state body on the issues of energy saving and energy efficiency"
- Resolution of the Government of the Republic of Tajikistan No. 524 dated 2 August 2014 "On defining the specially authorized state body for radioactive waste disposal"
- Resolution of the Government of the Republic of Tajikistan No. 523 dated 2 August 2014 "On defining the Committee on Environmental Protection to be the specially authorized state body for protection, use and reproduction of flora"
- Resolution of the Government of the Republic of Tajikistan No. 65 dated 26 February 2015 "On defining the specially authorized state body for protection and use of flora and fauna species belonging to the Red Book of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 41 dated 4 February 2002 "On creating the National Interdepartmental Coordination Commission on Environmental Statistics"

Resolution of the Government of the Republic of Tajikistan No. 755 dated 2 December 2014 "On defining the specially authorized state authority to support water user associations"

Resolution of the Government of the Republic of Tajikistan No. 615 dated 28 December 2006 "On the Agency for Standardization, Metrology, Certification and Trade Inspection under the Government of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 390 dated 2 August 2010 "On approval of the Regulations on the organization and carrying out of the mandatory state technical inspection of motor vehicles, as well as trailers (semi-trailers), participating in road traffic in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 39 dated 4 February 2002 "On approval of the Regulations on delineation of responsibilities of specially authorized state bodies on use and protection of water resources"

Resolution of the Government of the Republic of Tajikistan No. 354 dated 3 June 2014 "On the rules for connection to engineering networks and utility systems"

Resolution of the Government of the Republic of Tajikistan No. 660 dated 2 December 2009 "On the Coordination Council under the Government of the Republic of Tajikistan on Water and Energy Issues"

Resolution of the Government of the Republic of Tajikistan No. 193 dated 30 April 2002 "On procedures of maintenance of the state water cadastre of the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 201 dated 3 May 2010 "On procedures of realization of ecological migration in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 279 dated 2 June 2011 "On the approval of the Procedures, conditions and methods of collection, disposal, decontamination, transportation, storage and disposal of industrial and solid municipal waste in the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 428 dated 28 June 2009 "On the approval of the Procedures for forming and use of 'Stabilization fund of development of economy'"

Resolution of the Government of the Republic of Tajikistan No. 626 dated 2 November 2012 "On procedures for detection of and accounting for abandoned waste"

Resolution of the Government of the Republic of Tajikistan No. 362 dated 30 May 2015 "On procedures of movement of radioactive waste across the national border and within the Republic of Tajikistan"

Resolution of the Government of the Republic of Tajikistan No. 507 dated 1 August 2014 "On the state cadastre of sites containing radioactive waste"

Resolution of the Government of the Republic of Tajikistan No. 508 dated 1 August 2014 "On the state register of radioactive waste"

Resolution of the Government of the Republic of Tajikistan No. 250 dated 3 June 2013 "On the authorized state body on public-private partnerships"

Resolution of the Government of the Republic of Tajikistan No. 38 dated 12 February 2013 "On defining the authorized state body in the field of innovation"

Resolution of the Government of the Republic of Tajikistan No. 373 dated 3 June 2014 "On Procedures for development of the General Settlement Scheme for the Republic of Tajikistan"

Regulatory legal acts of ministries and other state bodies

Order of the Ministry of Transport of the Republic of Tajikistan No. 111 dated 23 June 2014 "On approval of general aviation rules of the Republic of Tajikistan 'Environmental requirements against the impact of civil aviation activity' (OAP RT-27)"

Categories of danger of ionizing radiation sources and Rules of their determination No. 37/10 dated 26 August 2010 approved by the Order of the Director of the Agency for Nuclear and Radiation Safety under the Academy of Sciences of the Republic of Tajikistan

Rules of safety during transportation of radioactive materials approved by the Order of the Director of the Agency for Nuclear and Radiation Safety under the Academy of Sciences of the Republic of Tajikistan No. 1/194 dated 7 October 2010

Methodological guidelines for soil assessment and economic evaluation of lands of the Republic of Tajikistan, approved by the Chair of the State Committee on Land Management dated 18 April 2003

Instruction on the definition, approval and management of tariffs and tariff estimates for goods (works, services) of natural monopoly entities, approved by Order of the Minister of Economic Development and Trade of the Republic of Tajikistan dated 28 May 2007 No. 10

Order of the Agency for Nuclear and Radiation Safety under the Academy of Sciences of the Republic of Tajikistan No. 1-121 dated 24 August 2012 "On approval of Rules and Norms NP 01.001-12 'Requirements for ensuring physical safety of radiation sources and radioactive substances storage facilities, revised version'"

Order of the Tax Committee under the Government of the Republic of Tajikistan No. 17-f dated 21 December 2012 "On approval of the Instruction on taxation of hydropower plant construction"

Joint Order of the Minister of Labour and Social Protection of the Population No. 73 dated 2 May 2012 and the Minister of Health No. 189 dated 2 May 2012 "On approval of the Instruction on medical-social expertise (revised version)"

Guide on realization of water supply projects in Tajikistan, approved by Order of the Ministry of Land Reclamation and Water Resources of the Republic of Tajikistan No. 307 dated 15 October 2009

Guidelines on strengthening the national surveillance of brucellosis No. 742 dated 21 August 2015, approved by the Order of the Minister of Health and Social Protection of the Population of the Republic of Tajikistan

Procedures on the application of norms and standards of other countries in the Republic of Tajikistan (RD RT 50-007-2005), enacted by the Order of the Agency for Standardization, Metrology, Certification and Trade Inspection under the Government No. 64 dated 20 January 2005

Resolutions of the Committee on Environmental Protection under the Government

Instruction on the procedure for approval and issue of permits for special water use, approved by the Chair of the State Committee on Environmental Protection and Forestry of the Republic of Tajikistan on 20 January 2005

Norms for water protection zones for water bodies in the Republic of Tajikistan, approved by Order of the Chair of the Committee on Environmental Protection under the Government of the Republic of Tajikistan No. 124 dated 29 October 2011

Decision of the Committee on Environmental Protection under the Government of the Republic of Tajikistan on introducing some amendments and additions to some of the Committee's earlier published documents No. 101 dated 15 August 2011

Rules on Fishing in Water Bodies of the Republic of Tajikistan dated 22 September 2007, approved by the Order of the Minister of Agriculture and Nature Protection

Regulation for Setting Norms for Pollutant Discharge into Water Bodies, approved by the Chair of the State Committee on Environmental Protection and Forestry of the Republic of Tajikistan dated 20 January 2005

Legal acts of local authorities

Resolution of the Council of Deputies of the City of Dushanbe No. 150-15 dated 16 October 2008 "On approval of the Rules on public order, beautification and sanitation in Dushanbe city"

Resolution of the Council of Deputies of the City of Khudjand No. 125 dated 16 April 2012 "On approval of the Rules on beautification and amelioration of the sanitary-ecological state"

Resolution of the Chair of the City of Dushanbe No. 603 dated 10 December 2009 "On Measures for Improving the Provision of Services Related to Maintenance and Use of Housing Stock and for Establishing Home Owners Associations within the Administrative and Territorial Area of the City of Dushanbe"

Resolution of the Chair of the City of Dushanbe No. 471 dated 19 November 2011 "On Strengthening the Housing and Utilities Reforms and Facilitating the Development of the Competitive Environment for Apartment Building Management within the Administrative and Territorial Area of the City of Dushanbe"

Concepts, Strategies, Programmes and Action Plans

State Environmental Programme of the Republic of Tajikistan for the period 2009–2019, approved by the Resolution of the Government of the Republic of Tajikistan No. 123 dated 27 February 2009

Action Plan for Implementation of the State Environmental Programme of the Republic of Tajikistan for the period 2009–2019, approved by the Resolution of the Government of the Republic of Tajikistan No. 602 dated 31 October 2009

Living Standards Improvement Strategy of Tajikistan for the period 2013–2015, approved by the Resolution of the Majlisi namoyandagon of the Majlisi Oli of the Republic of Tajikistan No. 1030 dated 26 December 2012

National Development Strategy of the Republic of Tajikistan for the period until 2015, approved by the Resolution of the Majlisi namoyandagon of the Majlisi Oli of the Republic of Tajikistan No. 704 dated 28 June 2007

National Development Strategy of the Republic of Tajikistan for the period until 2030, approved by the Resolution of the Majlisi namoyandagon of the Majlisi Oli of the Republic of Tajikistan No. 636 dated 1 December 2016

Concept of Transition to Sustainable Development of the Republic of Tajikistan, approved by the Resolution of the Republic of Tajikistan No. 500 dated 1 October 2007

National Environmental Action Plan of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 191 dated 3 May 2006

Concept on Environmental Protection in the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 645 dated 31 December 2008

Mid-term Plan for the Implementation of the Concept on Environmental Protection in the Republic of Tajikistan for the period 2010–2012, approved by the Resolution of the Government of the Republic of Tajikistan No. 94 dated 27 February 2010

State Comprehensive Programme of Development of the Environmental Awareness and Education of the Population of the Republic of Tajikistan for the period until 2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 178 dated 2 April 2015

Programme on Internal Migration of the Population in the Republic of Tajikistan for the period 2012–2014, approved by the Resolution of the Government of the Republic of Tajikistan No. 91 dated 1 March 2012

Programme of Adaptation of the Economy of the Republic of Tajikistan to Membership of the World Trade Organization (WTO), approved by the Resolution of the Government of the Republic of Tajikistan No. 691 dated 31 October 2014

Programme for Development of Apiculture in the Republic of Tajikistan for the period 2011–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 418 dated 2 September 2010

Programme of Development of the Housing and Utilities Sector of the Republic of Tajikistan for the period 2014–2018, approved by the Resolution of the Government of the Republic of Tajikistan No. 506 dated 1 August 2014

Programme of Emergency Preparedness and Radiation Safety for the period 2013–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 770 dated 29 December 2012

Programme on Fighting Locusts in the Republic of Tajikistan for the period 2011–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 573 dated 30 October 2010

Programme on Fighting Pests and Diseases in Gardens and Vineyards of the Republic of Tajikistan for the period 2011–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 625 dated 3 December 2010

Programme of Response to the HIV/AIDS Epidemic in the Republic of Tajikistan for the period 2011–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 562 dated 30 October 2010

Programme for Improvement and Rational Use of Pastures for the period 2009–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 481 dated 1 October 2008

State Programme for Research and Conservation of Glaciers in Tajikistan for the period 2010–2030, approved by the Resolution of the Government of the Republic of Tajikistan No. 209 dated 3 May 2010

Programme on Privatization of State Property in the Republic of Tajikistan for the period 2014–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 577 dated 5 December 2013

Programme for Reforming the Agricultural Sector of the Republic of Tajikistan for the period 2012–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 383 dated 1 August 2012

Programme for Improvement of Road Safety on Motor Roads of the Republic of Tajikistan for the period 2014–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 372 dated 3 June 2014

Programme on State Guarantees of Medical-Sanitary Assistance in Pilot Districts of the Republic of Tajikistan for the period 2014–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 20 dated 3 January 2014

Programme for Development of Tourism in the Republic of Tajikistan for the period 2015–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 738 dated 1 December 2014

State Programme on the Introduction and Development of New Information and Communication Technologies in the Republic of Tajikistan for the period 2014–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 428 dated 3 July 2014

Environmental Monitoring Programme of the Republic of Tajikistan for the period 2013–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 685 dated 3 December 2012

Programme for Development of the Cotton Production Sector in the Republic of Tajikistan for the period 2010–2014, approved by the Resolution of the Government of the Republic of Tajikistan No. 586 dated 31 October 2009

Programme for Development of Seed Production in the Republic of Tajikistan for the period 2010–2014, approved by the Resolution of the Government of the Republic of Tajikistan No. 297 dated 28 May 2009

Concept of Innovative Development in the Agro-industrial Sector of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 144 dated 3 March 2014

Programme for Development of Poultry Farming in the Republic of Tajikistan for the period 2007–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 451 dated 3 October 2006

Concept of Forecast Development of Legislation of the Republic of Tajikistan, approved by the Decree of the President of the Republic of Tajikistan No. 1021 dated 19 February 2011

National Concept of the Republic of Tajikistan on Rehabilitation of Uranium Waste Tailings for the period 2014–2024, approved by the Resolution of the Government of the Republic of Tajikistan No. 505 dated 1 August 2014

Programme for Implementation in the period 2016–2024 of the National Concept on Rehabilitation of Uranium Waste Tailings, approved by the Resolution of the Government of the Republic of Tajikistan No. 329 dated 27 July 2016

- Concept of Management of Local Development of the Republic of Tajikistan for the period until 2030, approved by the Decree of the President of the Republic of Tajikistan No. 522 dated 11 July 2015
- Programme on State Support for Entrepreneurship for the period 2012–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 201 dated 30 April 2012
- State Programme for Development of the Geological Sector of the Republic of Tajikistan for the period 2012–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 599 dated 3 December 2011
- State Programme on Rehabilitation and Further Use of Nuclear Research Reactor Argus-FTI for the period 2016–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 644 dated 2 November 2015
- State Programme to Implement the Concept of Forecast Development of Legislation in Agriculture and Environmental Protection for the period 2012–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 94 dated 1 March 2012
- State Programme for Development of Preschool Education in the Republic of Tajikistan for the period 2012–2016, approved by the Resolution of the Government No. 457 dated 4 October 2011
- State Quality Programme for the period 2013–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 512 dated 2 October 2012
- State Programme on Development of Specially Protected Natural Areas for the period 2005–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 79 dated 4 March 2005
- National Strategy on Development of Education in the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 334 dated 30 June 2012
- Strategy on Nutrition and Physical Activity of the Republic of Tajikistan for the period 2015–2024, approved by the Resolution of the Government of the Republic of Tajikistan No. 808 dated 31 December 2014
- Strategy of the Republic of Tajikistan on Science and Technologies for the period 2007–2015, approved by the Resolution of the Government of the Republic of Tajikistan dated 1 August 2006 No. 362 (ceased to be in force with the passing of the Resolution of the Government of the Republic of Tajikistan No. 114 dated 3 March 2011 'On the Strategy of the Republic of Tajikistan on Science and Technologies for the period 2011–2015')
- State Programme for Development of Professional Education in the Republic of Tajikistan for the period 2008–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 529 dated 2 November 2007
- Concept for Reform of the Housing and Utilities Sector of the Republic of Tajikistan for the period 2010–2025, approved by the Resolution of the Government of the Republic of Tajikistan No. 321 dated 1 July 2010
- Programme for Development of Pastures of the Republic of Tajikistan for the period 2016–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 724 dated 28 November 2015
- Programme for Statistics for 2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 613 dated 29 October 2015
- National Action Plan on Climate Change Adaptation of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 259 dated 6 June 2003
- National Implementation Plan on Realization of the Stockholm Convention on Persistent Organic Pollutants, approved by the Resolution of the Government of the Republic of Tajikistan No. 502 dated 1 October 2007
- State Programme on Investments, Grants and General Construction for the period 2013–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 608 dated 2 November 2012
- State Programme on Investments, Grants and General Construction for the period 2014–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 556 dated 5 December 2013
- State Programme on Investments, Grants and General Construction for the period 2015–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 798 dated 31 December 2014
- Programme on Improving Access of the Population to Clean Drinking Water for the period 2008–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 514 dated 2 December 2006
- Action Plan for Improving Statistics for the period 2016–2021, approved by the Resolution of the Government of the Republic of Tajikistan No. 614 dated 29 October 2015
- Programme for the Development of Forestry for the period 2006–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 396 dated 31 October 2005
- Programme on Renewable Energy Development and Construction of Small Hydropower Plants for the period 2016–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 795 dated 30 December 2015
- Programme of Water Sector Reform for the period 2016–2025, approved by the Resolution of the Government of the Republic of Tajikistan No. 791 dated 30 December 2015
- State Programme "The Main Directions of State Policy to Ensure Equal Rights and Equal Opportunities for Men and Women in the Republic of Tajikistan for the period 2001–2010", approved by the Resolution of the Government of the Republic of Tajikistan No. 391 dated 6 August 2001

State Programme on Cultivation, Collection and Processing of Medicinal Plants and Production of Medicines from such Plants for the period 2005–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 170 dated 10 May 2005

Occupational Safety and Health Programme of the Republic of Tajikistan for the period 2013–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 684 dated 3 December 2012

Programme of Recovery of Hydrometeorological Stations and Hydrological Posts of the Republic of Tajikistan for the period 2007–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 408 dated 7 September 2006

Poverty Reduction Strategy for the period 2010–2012, approved by the Resolution of the Majlisi namoyandagon of the Majlisi Oli of the Republic of Tajikistan No. 1557 dated 24 February 2010

National Health Strategy of the Republic of Tajikistan for the period 2010–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 368 dated 2 August 2010

National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 392 dated 1 September 2003

National Strategy to Promote the Active Role of Women in the Republic of Tajikistan for the period 2015–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 269 dated 29 May 2010

Action Plan for the National Strategy to Promote the Active Role of Women in the Republic of Tajikistan for the period 2015–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 548 dated 29 August 2015

Mid-term Plan on Organized Environmental Migration in the Republic of Tajikistan for 2014–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 474 dated 2 November 2013

Programme for the Efficient Use of Hydropower Resources and Energy Efficiency for the period 2012–2016, approved by the Resolution of the Government of the Republic of Tajikistan No. 551 dated 2 November 2011

Concept of Development of Electronic Government, approved by the Resolution of the Government of the Republic of Tajikistan No. 643 dated 30 December 2011

State Programme for Reclamation of New Irrigated Lands and Restoration of Lands No Longer in Agricultural Use for the period 2012–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 450 dated 31 August 2012

State Programme for Education Development for the period 2010–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 254 dated 29 April 2009

State Programme on Riverbank Protection for the period 2011–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 112 dated 3 March 2011

National Action Programme to Combat Desertification in the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 598 dated 30 December 2001

Decent Work Country Programme of Cooperation between the Tripartite Constituents of the Republic of Tajikistan and the International Labour Organization for 2015–2017, approved by the Resolution of the Government of the Republic of Tajikistan No. 103 dated 28 February 2015

National Disaster Risk Management Strategy of the Republic of Tajikistan for the period 2010–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 164 dated 30 March 2010

Food Security Programme of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 72 dated 2 February 2009

State Targeted Programme for Transport Sector Development for the period up to 2025, approved by the Resolution of the Government of the Republic of Tajikistan No. 165 dated 1 April 2011

Programme for Improvement of Road Safety on Motor Roads for the period 2009–2013, approved by the Resolution of the Government of the Republic of Tajikistan No. 598 dated 2 December 2008

Emergency and Civil Protection Development Programme for the period 2009–2014, approved by the Resolution of the Government No. 527 dated 31 October 2008

Concept of Agrarian Policy of the Republic of Tajikistan, approved by the Resolution of the Government of the Republic of Tajikistan No. 658 dated 31 December 2008

Programme for Restoration and Further Development of Apiculture for the period 2006–2010, approved by the Resolution of the Government of the Republic of Tajikistan No. 338 dated 1 September 2005

Programme of Silkworm Breeding and Silkworm Processing Sphere Development in the Republic of Tajikistan for the period 2012–2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 409 dated 30 August 2011

Programme of Application of Scientific-Technical Achievements in Industrial Production of the Republic of Tajikistan for the period 2010–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 574 dated 5 October 2009

Programme of Construction Materials Production Development for the period until 2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 601 dated 31 October 2009

Programme of Production of Materials for Children for the period until 2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 683 dated 30 December 2009

Programme of Complete Processing of Livestock Raw Materials (Skin and Wool) in the Republic of Tajikistan for the period until 2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 663 dated 31 December 2008

Programme of Processing and Production of Final Products from Primary Aluminium for the period 2007–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 648 dated 30 December 2007

National Strategy on Child and Adolescent Health for the period until 2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 297 dated 2 July 2008

Light-Industry Development Programme for the period 2006–2015, approved by the Resolution of the Government of the Republic of Tajikistan No. 422 dated 31 October 2005

Strategy of Innovative Development until 2020, approved by the Resolution of the Government of the Republic of Tajikistan No. 354 dated 30 May 2015

Action Plan on Establishment of Industrial Enterprises in the Republic of Tajikistan for 2012–2013, approved by the Resolution of the Government of the Republic of Tajikistan No. 175 dated 21 April 2012

Comprehensive State Programme for Development of the Education and Environmental Awareness of the Population until 2020, approved by the Decision of the Chair of the City of Dushanbe No. 286 dated 26 May 2015

Construction standards and norms (SNiPs), sanitary rules and norms (SanPiNs) and technical regulations

Methodological instructions for levying charges for environmental pollution (RD-01-93)

SNiP MKS-ChT 30-01-2007 "Town planning, physical planning and settlement development"

SNiP MKS-ChT 22-07-2007 "Anti-seismic construction"

SNiP MKS-ChT 23-02-2009 "Thermal protection of buildings"

Order of the Ministry of Health and Social Protection of the Population No. 181 dated 7 April 2014 "On approval of sanitary norms and rules 'Hygienic requirements for preschool institutions'" (SanPiN 2.4.1.009/13)

Sanitary rules and norms "Sanitary protection zones of water sources and water supply systems for domestic and drinking purposes" (SanPiN 2.1.5.006-07) No. 75 dated 28 February 2007, approved by the Chief Medical Sanitary Officer of the Republic of Tajikistan

Sanitary rules and norms "Drinking Water. Hygiene requirements for the quality of water in centralized water supply systems. Quality control" (SanPiN 2.1.4.004-07) No. 73-a dated 28 February 2007, approved by the Order of the Ministry of Health of the Republic of Tajikistan

Sanitary and epidemiological requirements for the protection of surface waters against pollution (SanPiN 3.02.003.04)

Sanitary rules for the protection of surface waters against pollution (SanPiN 4630-88)

Sanitary rules and norms "Requirements on water quality of non-centralized water supply. Sanitary protection of sources" (SanPiN 2.1.4.005-07)

Sanitary rules and norms "Protection of the population from exposure to electromagnetic fields generated by radio-technical facilities" (SanPiN 2.2.4.014-08) dated 28 July 2008, approved by the Chief Medical Sanitary Officer of the Republic of Tajikistan

Resolution of the Government of the Republic of Tajikistan No. 30 dated 3 January 2014 "On Technical Regulation 'Safety Requirements for Petrol, Diesel, Fuel Oil and Jet Fuel'"

Resolution of the Government of the Republic of Tajikistan No. 811 dated 31 December 2014 "On Technical Regulation of the Safety of Fodder and Fodder Additives"

Resolution of the Government of the Republic of Tajikistan No. 29 dated 3 January 2014 "On Technical Regulation of the Republic of Tajikistan 'Labelling of Foodstuffs'"

Resolution of the Government of the Republic of Tajikistan No. 498 dated 1 August 2015 "On Technical Regulation of the Safety of Products intended for Children and Teenagers"

Resolution of the Government of the Republic of Tajikistan No. 236 dated 27 April 2015 "On Technical Regulation of the Safety of Devices Operating on Gaseous Fuel"

Resolution of the Government of the Republic of Tajikistan No. 136 dated 4 March 2015 "On Technical Regulation 'Safety of Liquefied Petroleum Gas'"

Resolution of the Government of the Republic of Tajikistan No. 338 dated 30 May 2014 "On Technical Regulation of the Safety of Construction Materials"

Annex VI

RESULTS OF THE FOR FUTURE INLAND TRANSPORT SYSTEMS (ForFITS) TOOL

VI.1 Introduction

Methodology

This annex addresses projected well-to-wheel⁴ (WTW) CO₂ emissions stemming from the transport sector in Tajikistan using the for Future Inland Transport Systems (ForFITS) tool. All references to emissions in this annex refer to CO₂ emissions only.

The current impact of the transport sector of Tajikistan on the overall CO₂ emissions is quantified and future emissions are projected based on a reference scenario where no major shifts in the development of the transportation sector take place.

Data were collected from official national sources as well as local experts. In some cases, data were adjusted when the scope of data provided did not match the required input definitions or when data were not internally consistent (box VI.1).

Box VI.1: General explanation of differences between ForFITS results and results from other methodologies

ForFITS is a model used to estimate current and future transport activity as well as energy use and CO₂ emissions from the transport sector. CO₂ emissions under ForFITS are calculated on a well-to-wheel (WTW) basis, that is, emissions from vehicle operation as well as emissions from the production of the fuel used for vehicle operation and the distribution of fuel.

All results in the model are calculated using a "bottom-up" methodology through the collection and estimation of data on the number of vehicles registered in a country by mode, and their average travel, average vehicle load and average fuel consumption, among other factors. Model input data are usually based on official national sources, and local or other expert knowledge where it is necessary to fill data gaps and ensure the cohesiveness of data used as inputs. As an example, official data on vehicle stock in some countries include vehicles that are registered but are no longer in use. In these cases, official data are often adjusted downward in order to better capture the true level of activity in a country's transport sector.

Differences with baseline official data, as well as the estimation of gaps in official data, can often result in differences in top-level official data on vehicle activity, such as passenger kilometres (pkm) or ton kilometres (tkm). When comparing official data with ForFITS data, it is important to note the scope of each estimate. In some cases, ForFITS excludes vessels, aircraft and/or pipelines in transport activity calculations, due to the lack of data or because of the purpose of the analysis. Conversely, official data from some countries exclude private vehicles in pkm calculations. Additional difficulties in comparing results can arise when official data on transport activity include travel within the country by vehicles registered in other countries or exclude international transportation by vehicles registered in the country.

Lastly, as methods of estimation and scopes of estimation differ in calculations performed by different entities, discrepancies between results on energy use and CO₂ emissions are also to be expected between ForFITS and other sources.

Description of model

ForFITS is capable of satisfying two sets of key requirements:

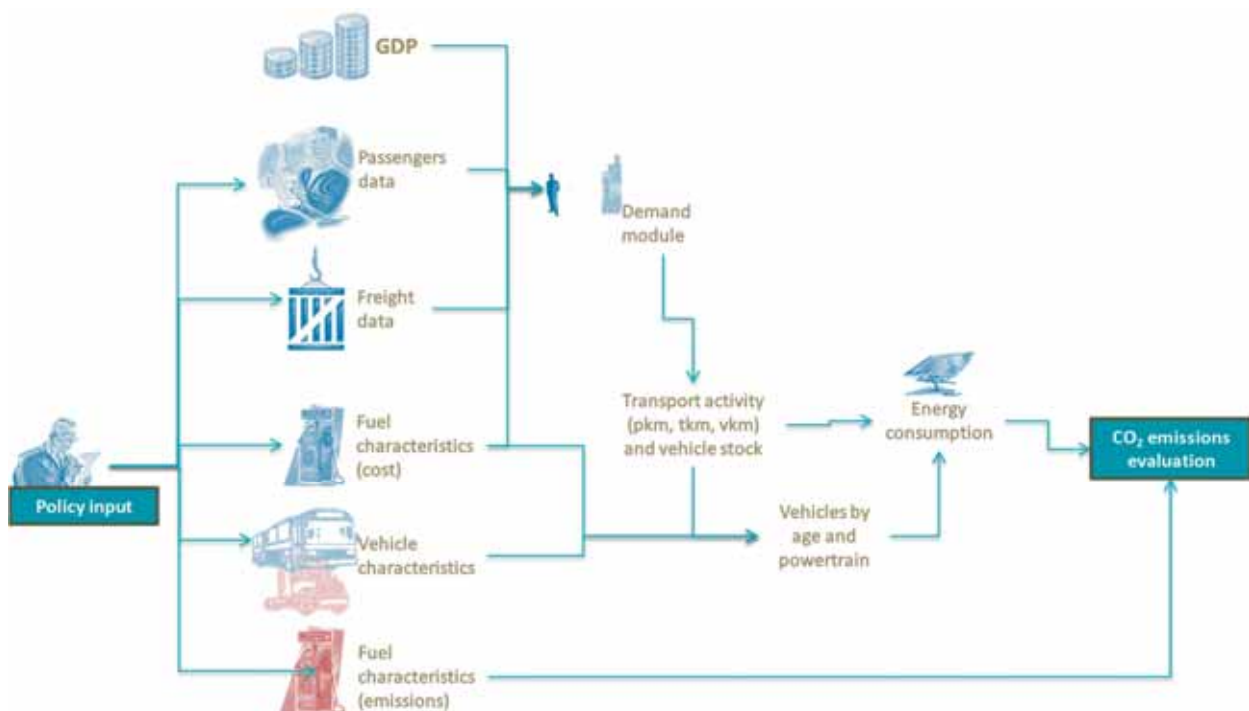
- The estimation/assessment of CO₂ emissions in transport;
- The evaluation of transport policies for CO₂ emission mitigation.

⁴ Well to wheel (WTW) refers to CO₂ emissions from vehicle operation as well as emissions from the production and distribution of the fuel used for vehicle operation.

To achieve these targets, ForFITS evaluates transport activity (expressed in terms of passenger kilometres (pkm)⁵, ton kilometres (tkm)⁶ and vehicle kilometres (vkm)), related vehicle stocks, energy use and CO₂ emissions in a range of possible policy contexts (figure VI.1).

ForFITS covers both passenger and freight transport services on all transport modes (including aviation and maritime transport), but mainly targets inland transport (especially road, rail, and inland waterways). Pipelines and non-motorized transport (walking and cycling) are also considered in the model. Each mode is further characterized in sub-modes (when relevant) and vehicle classes. Vehicle classes are further split to take into account different powertrain technologies and age classes. Finally, powertrains are coupled with fuel blends that are consistent with the technology requirements.

Figure VI.1: ForFITS schematic



ForFITS does not provide information on the evaluation of the overall effects of changes in the transport system on economic growth.

For the analysis of Tajikistan, projections account for road vehicles, non-motorized transport, rail transport and aircraft. Projections for vessels are excluded as this sector is not relevant in Tajikistan. Pipelines are also excluded as the focus of analysis was on scenarios related to general passenger and freight transport policies.

This annex provides projections of transport sector CO₂ emissions in Tajikistan under a reference scenario and four additional scenarios:

- **Scenario A (reference):** Accounts for the expected evolution of socioeconomic parameters such as population and GDP. It includes default data in ForFITS on the expected evolution of fuel consumption characteristics by powertrain to reflect future improvements in vehicle technology and their associated costs. Other characteristics defining the transport system in the base year (e.g. fuel taxation schemes, road pricing, passenger/freight transport system structure, fuel characteristics, powertrain technology shares, behavioural aspects) remain unchanged in projections;

⁵ A passenger kilometre is defined as a unit of passenger carriage equal to the transportation of one passenger one kilometre.

⁶ A ton kilometre is defined as a unit of freight carriage equal to the transportation of one metric ton of freight one kilometre.

- Scenario B (*vehicle fleet renewal*): Evaluates the impact of decreasing the average age of the personal passenger LDV fleet (currently almost 18 years) by one third by 2030;
- Scenario C (*shift to public transport*): On the basis of ongoing projects developing trolleybus lines in Dushanbe and major cities, as well as projected further increases in bus services, this scenario simulates a shift from personal vehicles to public transport modes due to structural changes in the passenger transport system;
- Scenario D (*increase in LPG share*): Simulates a continuation of the trend of the conversion of gasoline-fuelled personal passenger vehicles to LPG powertrains. The scenario evaluates the impact of the increase of the share of the fleet with LPG powertrains to 38 per cent by 2030;
- Scenario E (*combined*): A combined scenario reflects an interconnected scenario where scenarios B and C each come into effect.

VI.2 Baseline status

Breakdown of base year ForFITS inputs

Data were collected from official sources and estimates based on available data, and on the judgement of local transport experts. Data from 2003 are approximate, as the current system of reporting and collecting statistical data was introduced in 2005.

Sources for road transport data include the Road Police of the Ministry of Interior, the Ministry of Transport, and the Agency of Statistics. The primary sources for railway and aircraft transport data were the State Unitary Enterprise Tajik Railways and national air companies, respectively. In all cases, data from these sources were adjusted or supplemented with estimations based on expert judgement.

Data were adjusted when the rate of new registrations was incongruous with vehicle stock. Transport experts in Tajikistan estimated that the average personal passenger vehicle life was approximately 15–18 years and explained the seemingly high number of new vehicle registrations by the high turnover rate of previously used vehicles. Accordingly, the new registration data were adjusted to approximate the better known scrappage rate. Table VI.1 shows the breakdown of vehicle stock and historical new registration statistics used in the analysis of Tajikistan. As input data for historical fuel consumption of newly registered vehicles were unavailable or not aligned with vehicle stock data, vehicle stock data were used.

The breakdown of powertrains by each vehicle type was also a required input for ForFITS and data for Tajikistan are shown in table VI.2. As was the case with historical fuel consumption data, historical powertrain breakdown data were also unavailable or unaligned with vehicle stock data. Consequently, vehicle stock data were also used in this case.

Baseline projections

Socioeconomic data and data on fuel taxation were collected, as shown in table VI.3. Population projections are from the Ministry of Economic Development and Trade, the Institute of Economy and Demography of the Academy of Sciences of Tajikistan, and World Population Prospects 2015 published by the United Nations Department of Economic and Social Affairs Population Division. The population of Tajikistan is expected to increase by almost 40 per cent by 2030.

The source of GDP data was the World Bank. GDP projections are based on those available from the Organisation for Economic Cooperation and Development and the World Economic Outlook published by the International Monetary Fund, and assume an annual growth of between 4 and 5 per cent through 2030. This level of growth would lead to a more than doubling of GDP between 2013 and 2030.

Fuel price and taxation data were based on data from the Ministry of Economic Development and Trade, the Tax Committee, Anti-Monopoly Service and Agency of Statistics.

Table VI.1: Vehicle stock and historical new registration data, 2003, 2008, 2013

	Vehicle stock 2013				New vehicle registrations		
	Active vehicles	Avg. fuel consumption, lge/100 km	Avg. travel /vehicle, km/yr	Avg. load*	2013	2008	2003
Non-motorized transport							
Walking	7 344 990	..	490	1.0	..	..	..
Cycling	8 320	..	2 190	1.0	..	..	..
Two-wheeler	4 907	7.0	3 285	1.1	620	713	260
Passenger LDVs							
Personal	340 610	11.0	11 000	1.5	25 384	21 597	17 913
Public	9 743	13.0	40 000	2.5	1 471	2 160	2 666
Buses	10 753	25.0	40 000	17.4	3 032	2 800	1 050
Passenger rail	100	200.0	20 000	10.0	28	28	28
Passenger air	52	483.0	730 000	70.0	5	5	5
Freight LDVs	3 500	13.0	36 000	0.5	965	402	431
Freight trucks							
Medium-duty	5 541	24.0	36 500	3.0	702	646	691
Heavy-duty	31 401	32.0	34 300	5.0	4 000	2 443	3 664
Freight rail	2 287	260.0	74 825	612.0	229	229	229
Freight air	11	826.0	150 000	14.0	1	1	2

Sources: Ministry of Interior (Road Police), Ministry of Transport, Dushanbe motor transport depot, regional motor transport depots, Tajik Railways, Agency of Statistics, local air companies, interview with freight forwarders.

Notes: * Passengers/vehicle for passenger vehicles, tons/vehicle for freight vehicles. lge = litres of gasoline equivalent.

Table VI.2: Powertrain shares of vehicle stock, 2013, per cent

	Powertrain Group			
	Gasoline	LPG	Diesel	Electric
Passenger two wheelers	42			58
Passenger LDVs				
Personal	60	25	15	
Public	25	70	5	
Buses		7	90	3
Passenger Rail			100	
Freight LDVs	12	10	78	
Freight Trucks				
Medium-Duty		2	98	
Heavy-Duty			100	
Freight Rail			100	

Sources: Ministry of Transport, Ministry of Industry and New Technologies, Agency of Statistics, Transport associations ABBAT and AIAT, Tajik Gazprom (oil company), regional motor transport depots.

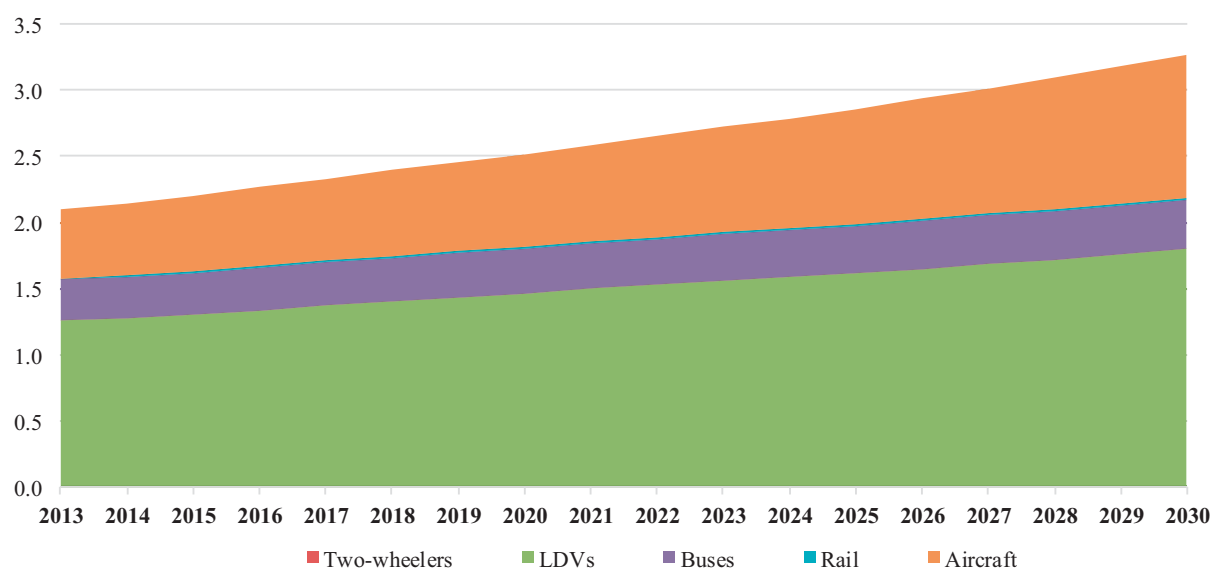
Figure VI.2 and figure VI.3 show the projected WTW CO₂ emissions from Tajikistan's transport sector by mode within passenger and freight transport, respectively. The ForFITS tool generated projections based on transport-specific inputs given in the tables above, as well as projections of socioeconomic data as specified in table VI.3. The reference scenario also includes default data in ForFITS on the expected evolution of fuel consumption characteristics by powertrain in order to reflect future improvements in vehicle technology and their associated costs. The other characteristics defining the transport system in the base year (e.g. fuel taxation schemes, road pricing, passenger/freight transport system structure, fuel characteristics, powertrain technology shares, behavioural aspects) remain unchanged in projections.

Table VI.3: Socioeconomic data and projections with fuel taxation data

Value at base year and over time	2013	2015	2020	2025	2030	2035	2040
Population, thousand	8 161	8 532	9 432	10 332	11 232	12 132	13 032
GDP, US\$ million at constant PPP (2013)	20 745	22 610	28 042	34 946	43 549	54 270	67 630
Fuel price before taxation, US\$/lge							
Gasoline	0.68	..					
LPG	0.33	..					
Diesel	0.58	..					
Electricity	0.18	..					
Fuel taxation (as percentage of fuel cost)							
Gasoline	20	..					
LPG	20	..					
Diesel	20	..					
Electricity	18	..					

Sources: World Bank, International Monetary Fund, Organisation for Economic Cooperation and Development, Ministry of Economic Development and Trade, United Nations World Population Prospects 2015, Agency of Statistics, Tax Committee, Institute of Economy and Demography of the Academy of Sciences.

Note: lge = litres of gasoline equivalent.

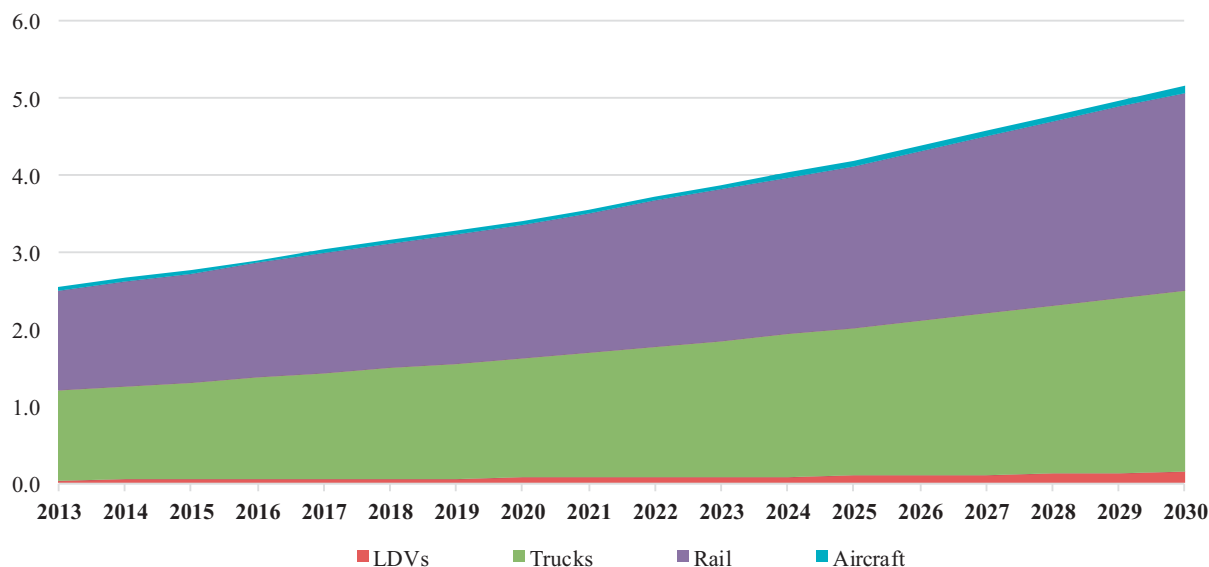
Figure VI.2: WTW CO₂ emissions by mode of passenger transport under reference scenario, 2013–2030, billion kg CO₂/year

Note: Two-wheelers represent a very small proportion of CO₂ emissions and are not visible in this figure.

As a result of Tajikistan's projected population and GDP growth, the GDP per capita of the country is projected to more than double (from \$2,542 to \$5,190 at constant (2013)) between 2013 and 2030. The per capita GDP level over the time period analysed is lower than levels historically coupled with a saturation of personal vehicle ownership. This explains the projected increase of both passenger transport activity and freight activity. In line with Tajikistan's relatively low level of GDP per capita, CO₂ emissions from freight transport were estimated to be 20.96 per cent higher than emissions from passenger transport in 2013. This gap is projected to widen to 57.62 per cent by 2030.

Energy use is projected to grow over time in line with projected transport activity. Fuel savings associated with the improving evolution of the powertrain technologies in terms of fuel consumption only partly offset the upward influence of growing transport activity.

Figure VI.3: WTW CO₂ emissions by mode of freight transport under reference scenario, 2013–2030, billion kg CO₂/year



The projected growth of WTW CO₂ emissions follows closely the trend of increased energy demand, since the emission factors remain constant. Throughout the period analysed, freight vehicle emissions are expected to be higher than passenger vehicle emissions. Projections of emissions from the inland modes of passenger transport in total emissions under the *reference* scenario remain somewhat constant, with LDVs representing approximately 82.1 per cent of annual emissions. Projections of passenger vehicle emissions increase by 55.4 per cent by 2030 compared to 2013.

Similarly, projections of the shares of various modes of freight transport in emissions under the *reference* scenario remain somewhat constant over the period analysed, with trucks and rail accounting for 102 per cent of annual emissions. Overall, projections of freight transport WTW CO₂ emissions more than double between 2013 and 2030. This increase is greater than that for passenger transport, partly due to the slower increase in GDP per capita (and accordingly in motorization rates) compared with total GDP growth.

VI.3 Alternative scenarios

Description of scenarios

Scenario B: Vehicle fleet renewal

ForFITS determines the average vehicle life at the base year according to the user input data on the number of vehicles registered in the past and the number of vehicles currently in the fleet. According to the data provided by the local expert, the average vehicle age of personal passenger LDVs is particularly high, at almost 18 years.

The simulation of a renewal of the vehicle fleet is executed in ForFITS by changing the average vehicle age of the fleet over time. To simulate this change in Tajikistan, the average vehicle life for personal passenger cars was reduced to two thirds of the base year value by 2030. Linear interpolations were assumed in between the initial and final years of the projections for the sake of simplicity.

The resulting *vehicle fleet renewal* scenario triggers a change in the age distribution of the vehicle fleet. This means that the presence of new vehicles will be more significant over time, whereas aged vehicles will be scrapped at a lower age. This scenario does not directly specify the policy interventions required to achieve the goal of decreasing the average personal passenger car life by one third by 2030.

Scenario C: Shift to public transport

The *shift to public transport* scenario projects future emissions assuming an evolution of the passenger transport system index towards a condition where an increased proportion of the passenger transport task is performed by public transport modes. The practical implementation of this input relies on the possibility of modifying the ForFITS passenger transport system index⁷, an instrument that was specifically developed to help understand the changes in the passenger transport system associated with shifts to/from personal vehicles from/to public transport.

In the *shift to public transport* scenario, the gap between the passenger transport system index value calculated in the base year and the 0.7 target value characterizing regions which trend toward high population density and high use of public transport as GDP increases, is assumed to be progressively reduced by 13 per cent between the base year and 2030. The evolution of the passenger transport system index between the base year and 2030 is assumed to be linear, for the sake of simplicity. In practice, this assumption represents the implementation of a wide number of policies favouring public transport over personal vehicles, such as parking and access restrictions for personal vehicles, land use policies that encourage the vertical development of the city and mixed use areas, and support for the provision of appealing, widely available and high quality public transport services.

In Tajikistan, the passenger transport system index at the base year is nearly zero. This highlights the low public transport use compared with other countries at similar levels of economic development. As a result, the impact of the *shift to public transport* scenario is significant in Tajikistan, given the space for improvement in this area. This initial low value of the index reflects a strong need for policy interventions aimed at creating conditions in which a public transport system could thrive.

For this scenario, the gap between Tajikistan's current passenger transport system index and the 0.7 target is reduced by 13 per cent between 2013 and 2030 (from 0.005 to 0.092). Moving towards a higher passenger transport system index would not affect freight transport.

Scenario D: Increase in LPG share

The *increase in LPG share* scenario simulates a continuation of the trend in which gasoline-fuelled personal passenger vehicles are increasingly converted to LPG powertrains. The share in the fleet will increase to 38 per cent by 2030 under this scenario. In 2013, 25 per cent of personal passenger LDVs are converted to LPG and it is likely that this trend could continue for economic reasons, given the relatively low cost of gas compared with petrol. Under this scenario, the increase in the share of LPG powertrains is mirrored by a decrease in the share of gasoline powertrains.

Scenario E: Combined

The *combined* scenario simulates the cumulative effect of the *vehicle fleet renewal* scenario and the *shift to public transport* scenario. It shows the result of implementing these policies concurrently. The *increase in LPG share* scenario is not included, as the initial projections under this scenario did not show a decrease in overall CO₂ emissions.

Scenario results

Figures VI.4 to VI.6 show the evolution of passenger activity (pkm), energy use (toe) for passenger transport and total kg of CO₂ emissions (WTW) for Tajikistan under the four scenarios described. The figures do not

⁷ This index ranges from 0 (indicating that the share of personal vehicles in pkm tends towards 100 per cent when GDP increases) to 1 (indicating that the share of personal vehicles in pkm is 0 per cent). Between these extreme values, the index measures differences in modal choice independent of differences in GDP per capita, cost of driving and behavioural aspects. Index values represent the share of personal vehicles in pkm relative to countries or regions with similar socioeconomic characteristics. Changes in modal shares over time for a country or region with a constant index value (the default option) are attributed to changes in GDP per capita, cost of driving and behavioural aspects.

show freight transport projections separately, as none of the scenarios affect future freight transport activity or emissions. All scenarios use the *reference* scenario as a starting point for evaluating policy changes.

Table VI.4 shows the values of the main outputs in the *reference* scenario, at the first and last year of the projections, as well as the projections in 2030 for the four additional scenarios described above.

Table VI.4: Main outputs: reference and alternative scenarios

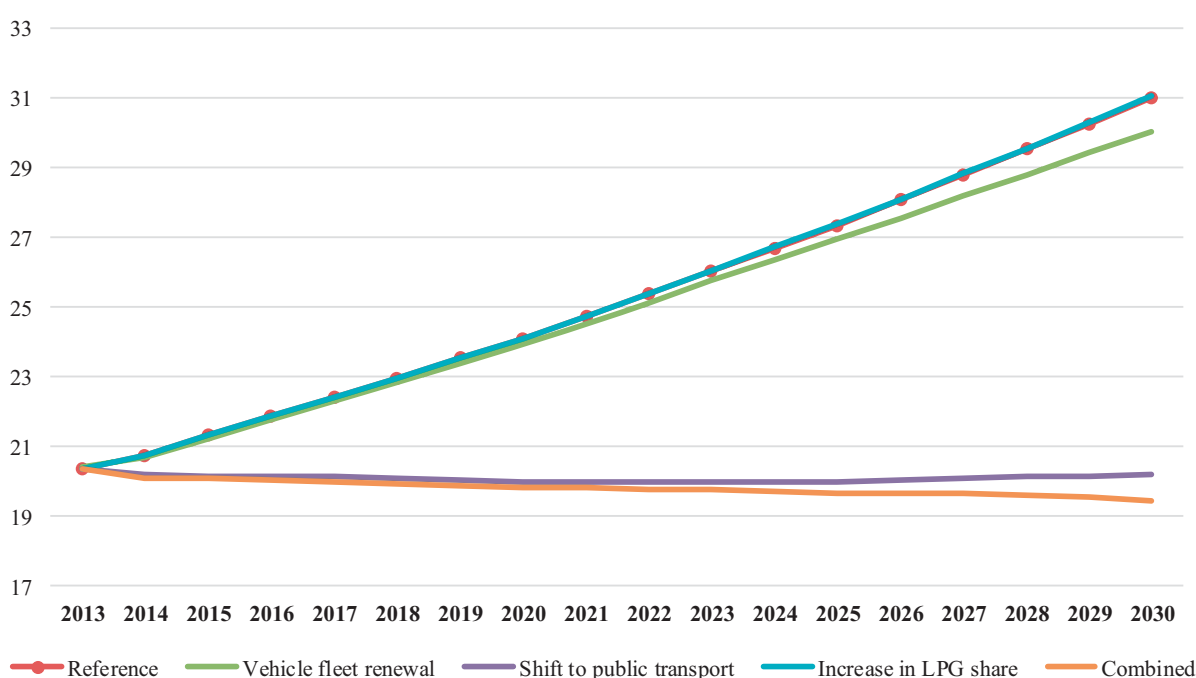
	Unit	2013	2030				
			Reference	Vehicle fleet renewal	Shift to public transport	Increase in LPG share	Combined
Total pkm	billion pkm	20.40	31.00	30.00	20.20	31.10	19.50
Total energy use	million toe	1.30	2.35	2.26	1.94	2.35	1.87
Total WTW CO ₂ emissions	billion kg CO ₂	4.65	8.43	8.14	7.01	8.43	6.78
Total WTW CO ₂ emissions per capita	kg CO ₂ /person	569.80	750.50	724.70	624.10	750.50	603.60
Total WTW CO ₂ emissions intensity	kg CO ₂ /GDP*1 000	224.20	131.70	127.10	109.50	131.70	105.90

Note: GDP is measured in purchasing power parity (PPP) units at 2013 prices.

Figure VI.4 compares the passenger transport activity (measured by pkm) projected under the *vehicle fleet renewal*, *shift to public transport*, *increase in LPG share* and *combined* scenarios with the *reference* scenario.

In the *vehicle fleet renewal* scenario, the decrease in the share of vehicles of advanced age in circulation projects to decrease transport activity by about 3 per cent in 2030 compared with the *reference* scenario. This is explained by the effect of the increased cost of newer vehicles on motorization rates.

Figure VI.4: Projected passenger kilometres under various scenarios, 2013–2030, billion pkm



Under the *shift to public transport* scenario, pkm is projected to decrease substantially in comparison with the *reference* scenario (34.84 per cent lower by 2030). This projected decrease in passenger travel is related to the assumption of movement towards conditions that are conducive to successful public transport systems, such as increased population density through urbanization. As the population is more centralized in 2030 under this scenario, the average distance travelled by residents is projected to decrease substantially.

While passenger transport activity is not directly affected by the *increase in LPG share* scenario, a similar, but opposite, cost effect to that seen in the *vehicle fleet renewal* scenario is projected to affect activity. In this case, the lower cost of gas as compared with petrol projects to increase pkm by 1 per cent relative to that of the *reference* scenario in 2030.

The *combined* scenario projects a total decrease of pkm for 37.18 per cent by 2030 in comparison with the *reference* scenario.

Figure VI.5 shows the projected passenger transport energy use under the *reference*, *vehicle fleet renewal*, *shift to public transport*, *increase in LPG share* and *combined* scenarios.

In each case, changes in passenger transport activity in comparison with the *reference* scenario translated into a similar change in energy use in comparison with the *reference* scenario. However, some additional effects are also observed under these scenarios.

In the *vehicle fleet renewal* scenario, a relative improvement in energy efficiency, combined with the previously mentioned decrease in transport activity, results in a total decrease of 8.8 per cent in passenger transport energy use in 2030 compared with the *reference* scenario. Similarly, the relative decrease in passenger transport activity under the *shift to public transport* scenario, in combination with further energy efficiency gained by a relative increase in the use of public transport, is projected to lead to a total decrease in passenger transport energy use of 43.26 per cent by 2030 compared with the *reference* scenario.

A 0.48 per cent increase is again projected for passenger transport energy use under the *increase in LPG share* scenario relative to the *reference* scenario. The *combined* scenario projects a total decrease of 50.41 per cent by 2030 in comparison with the *reference* scenario.

Figure VI.5: Projected passenger transport energy use under various scenarios, 2013–2030, million toe

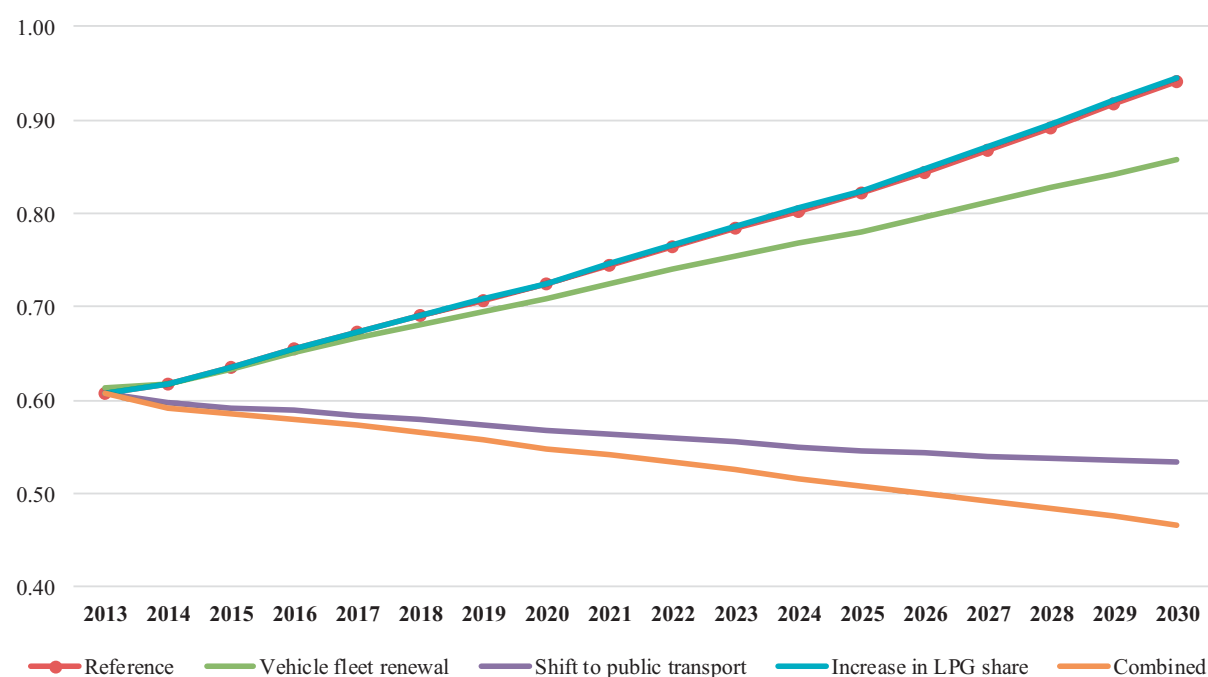


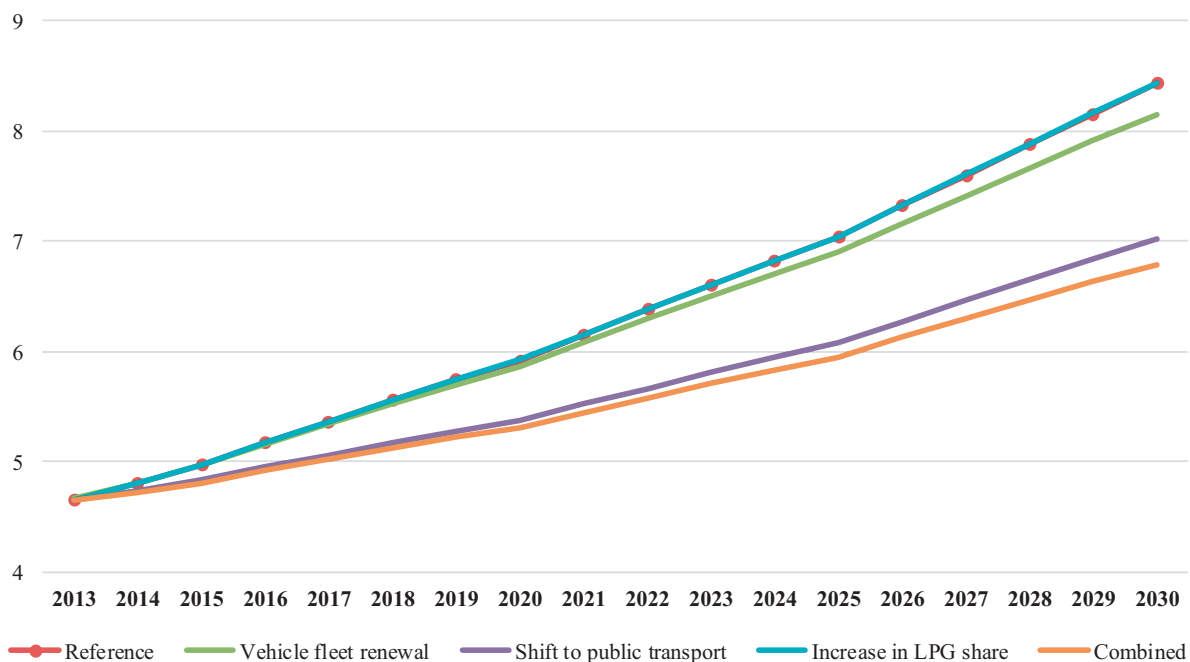
Figure VI.6 shows the total projected WTW CO₂ emissions from transport activity for each scenario. As in previous figures, the *shift to public transport* scenario projects to have the greatest effect on future emissions. Under this scenario, the decrease in WTW CO₂ emissions in 2030 compared with the *reference* scenario is 16.76 per cent. This stems primarily from the relative decrease in average trip distance associated with conditions conducive to successful public transport systems.

The *vehicle fleet renewal* scenario projects to have a lower, but still significant, effect on total emissions. For this scenario, the decrease in 2030 compared with the *reference* scenario is 3.32 per cent. As described above, this decrease stems both from changes in total transport activity related to increased vehicle cost as well as improvements in energy efficiency compared with the older passenger LDV fleet simulated in the *reference* scenario.

The *increase in LPG share* scenario is projected to have a minimal effect on total emissions (an increase of 0.1 per cent in 2030 compared with the *reference* scenario), as fuel consumption is assumed to be the same in both (gasoline and LPG) powertrains and higher upstream emissions for LPG fuel blend counterbalance the marginal improvements achieved from tailpipe emissions.

Overall, the *combined* scenario projects a total decrease of 19.46 per cent by 2030 in total WTW CO₂ emissions for the transport sector in Tajikistan in comparison with the *reference* scenario.

Figure VI.6: Projected WTW CO₂ emissions for transport under various scenarios, 2013–2030, billion kg CO₂ emissions



VI.4 Conclusions

The estimated WTW CO₂ emissions in 2013 from the transport sector for Tajikistan show that emissions from freight vehicles were 20.96 per cent higher than those from passenger vehicles (2.5 billion kg compared with 2.1 billion kg).

In the *reference* scenario, projections of CO₂ emissions from the transport sector show an overall increase of 81.10 per cent by 2030 from 2013, with freight vehicles still contributing higher levels of emissions of CO₂. The gap between freight and passenger vehicle emissions is widening as scenarios analysed only tackle the passenger sector. The increase in each sector shows the large impact of expected economic growth on CO₂ emissions.

While projections of future CO₂ emissions under the four alternative scenarios show this same increasing trend, several demonstrate opportunities to decrease future transport CO₂ emissions relative to the *reference* scenario. A decrease in the average passenger car life to two thirds under the *vehicle fleet renewal* scenario is projected to lead to a relative reduction of 8.85 per cent in terms of passenger transport energy use in 2030. This translates to a 3.32 per cent decrease in overall WTW CO₂ emissions in 2030 compared with the *reference* scenario. The

projected effect of the *shift to public transport* scenario is more pronounced. Under this scenario, an overall decrease in WTW CO₂ emissions of 16.76 per cent is projected in 2030 compared with the *reference* scenario. This decrease is largely attributed to a decrease in passenger transport activity associated with a population shift towards denser cities. The *increase in LPG share* scenario results in a much lower projected impact when compared with other scenarios. The higher upstream emissions for LPG fuel blend in comparison with gasoline counterbalance the marginal improvements from tailpipe emissions. While a shift to LPG may be justified in economic terms, the effect on transport emissions is not projected to be substantial. The *combined* scenario projects a total decrease of 19.46 per cent by 2030 in total WTW CO₂ emissions for the transport sector.

These results together show the effect of steps that can be taken by Tajikistan to limit emissions from the passenger transport sector. Tajikistan faces challenges in that its expected future economic growth would typically correspond with an increase in CO₂ emissions. However, improvements in the efficiency of its transport sector could help mitigate these issues.

The results provided in this annex demonstrate the potential impact of having transit-oriented land use policies and of increasing the share of public transport in passenger transport activity and increasing the efficiency of the transport sector through a shift to newer and more energy efficient personal passenger vehicles. Projections generated by ForFITS based on these scenarios show that pursuing such policies can temper the current trend of increasingly high WTW CO₂ emissions stemming from the transport sector of Tajikistan. With the aim of mitigating the impact of future CO₂ emissions from its transport sector, Tajikistan may wish to further investigate the relative cost of implementing the following measures:

- Decreasing the average age of the passenger LDV fleet;
- Developing policies necessary to support a shift towards increased use of public transport.

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Tajikistan Environmental Performance Reviews

The United Nations Economic Commission for Europe Environmental Performance Review Programme assesses progress made by individual countries in reconciling their economic and social development with environmental protection, as well as in meeting international commitments on environment and sustainable development.

The Environmental Performance Review Programme assists countries to improve their environmental policies by making concrete recommendations for better policy design and implementation. Environmental Performance Reviews help to integrate environmental policies into sector-specific policies such as those in agriculture, energy, transport and health. Through the peer review process, the reviews promote dialogue among Governments about the effectiveness of environmental policies as well as the exchange of practical experience in implementing sustainable development and green economy initiatives. They also promote greater Government accountability to the public.

The third Environmental Performance Review of Tajikistan examines the progress made by the country in the management of its environment since the country was reviewed in 2010 for the second time. It assesses the implementation of the recommendations contained in the second review. The third review covers policymaking, implementation and the financing of environmental policies, as well as efforts in the area of greening the economy. It addresses air protection, water management, waste management, biodiversity and protected areas and discusses integrating environmental concerns into selected sectors, in particular, agriculture, industry, energy, transport, housing and health. The review also assesses the progress made by Tajikistan in the management of disaster risk associated with natural and man-made hazards. It makes suggestions for strengthening efforts towards a comprehensive and systemic response to sustainable development challenges and implementation of the 2030 Agenda for Sustainable Development.

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Information Service
United Nations Economic Commission for Europe

Palais des Nations
CH - 1211 Geneva 10, Switzerland
Telephone: +41(0)22 917 44 44
Fax: +41(0)22 917 05 05
E-mail: info.ece@unece.org
Website: <http://www.unece.org>

ISBN 978-92-1-117128-0



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