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**Joint Intersectoral Task Force on Environmental Indicators**

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**REVIEW OF THE GUIDELINES ON THE APPLICATION OF ENVIRONMENTAL  
INDICATORS**

Revised informal note by the secretariat<sup>1</sup>

**Introduction**

As a part of basic activities of the Joint Task Force on Environmental Indicators, the Review of the Guidelines on the Application of Environmental Indicators continues. At the 4<sup>th</sup> session the following Guidelines indicators are being reviewed:

- Waste generation,
- Final waste disposal (treatment and disposal of municipal waste, management of non-hazardous industrial waste),
- Transboundary movements of hazardous waste,
- Ambient air quality in urban areas,
- Threatened and protected species (mammals, birds, fish, reptiles, amphibians, invertebrates, vascular plants, mosses, lichens, fungi, algae),
- Trends in the number and distribution of selected particular species.

This report provides the analysis of replies to the questionnaire on indicators submitted by the following countries:

- Albania
- Armenia,
- Azerbaijan,
- Belarus,
- Bosnia and Herzegovina,
- Former Yugoslav Republic of Macedonia,
- Georgia,
- Kazakhstan,

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- Kyrgyzstan,
- Montenegro,
- Republic of Moldova,
- Russian Federation,
- Serbia,
- Tajikistan,
- Ukraine,
- Uzbekistan.

Review and basic analysis of the data reported by countries for each indicator is presented below.

## I. SUMMARY OF COUNTRY REPORTS ON THE QUESTIONNAIRE ON 6 INDICATORS FROM THE GUIDELINES

### 1. Waste generation (generation by sectors)

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

*Note: Green colour means that the country has reported at least some data related to this indicator.*

All 16 countries filled in the questionnaire on this indicator with different levels of detail presented.

The data on municipal waste generation are being collected: in Armenia and Belarus since 1990; in Azerbaijan, Moldova, the Russian Federation, Ukraine - since 1995; in Kazakhstan and Uzbekistan - since 2000; in the former Yugoslav Republic of Macedonia - since 2003 (from 2003 to 2007 – calculated data reported); in Albania - since 2005; in Kyrgyzstan since 2005 as well (up to 2009, the reported figures are estimates because the amount of waste in this time period was calculated in cubic meters); in Georgia - since 2007; in Bosnia and Herzegovina - since 2008; in Tajikistan - since 2009. Montenegro began collecting such data in 1996, but then had breaks in data collection. Serbia has not reported any data on municipal waste in the updated version of the questionnaire.

Most countries collect data on municipal waste generation in tons per year. In Tajikistan, Uzbekistan and the Russian Federation, volumes of waste generated are collected in cubic meters per year, while in the latter, municipal waste is determined in terms of volumes of household waste and liquid waste transported by specialized transport companies from urban territories while rural settlements are not taken into account.

The data on waste generation by households are available in Azerbaijan, Belarus, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, Tajikistan and Ukraine.

In Azerbaijan, the amount of municipal waste has increased during the reporting period almost 1.5 times, and per capita - 1.3 times. In 2010, the amount of municipal waste represented 75% of all waste. In Belarus, the amount of municipal waste for 20 years has increased 1.9 times and in 2010 represented 8% of the total amount of waste generated. In Kazakhstan, the municipal waste in 2010 amounted to less than 0.5% while in the Republic of Moldova - 56% of total waste, while in the latter the generation of this type of waste during 15 years has increased almost 1.5 times. In Tajikistan, during the period 2009 - 2010, the amount of municipal waste increased 3.5 times, which cannot be considered reliable.

From the countries reporting this data, the highest amount of municipal waste per capita in 2010 was generated in the Republic of Moldova - 655.4 kg – while the lowest amount - 118.9 kg - in Armenia. Data from Georgia should not be taken into account because of their negligibility. Data by reporting countries are shown in Fig. 1. At the same time, Uzbekistan has reported such data in kg / capita, although the total amount of collected municipal waste is reported in cubic meters.

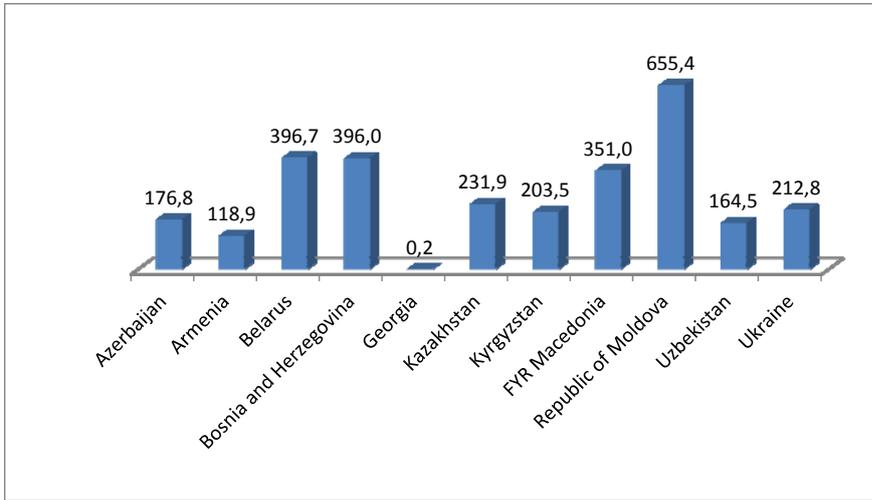


Figure 1. Amount of municipal waste per capita in 2010 (kg/capita)

Data on waste generation by particular economic sectors have not been reported by Montenegro, Tajikistan and the former Yugoslav Republic of Macedonia. Albania has presented data on waste generation only for the construction sector, Uzbekistan has presented data only for agriculture, forestry and fishery, and Georgia for several sectors for one year only. Other countries collect this information in the following way: Azerbaijan since 1995, Armenia, Kazakhstan and the Republic of Moldova since 2000, the Russian Federation since 2004, Belarus, Bosnia and Herzegovina and Serbia since 2008, Kyrgyzstan since 2010. Ukraine collects this data starting 2005; however hazardous waste of class I to III and solid household waste were included into these data between 2006 and 2009. Shift of several countries to the pan-European classification of economic activities in the middle of 2000s has caused delays in reporting this information.

In Armenia, the amount of waste from mining industry and quarrying has increased by more than 11 times during ten years and represented 99.7 % of waste generated by all economic sectors in 2010. In Kyrgyzstan, this type of waste represented 96.6 % in 2010, in Kazakhstan – 85 % (almost all included into the hazardous waste category) and in Ukraine -77.2 %.

Dynamics of change in waste generation in total and broken down by main economic sectors in the Republic of Moldova and Azerbaijan for the period 2000 – 2010 is presented in Figures 2 and 3. It can be clearly seen from these figures that the change in total waste generation in the Republic of Moldova till 2006 well correlates with the change in waste generation in manufacturing industry and after 2006, it well correlates with the change in agricultural waste. Dynamics of change in total waste generation in Azerbaijan correlates to considerable extent with the change in waste generation in manufacturing industry.

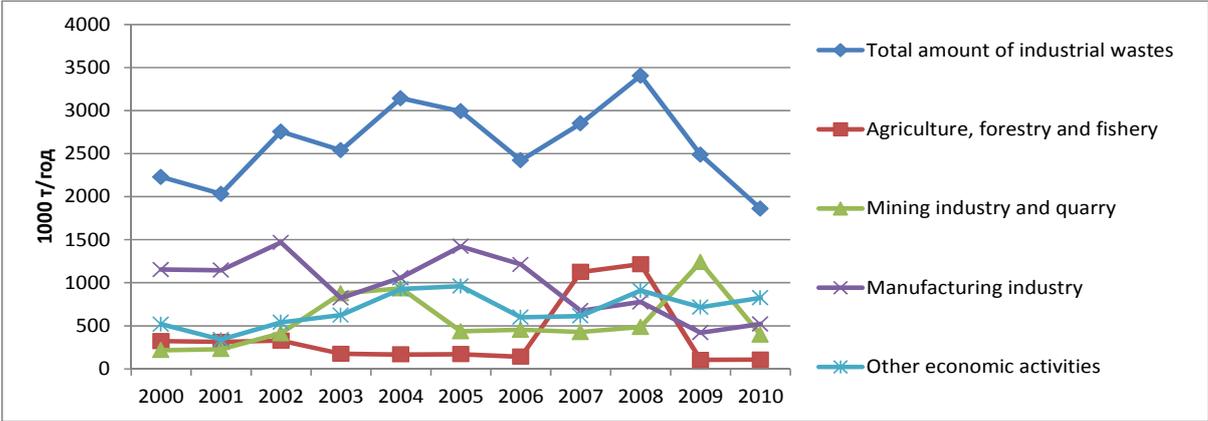


Figure 2. Dynamics of change in industrial waste generation in the Republic of Moldova between 2000 and 2010.

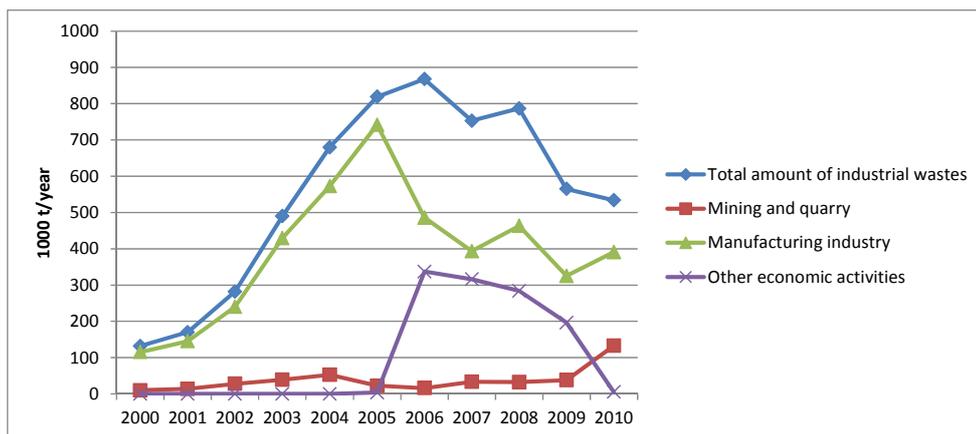


Figure 3. Dynamics of change in industrial waste generation in Azerbaijan between 2000 and 2010.

In the explanatory note to this indicator, Belarus has stated that, in accordance with the national classification of economic activities, mining and manufacturing industries belong to the same category of economic activities. In this relation, considerable part of waste from mining industry is presented within the category of manufacturing industry.

In Azerbaijan, the total amount of waste generated per unit of GDP has increased by 20 % between 1995 and 2010. This might be related to the considerable increase in generation of both manufacturing industry wastes and also municipal waste at the beginning of 2000s (Fig. 4). The amount of hazardous waste per unit of GDP has decreased more than 5 times during the same period of time (Fig 5).

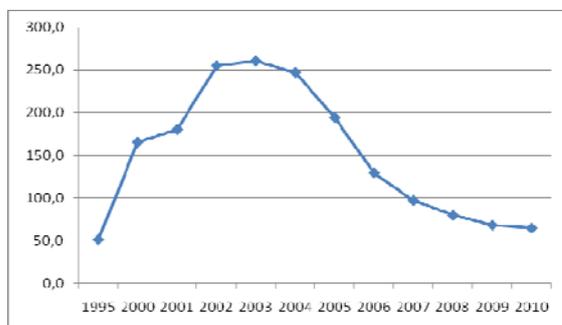


Figure 4. Total amount of waste per unit of GDP in Azerbaijan between 1995 and 2010.

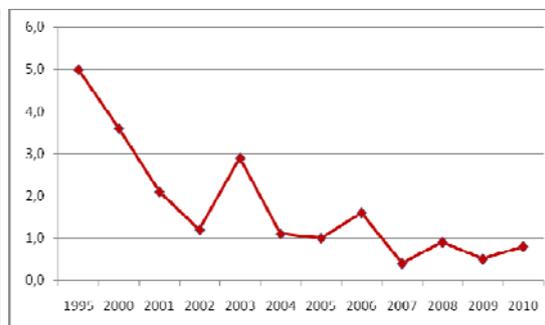


Figure 5. Amount of hazardous waste per unit of GDP in Azerbaijan between 1995 and 2010.

Between 2000 and 2010, the amount of waste generated per unit of GDP increased more than twice in Armenia (Fig 6). The amount of hazardous waste per unit of GDP increased more than 7 times during the same period of time (Fig 7). However, such considerable increase of waste generated per unit of GDP at the beginning of 2000s is not possible to be explained on the basis of available data. It could be suggested that such a strong variability was related to the variability of national currency exchange rate.

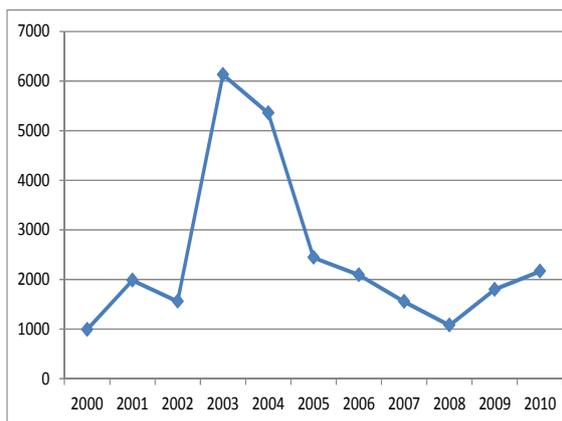


Figure 6. Total amount of waste per unit of GDP in Armenia between 2000 and 2010

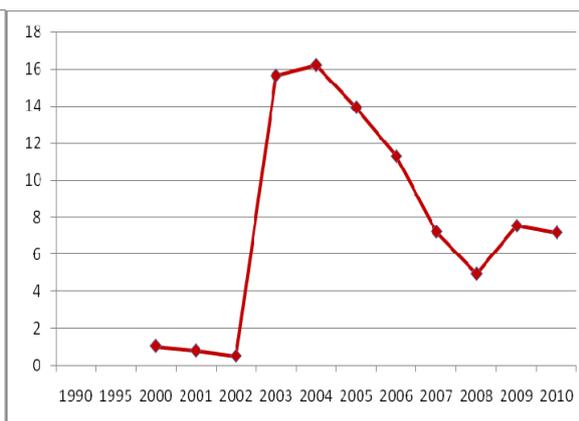


Figure 7. Amount of hazardous waste per unit of GDP in Armenia between 2000 and 2010

The amount of hazardous waste per unit of GDP in Belarus increased more than three times between 1995 and 2009 and the total amount of waste generated per unit of GDP decreased by almost 40 % during the same period of time.

In Kazakhstan, the total amount of waste generated per unit of GDP increased more than 4 times between 2000 and 2010 due to the increased generation of waste by all economic activities. The amount of hazardous waste per unit of GDP increased by almost 40 % during the same period of time.

In the Republic of Moldova, the total amount of waste generated per unit of GDP has decreased by 10 % since 2000 and in the case of hazardous waste has decreased 4 times.

As the only one of countries reporting its GDP in roubles instead of dollars, the Russian Federation has reported for the period from 1995 to 2009 the 70-times increase in total waste generation per 1000 roubles of GDP and in the case of hazardous waste more than two times increase. However, until the end of 2001, all industrial waste generated in the Russian Federation had been included into the category of hazardous waste and the differentiation between hazardous and non-hazardous waste (which were not taken into account before) has only started since 2002. Notwithstanding, class V non-hazardous waste represent more than 95 % of total waste generated which has led to the considerable increase of total waste per unit of GDP starting 2002.

From all countries reporting this information for analysis, the highest amount of total waste per unit of GDP in 2010 was generated in Kazakhstan – 13 116 kg per USD 1000 and the lowest amount in Serbia - 53 kg per USD (Fig 8). The same highest value of this indicator in the case of hazardous waste is characteristic for Kazakhstan - 4 349 kg per USD and the lowest value for the Republic of Moldova - 0.3 kg per USD 1 000 (Fig 9). Considerably higher values of total waste generated per unit of GDP in the case of Kazakhstan and Ukraine can be explained by the fact that the amount of waste from mining industry is higher by one order of magnitude than the total amount of waste generated in other countries. In addition, the amount of hazardous waste in Kazakhstan in 2010 represented one third of total waste generated.

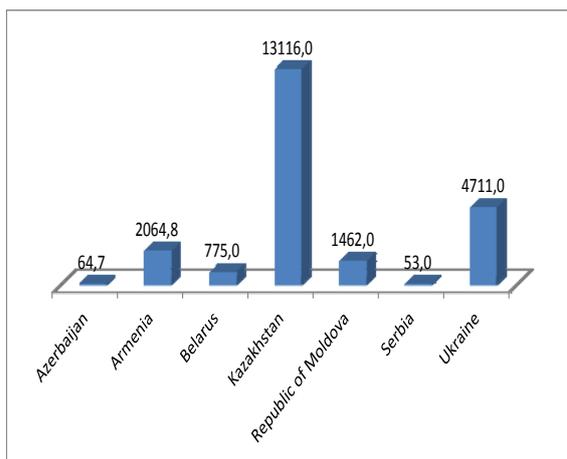


Figure 8. Amount of waste per unit of GDP (total waste) in 2010

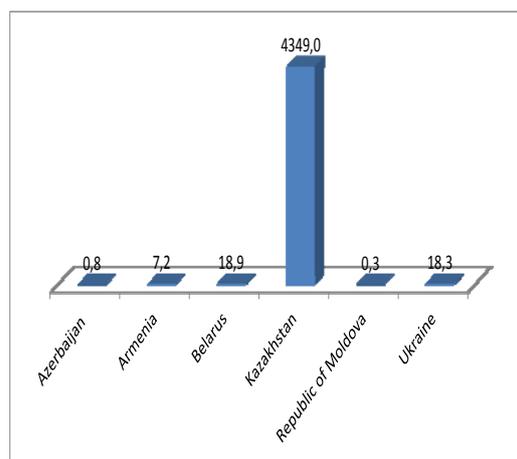


Figure 9. Amount of waste per unit of GDP (hazardous waste) in 2010

Statistical authorities in Azerbaijan, Bosnia and Herzegovina, Kyrgyzstan, Montenegro, Serbia and the former Yugoslav Republic of Macedonia are responsible for the preparation of data on waste generation. In Belarus, the Republic of Moldova, the Russian Federation and Tajikistan, this data is collected in cooperation between environmental and statistical authorities. In Albania, Armenia and Ukraine, considerable amount of ministries, authorities, institutions and legal entities is engaged in data collection. In Georgia, data on waste was last time collected in 2007 by different authorities without mutual coordination. In Kazakhstan, the responsibility for data collection was with statistical authorities till 2009 while with the environmental authorities after 2009. Uzbekistan has not presented authority, responsible for the preparation of data on waste generation.

With the exception of Montenegro, all countries which have reported information on waste generation publish data in environmental reports, statistical yearbooks and websites.

#### Conclusions:

1. Majority of countries, with the exception of Serbia, has available data on municipal waste generation. However, only Azerbaijan, Belarus, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, Tajikistan and Ukraine have available data on household waste generation.
2. In Azerbaijan and the Republic of Moldova, the amount of municipal waste generated is higher than the sum of waste generated by all other economic activities.
3. The Russian Federation, Tajikistan and Uzbekistan measure amounts of municipal waste generated in cubic meters per year without having conversion factors from cubic meters to tons per year available.
4. Montenegro, Tajikistan and the former Yugoslav Republic of Macedonia do not have available data on waste generation by installations belonging to particular economic activities. Albania, Georgia and Uzbekistan have reported specific data on waste generation only for certain economic activities.
5. In Armenia, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, the Russian Federation, Serbia and Ukraine, wastes from mining industry and quarrying represent the dominant types of waste.
6. Data on indicator „Waste generation“ is not published in Montenegro.
7. The best representative data coverage for generation of all types of waste for at least 10-years time period is available in Armenia, Azerbaijan and the Republic of Moldova.

Recommendations:

1. The Russian Federation, Tajikistan and Uzbekistan are recommended to develop system of collection data on municipal waste generation at the national level and to develop conversion coefficients to re-calculate amounts of generated municipal waste from cubic meters to tons.
2. It is recommended to the countries having the most complete data coverage to use these data for the development of indicator „Waste generation“.

## 2. Final waste disposal

### A. Sub-indicator: Treatment and final disposal of municipal waste

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

*Note: Green colour means that the country has reported at least some data related to this indicator.*

Thirteen countries have reported data on final treatment and disposal of municipal waste. Two countries only, Armenia and Belarus, have time series of 20 years available to develop this sub-indicator. The Republic of Moldova has started to collect this data since 1995 and Azerbaijan, the Russian Federation and Uzbekistan since 2000 while other countries have started later. Montenegro started to collect data in 1996, but data is missing for several years after.

It can be seen that that all municipal waste is being disposed at controlled landfills in Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, the Republic of Moldova, the former Yugoslav Republic of Macedonia and Uzbekistan. At the same time, the amount of disposed waste has increased during the reporting periods in Azerbaijan and in the Republic of Moldova 1.5 times (Fig 10), in Kazakhstan 1.8 times, in Belarus almost 2 times (Fig 11) and in Kyrgyzstan 2.1 times.

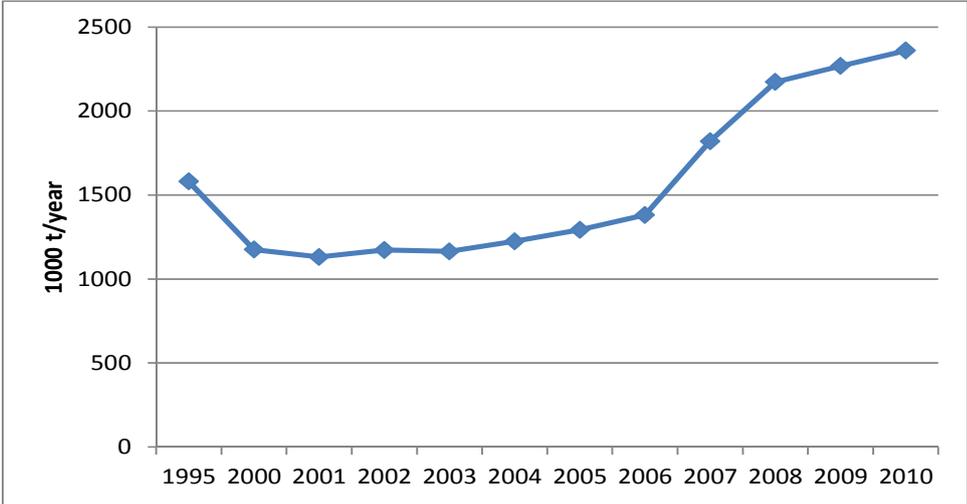


Figure 10. Final disposal of municipal waste in the Republic of Moldova between 1995 and 2010

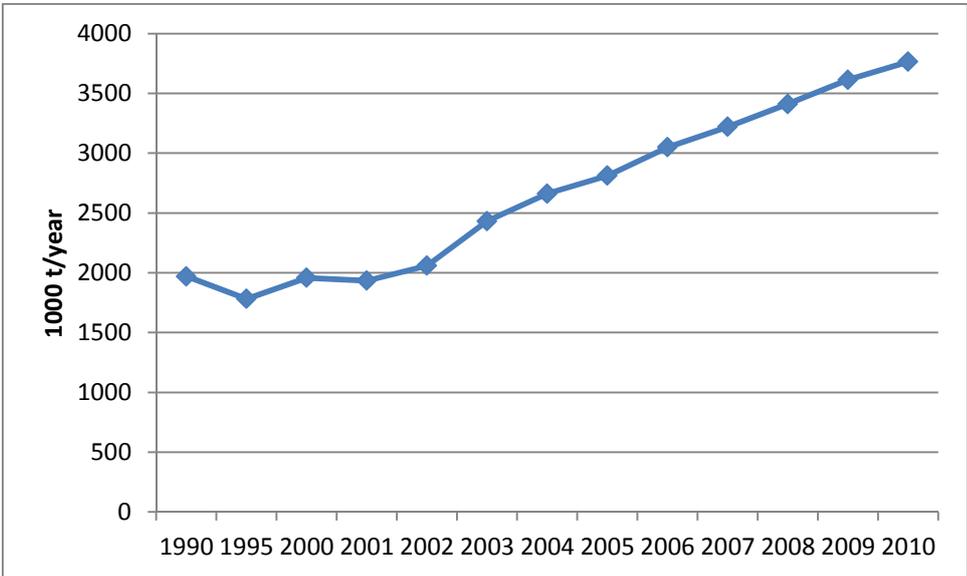


Figure 11. Final disposal of municipal waste in Belarus between 1995 and 2010

In Bosnia and Herzegovina, the amount of disposed waste, mainly at controlled landfills, exceeds the amount of generated waste during the reporting period. Probably, earlier generated waste was being disposed.

Georgia has presented that all municipal waste is being disposed, however without specifying the method applied.

In the case of the former Yugoslav Republic of Macedonia and Montenegro, the reported amounts of generated household waste (year by year) differ from the respective amounts reported under indicator „Waste generation“.

Albania and Tajikistan did not fill in tables for this sub-indicator regardless their data on municipal waste generation are filled in the table for indicator „Waste generation“.

The Russian Federation does not keep records on municipal waste generation at the federal level. Country has presented data on transportation of household trash and liquid waste from municipalities by specialized transporting companies in cubic meters per year and also data on transportation of solid household waste to the waste treatment facilities in tons per year.

Statistical authorities in Azerbaijan, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, Montenegro, Serbia, and the former Yugoslav Republic of Macedonia are responsible for the preparation of data on treatment and disposal of municipal waste. In Georgia, responsibility for this activity lies with municipalities. In Belarus and the Republic of Moldova, this data is being collected in cooperation between environmental and statistical authorities. In Armenia and Ukraine, considerable number of ministries, authorities, organizations and legal person is engaged in data collection. The Russian Federation and Uzbekistan did not present organizations responsible for the preparation of data on this sub-indicator.

Results of treatment and final disposal of municipal waste are not being published in Georgia, Montenegro, the Russian Federation and Uzbekistan.

#### Conclusions:

1. Data on final disposal of municipal waste have been reported by 13 countries.
2. Non-hazardous municipal waste is being finally disposed completely at controlled landfills in Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, the Republic of Moldova, the former Yugoslav Republic of Macedonia and Uzbekistan.
3. In the Russian Federation, records on municipal waste generation are not being kept at federal level. As a result, data on final disposal is not available.

#### Recommendations:

1. It is recommended to the Russian Federation to introduce system for registration of generation and final disposal of municipal waste at the federal level.
2. It is recommended to the former Yugoslav Republic of Macedonia and Montenegro to put into compliance the data on municipal waste treatment and disposal with those on its generation (year by year) to eliminate discrepancies.
3. It is recommended to Albania and Tajikistan to use their available data on municipal waste management in the development of this sub-indicator.
4. It is recommended to those countries which have available consistent balances of amounts of generated and finally disposed municipal waste to use this data for the development of sub-indicator “Treatment and final disposal of municipal waste”.

**B. Sub-indicator: Management of non-hazardous industrial waste**

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

*Note: Green colour means that the country has reported at least some data related to this indicator.*

Some information on non-hazardous industrial waste has been reported by 11 countries. Azerbaijan is the only one to have such information available for the time period of 20 years. Ukraine has experience with non-hazardous industrial waste management for 15 years, and Armenia, Belarus and the Republic of Moldova for 10 years.

During the time period of 10 years, the amount of non-hazardous waste in Belarus has increased almost two times, however in 2010 only less than one quarter of their amount was finally disposed and major part (75 %) was recycled. Considerable share of non-hazardous high-volume waste is being reserved for the purposes of its final disposal (Fig 12).

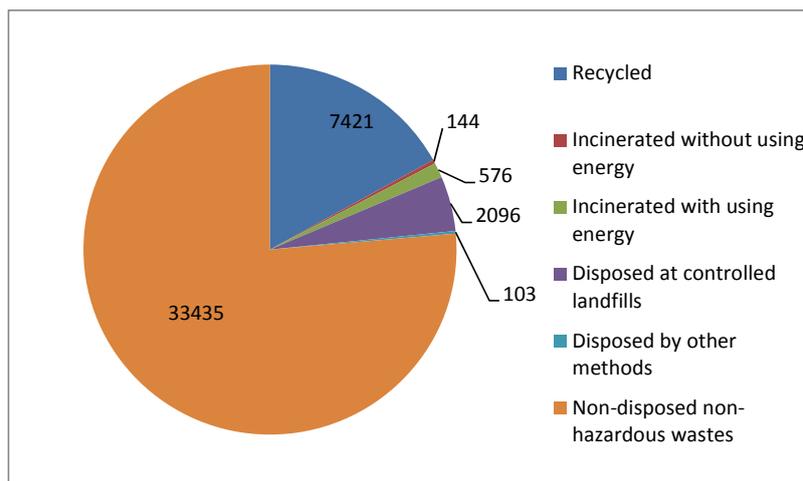


Figure 12. Disposal of non-hazardous industrial waste in Belarus in 2010.

In Ukraine, some 50% of non-hazardous industrial wastes is disposed at controlled landfills, more than 30% is disposed by other methods (buried in the ground or dumped on the ground, dumped into surface waters).

In Armenia, all volumes of non-hazardous waste are being disposed at controlled landfills. At the same time, these volumes increased more than 11 times between 2000 and 2010. This increase is caused by the increase in amounts of non-hazardous waste generated by mining industry (Fig 13).

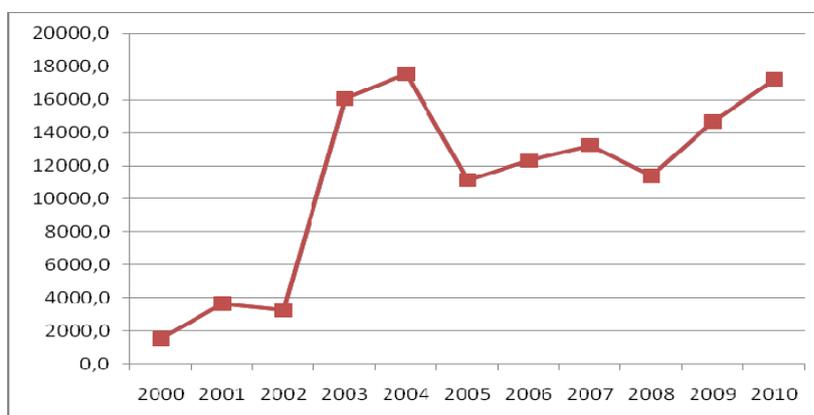


Figure 13. Dynamics of change in non-hazardous industrial waste disposal in Armenia between 2000 and 2010.

Kyrgyzstan has presented information on the total amount of generated industrial waste for 2010; this total includes data on both non-hazardous and hazardous waste. At the same time, it has been presented that 84 % of the total amount of this waste was disposed within the territories of enterprises at sites for controlled disposal.

Albania, Kazakhstan and Uzbekistan have not reported any data on this sub-indicator, regardless that they reported data on waste generation by economic activities under indicator „Waste generation“.

Data from the Republic of Moldova show that from 6 % to 45 % of non-hazardous industrial wastes was disposed at controlled landfills in particular years, however methods of disposal of resting amounts of waste are not presented.

In Azerbaijan, the amount of this type of waste generated annually is lower by two orders of magnitude than the amount of waste disposed by other methods like physical-chemical or biological treatment, dumping into water reservoirs or permanent storage. It is clear that such a big annual difference between generation of non-hazardous industrial waste and its disposal requires thorough investigation.

In the reports presented by the Republic of Moldova and Serbia, the amounts of non-hazardous industrial wastes do not correspond with the amounts, reported under the indicator “Waste generation“.

Bosnia and Herzegovina, Georgia and the Russian Federation have only reported the total amounts of generated non-hazardous industrial wastes without specifying methods of their disposal. At the same time, in the Russian Federation, the non-hazardous industrial waste is defined as the waste of the fifth class of hazard, which represent majority of all industrial wastes. Data presented by these countries are not sufficient for the development of this sub-indicator.

Statistical authorities in Azerbaijan, Bosnia and Herzegovina, Kyrgyzstan, Serbia and the former Yugoslav Republic of Macedonia are responsible for the preparation of data on management of non-hazardous industrial waste. In Belarus and the Republic of Moldova, this data is being collected in cooperation between environmental and statistical authorities. In Armenia and Ukraine, considerable number of ministries, authorities, organizations and legal persons is engaged in data collection. The Russian Federation did not present organizations responsible for the preparation of data on this sub-indicator.

Data on management of non-hazardous industrial wastes are not being published in Georgia and the Russian Federation.

Taking into account that considerable part of high-volume non-hazardous industrial waste is being reserved in many countries for the purposes of future use in a long-term time horizon and the rate of its accumulation is higher than the rate of disposal, Belarus has proposed to complement this indicator by new figures: „Reservation of industrial waste at special sites“ and „Use of industrial wastes reserved at special sites“.

#### Conclusions:

1. Non-hazardous industrial waste is being disposed at controlled landfills: Completely in Armenia, mostly in the former Yugoslav Republic of Macedonia, up to 50 % in Ukraine and partially in Belarus, Kyrgyzstan and the Republic of Moldova.
2. Considerable part of non-hazardous industrial wastes is being recycled in Belarus and Serbia and partially in the former Yugoslav Republic of Macedonia and Ukraine.
3. In Kyrgyzstan, 84% of all disposed industrial wastes, including hazardous wastes, is being placed within the territories of enterprises at controlled sites.
4. Non-hazardous industrial waste annually generated are not completely disposed in Belarus, Serbia and the Republic of Moldova.
5. In Azerbaijan, the annual amount of disposed non-hazardous wastes is dozens times higher than the annual amount of generated wastes.
6. In the Republic of Moldova and Serbia, the reported sums of generated non-hazardous industrial wastes do not correspond with the analogical data reported under the indicator „Waste generation“.

### Recommendations:

1. It is recommended to Armenia, Belarus and Ukraine to use their available data for the development of sub-indicator „Management of non-hazardous industrial waste“.
2. It is recommended to other countries to check and precise the data reported under this sub-indicator and to harmonize them with the data used in the indicator „Waste generation“.
3. It is recommended to Albania, Kazakhstan and Uzbekistan to use data on management of non-hazardous industrial wastes available in their countries for the development of this indicator.
4. It is recommended to Kyrgyzstan to introduce separation of non-hazardous industrial wastes from industrial waste into its waste management system.
5. It is recommended to consider possibility to include into this sub-indicator figures „Reservation of industrial waste at special sites“ and „Use of industrial wastes reserved at special sites“ in order to take into account wastes reserved for long periods of time.

### 3. Transboundary movement of hazardous waste

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

Note: Green colour means that the country has reported at least some data related to this indicator.

Twelve countries have reported some data on this indicator.

Armenia has informed on zero export and import of hazardous waste between 1990 and 2010.

Bosnia and Herzegovina, Georgia, the Republic of Moldova and Uzbekistan are exporters of hazardous waste only. However, Uzbekistan has included into this indicator all treated and disposed waste, regardless no import of hazardous waste has been reported.

In Albania, only import of hazardous waste is in place, however no information was reported on what is being done with such wastes.

With the exception of 2009, import of hazardous waste exceeds its export in Belarus considerably. At the same time, almost all imported waste was recycled.

In Azerbaijan, the ratio between import and export of hazardous waste is changing year by year. However, treatment and disposal of hazardous wastes every year exceeds in quantitative terms their import considerably, which requires further explanation.

Almost all imported waste is being recycled in Kazakhstan.

In the Russian Federation (Fig 14) and in Ukraine, export of hazardous wastes exceeds their import considerably. However, while in the Russian Federation all imported waste is being recycled (country has also shown recycling of its exported wastes), Ukraine has not reported on the way in which imported wastes are treated.

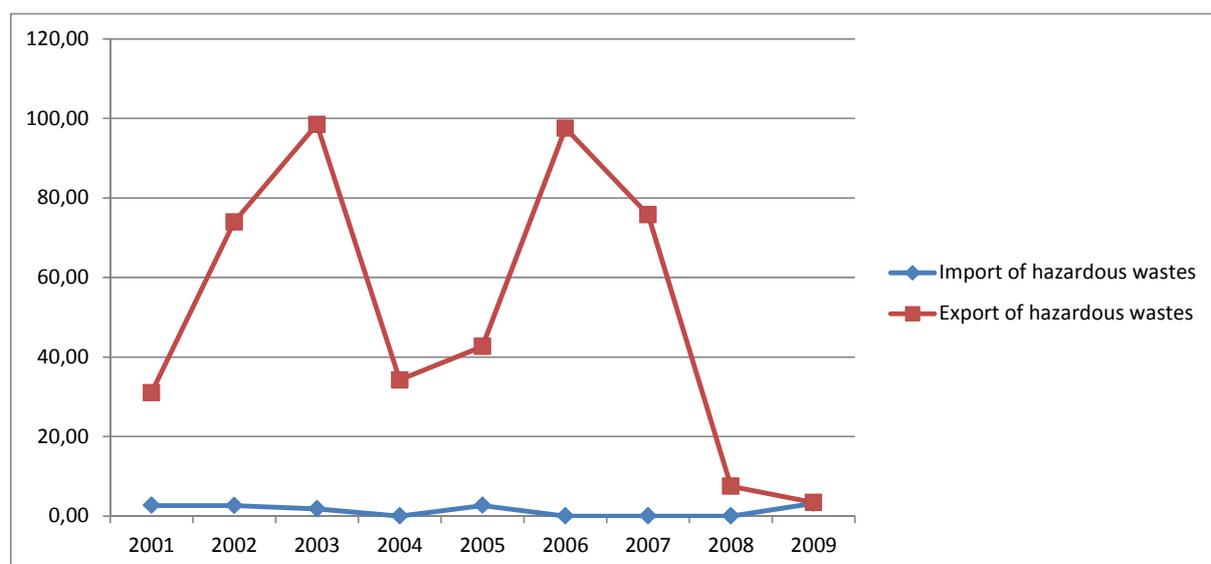


Figure 14. Export and import of hazardous waste in the Russian Federation between 2001 and 2009

In the countries which have reported on this indicator, responsibility for transboundary movement of hazardous waste lies with the customs authorities in Albania, Armenia, Belarus, Kazakhstan and Ukraine, with environmental authorities in Bosnia and Herzegovina, the Republic of Moldova, the Russian Federation and Montenegro, with statistical authority in Azerbaijan and with the Ministry of Economic Development and Finance in Georgia.

Data on transboundary movement of hazardous waste are being published in regular publications and websites in Albania, Azerbaijan, Belarus, Bosnia and Herzegovina and Kazakhstan. Armenia has also informed that it publishes data on zero export and import of

hazardous wastes regularly. Data on this indicator are not being published in Georgia, Montenegro, the Republic of Moldova, the Russian Federation, Uzbekistan and Ukraine.

Conclusions:

1. Bosnia and Herzegovina, Georgia, the Republic of Moldova and Uzbekistan have only reported on export of hazardous waste. Due to this, data on disposal of transboundary wastes on their territories have not been reported.
2. Belarus and Kazakhstan recycle in their countries almost all imported hazardous wastes.
3. Data on transboundary movement of hazardous wastes is not available in the former Yugoslav Republic of Macedonia, Serbia and Tajikistan.
4. Data reported by two countries only – Belarus and the Russian Federation – can be considered relevant to indicator „Transboundary movement of hazardous waste“.

Recommendations:

1. It is recommended to those countries, which have not reported data on this indicator but are parties to the Basel Convention and therefore obliged to submit to the Secretariat of the Convention annual national communications on transboundary movement of hazardous waste, to collect data necessary for the development of this indicator.
2. It is recommended to Belarus and the Russian Federation, which have reported the most complete data, to publish indicator „Transboundary movement of hazardous waste“ regularly for the purposes of environmental protection and of public awareness.

**4. Ambient air quality in urban areas**

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													



With the exception of Bosnia and Herzegovina, Kyrgyzstan (which terminated measurements as from 2000) and the former Yugoslav Republic of Macedonia, all countries monitor dust concentrations in terms of suspended particulate matter. At the same time, Albania, Belarus, Bosnia and Herzegovina, Montenegro, Serbia and the former Yugoslav Republic of Macedonia have introduced monitoring of PM<sub>10</sub> recently, using automated monitoring stations.

Tajikistan has also reported measurements of PM<sub>10</sub>, however, according to other reports, including the Environmental Performance Review of Tajikistan, prepared in 2010, such measurements are not being carried out in this country. In addition, in the Tajikistan's report, daily and annual limit values for other air pollutants are changing from year to year. It seems that that measured concentrations are presented rather than limit values.

In several cities in the Russian Federation (e.g. Moscow, St Petersburg, Sochi), concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are being monitored regularly. However, this data has not been reported by the country<sup>2</sup>.

In Azerbaijan, Bosnia and Herzegovina, Montenegro, Georgia, Uzbekistan and Ukraine, data on NO<sub>x</sub> are being obtained regularly at many stations.

In addition to the questionnaire, which requires data on pollutants necessary for the development of indicator, Kyrgyzstan has presented data on measurements of concentrations in the ambient air of two specific pollutants – formaldehyde and ammonium.

Armenia, the Russian Federation and Ukraine have only reported information on annual mean concentrations of pollutants in ambient air. At the same time, the Russian Federation has informed that maximum daily mean concentrations of pollutants in ambient air are not being determined in the country.

Table 1. Data reported by the countries

Indicators	Albania	Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Former Yugoslav Republic of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Republic of Moldova	Montenegro	Russian Federation	Serbia	Tajikistan	Ukraine	Uzbekistan
Dust																
PM <sub>10</sub>																

<sup>2</sup> According to the country members of the Joint Task Force, these measurements are being carried out on an experimental basis (in the test mode), without the evidence of equivalence with the reference (gravimetric) method of measurement. As a result, these data are not used in the analysis of Roshydromet and preparation of information on air quality in the Russian Federation, and are currently regarded as tentative.

SO <sub>2</sub>																		
NO <sub>2</sub>																		
NO <sub>x</sub>																		
CO																		
Number of days with exceeded limit values																		

In the case of Albania, Armenia, Bosnia and Herzegovina, the Russian Federation and Ukraine, the key information on the number of days with exceeded limit for monitors pollutants values is missing.

Several countries have not reported information on the number of days with exceeded limit values for all monitored pollutants. Such information is missing: In Georgia for NO; in Kazakhstan for SO<sub>2</sub> and NO<sub>x</sub>; in the former Yugoslav Republic of Macedonia for NO<sub>2</sub>; in Montenegro for dust and NO<sub>x</sub>; in Uzbekistan for SO<sub>2</sub> and NO<sub>x</sub>.

In order to improve the indicator „Ambient air quality in urban areas“, Belarus proposes to unify approaches to determination of daily mean concentrations and to using terms „maximum daily mean concentration“ and „maximum measured concentration“ and also to develop methodology of treatment, interpretation and quality control for the data from continuous measurements to enable their comparability.

Three countries only – Azerbaijan (Fig 16), Kazakhstan and Kyrgyzstan (Fig 17) have accompanied information on ambient air quality with maps/schemes showing the siting of monitoring stations.

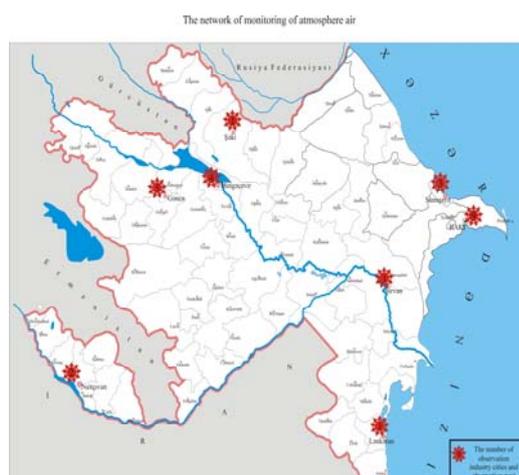


Figure16. Map of location of cities in which ambient air quality monitoring is being carried out in Azerbaijan



Figure 17. Scheme of siting of ambient air quality monitoring stations if Bishkek (Kyrgyzstan)

In Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, the Republic of Moldova, the Russian Federation, Tajikistan, Uzbekistan and Ukraine, organization and execution of ambient air quality monitoring is being carried out by hydrometeorological services. In Albania, Azerbaijan, Georgia, the former Yugoslav Republic of Macedonia and Montenegro this activity is being carried out by environmental authorities and in Armenia by a special organization – Armeconmonitoring. Belarus and Serbia did not report on organizations responsible for ambient air quality monitoring.

Since 2010, measurements of ambient air quality indicators in Armenia are being executed in accordance with international standards for air quality monitoring: ISO 4219: 1979; ISO 4221: 1983 и ISO 7996: 1985. In Kazakhstan, inter-laboratory control of data quality in in place in accordance with the document ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories". Georgia, the Republic of Moldova and Ukraine by now use for the purposes of data quality control the Guiding document RD ПД.52..04.186.89, developed in USSR. Other countries apply analytical methods for ambient air quality measurements developed at national levels.

Montenegro is the only country not publishing results of ambient air quality monitoring. Serbia did not inform on publication of data on this indicator. Azerbaijan publishes the data with notice “for official use only“. Other countries publish the obtained data regularly in national reports, statistical yearbooks, different publications and on websites.

#### Conclusions:

1. Programs of ambient air quality monitoring in all countries include measurements of concentrations of sulphur dioxide and nitrogen dioxide. The majority of countries measures concentrations of carbon monoxide and dust.
2. Recently, regular measurements of PM<sub>10</sub> at automated stations have been introduced into air quality monitoring practice at many sites in Albania, Belarus, Bosnia and Herzegovina, Montenegro Serbia and the the ormer Yugoslav Republic of Macedonia.
3. There is no information on maximum daily mean concentrations of pollutants in ambient air from Armenia, the Russian Federation and Ukraine.
4. The number of days with exceeded limit values for air pollutants is one of basic criteria for this indicator. Albania, Armenia, Bosnia and Herzegovina, the Russian Federation and Ukraine do not have these data available for all measured pollutants.

5. Montenegro does not publish data on this indicator and Serbia did not provide information on publishing. In Azerbaijan, the information on ambient air pollution is being published with a note „for official use“.

Recommendations:

1. It is recommended to all reporting countries to complete missing data, especially on PM<sub>10</sub> and NO<sub>X</sub> and to determine the number of days with exceeded limit values of monitored pollutants.
2. It is recommended to the Joint Task-force to assess at one of its sessions the proposal by Belarus related to further improvement of indicator „Ambient air quality in urban areas“.

**5. Threatened and protected species**

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

Note: Green colour means that the country has reported at least some data related to this indicator.

14 countries have reported some information on this indicator.

The most complete and relevant data on all requested species, including year-by-year dynamics of change have been reported by the Russian Federation. Belarus and Kyrgyzstan have presented full information as well, however information on algae is missing in the case of Belarus and information on algae, mosses and lichens is missing in the case of Kyrgyzstan.

Uzbekistan has also presented information on 5 important species applicable for the development of indicator. However this information covers three years only.

Kazakhstan has available full information on fauna but considerably less complete information on flora. At the same time, Kazakhstan has presented as an example data on status of vascular plants in the Mangistaus region.

When reporting long-term information of particular species of taxons, the Republic of Moldova and Serbia did not calculate percentages of critically endangered, endangered, vulnerable and protected species.

Tajikistan has presented almost full 7-years data series on mammals, birds, fishes, reptiles, invertebrates, vascular plants, mosses and fungi. It can be seen that, with the exception of vascular plants, there was no change in the number of species during the reporting period. However, the analysis of the data shows that the numbers of majority of threatened species are lower than the sums of numbers of critically endangered, endangered and vulnerable species which is not possible.

Albania has only reported information on situation related to the danger of extinction for birds. During the reporting period, such danger decreased from 32 % to 25.4 % (Fig. 18). In addition, country has added into the table data on numbers of bird species within the low risk category.

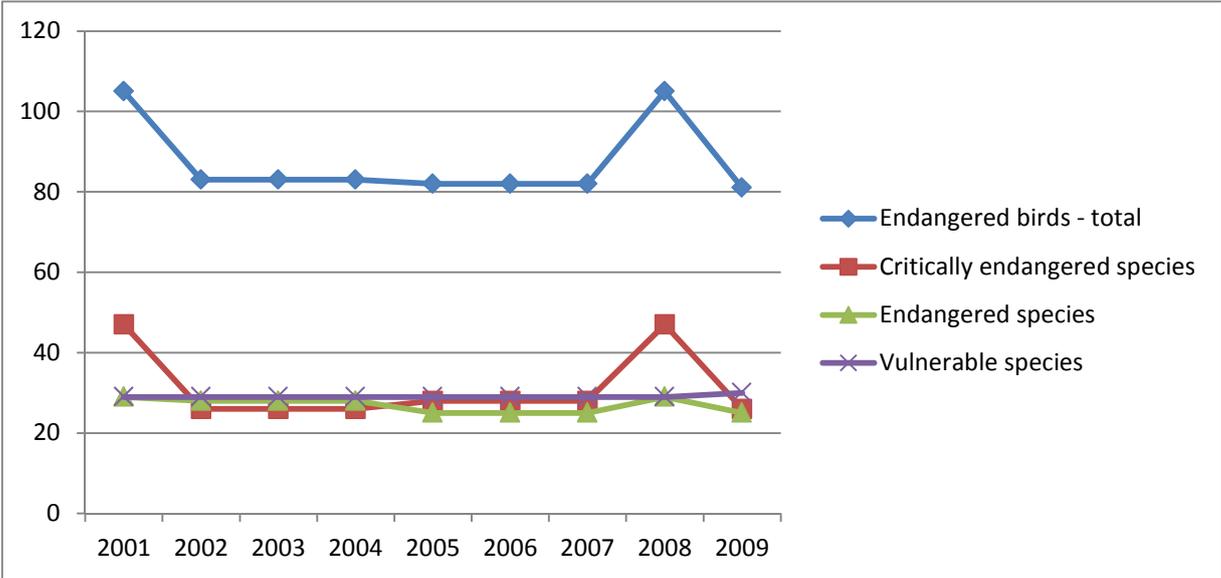


Figure 18. Dynamics of change in number of endangered species of birds in Albania between 2001 and 2009.

Azerbaijan has presented rather fragmented data for one year 2010 related to several species of endangered fauna and flora. It can be concluded from the data that, with the exception of vascular plants, none of endangered species is protected in Azerbaijan which is dubious.

It is presented by the Russian Federation, Georgia, Belarus (with the exception of lichens and fungi) and Uzbekistan (with the exception of fishes) that not only threatened species but all existing species are fully protected. It can be concluded that these countries did not understand the questionnaire.

Armenia and Ukraine have reported for few years with considerable empty periods data on protected species only and not on those under threat. Such data is not sufficient for the development of indicator.

The former Yugoslav Republic of Macedonia has only informed on the total number of fauna and flora species in the country and on the number of threatened species without any analysis.

Analysis of relevant data reported by countries shows the following trends of change in the numbers of threatened species in these countries during respective reporting periods:

- Belarus: Two times increase in the number of threatened fishes and amphibians; slight increase in the case of threatened species of mammals, birds, vascular plants and lichens;
- Georgia: Increase in the numbers of threatened species: Mammals-1.5 times, fishes- 15 times, reptiles-2 times. Decrease in the number of threatened species of amphibians- 2 times.
- Kazakhstan: Increase in the number of threatened species: Fishes-3 times; Decrease by 10 % of threatened species of invertebrates.
- The Republic of Moldova: Increase in the number of threatened species: Mammals and birds – 2 times; fishes – 3 times; amphibians and lichens – 4 times.
- The Russian Federation: Increase in the number of threatened species: Birds, amphibians and fungi – 1.5 times; reptiles and lichens – 2 times, mosses – 3 times, invertebrates – 4 times, mammals and vascular plants – slight increase.
- Tajikistan: Slight increase in the number of threatened species of vascular plants.
- Uzbekistan: Slight increase in the numbers of all threatened species.

In the majority of countries reporting on this indicator, information is being published in statistical and environmental publications and on websites. There is no information on data publication from Azerbaijan and Serbia.

In Armenia, Belarus, Kazakhstan, Kyrgyzstan, Uzbekistan and Ukraine, „Red Books“ on fauna and flora were published. In the Russian Federation, Red Books on fauna and flora were published not only at the federal level but also in 80 subjects of the Federation.

#### Conclusions:

1. The most complete materials have been submitted by the Russian Federation, Belarus, Kazakhstan, Kyrgyzstan and partially by Uzbekistan and Georgia.
2. Albania, Armenia, Belarus, Georgia, Kazakhstan, the Republic of Moldova, the Russian Federation and Uzbekistan have analyzed the dynamics of change in the number of protected and threatened species.
3. In Kyrgyzstan, changes in the number of threatened species are not reported for the period of 20 years.
4. Certain information on this indicator is being published in all countries (with the exception of Azerbaijan and Serbia) and seems to be available to general public.

#### Recommendations:

1. It is recommended to the Russian Federation, which has reported information on all requested species, to publish all available data regularly in the form of indicator.
2. It is recommended to Belarus, Georgia, Kazakhstan, Kyrgyzstan, Serbia, Tajikistan, and Uzbekistan to complete, wherever possible, the content of this indicator by information on other threatened species.
3. It is recommended to the Republic of Moldova and Serbia to carry out, on the basis of data available, necessary calculations of the percentage of critically endangered,

endangered, vulnerable and protected species for the purposes of indicator development.

## 6. Trends in the number and distribution of selected particular species

Country	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Albania													
Armenia													
Azerbaijan													
Belarus													
Bosnia and Herzegovina													
Georgia													
Kazakhstan													
Kyrgyzstan													
Serbia													
Montenegro													
Republic of Moldova													
Russian Federation													
Tajikistan													
The former Yugoslav Republic of Macedonia													
Ukraine													
Uzbekistan													

*Note: Green colour means that the country has reported at least some data related to this indicator.*

13 countries have reported some information on this indicator.

The most comprehensive report has been presented by 4 countries: Kazakhstan (Fig 19), the Russian Federation (Fig 20), Tajikistan and Uzbekistan. These countries have presented data on populations of concrete keystone, flagship and endemic species and species of international significance (including names in Latin language). They have also analyzed the dynamics of changes in populations of each species during the reporting time. Moreover, Kazakhstan has presented as an example the data on distribution of particular species of vascular plants in the Mangistaus region.

As a part of its updated questionnaire, Armenia has also presented information on concrete keystone, flagship and endemic species of fauna and flora and on species of international importance as well as on other species, important for the country. Armenia has reported on changes in the number of plants by years and by areas.

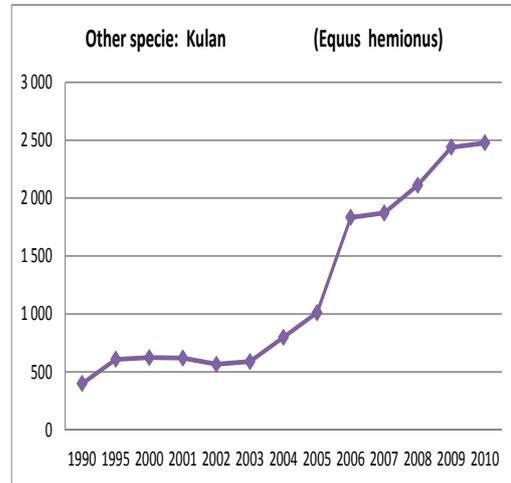
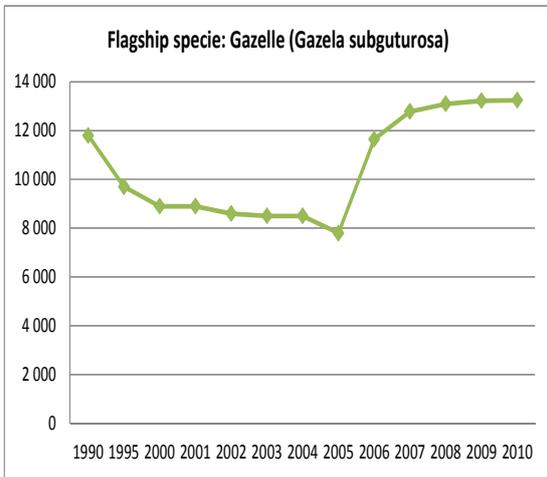
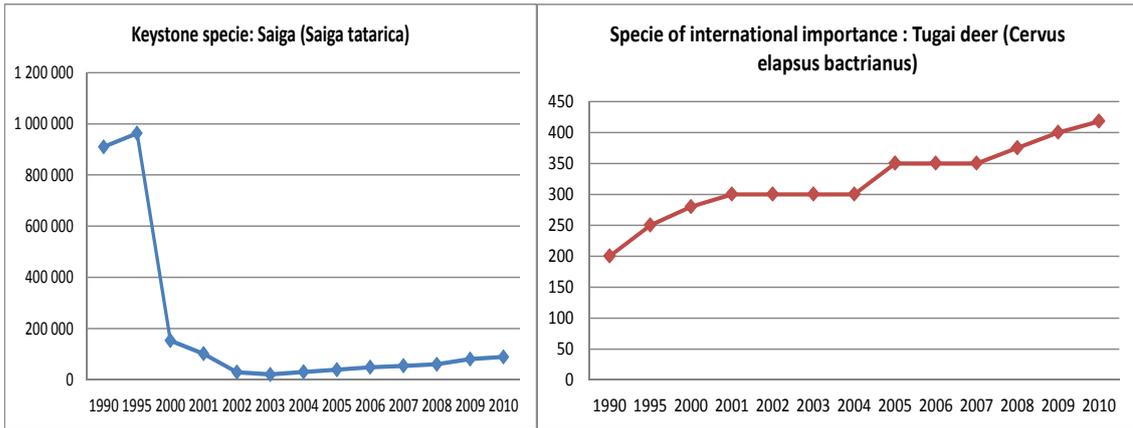
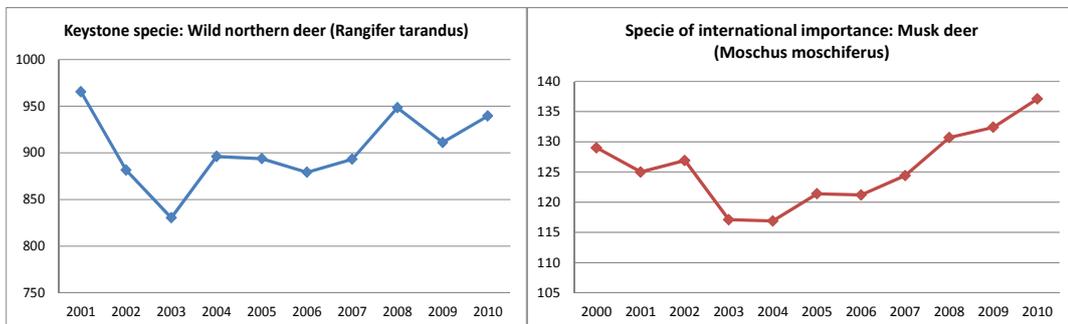


Figure 19. Change in the number of particular animal species in Kazakhstan



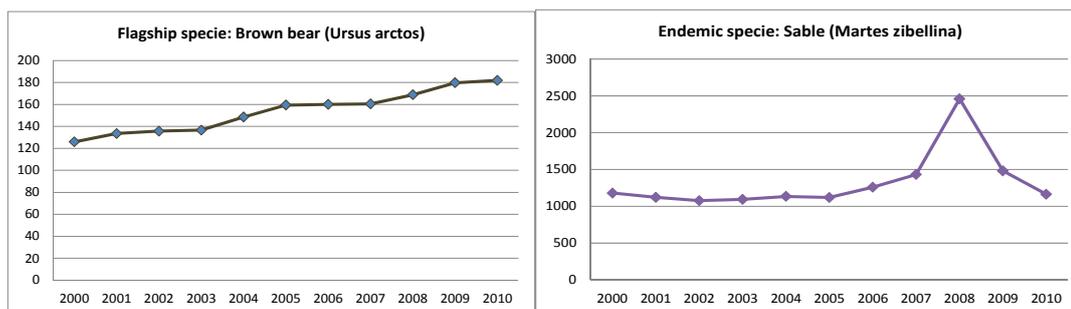


Figure 20. Change in the number of particular animal species in the Russian Federation

Uzbekistan has shown the distribution of numbers of particular species by categories, however in specially protected areas only.

Kyrgyzstan has referred in its documents to 5 species of international importance without any clarification. Such data is not sufficient for the development of indicator.

Data on the numbers of endemic species (without presenting their populations) have been presented by Armenia, Azerbaijan, Bosnia and Herzegovina, Serbia and the former Yugoslav Republic of Macedonia.

The Republic of Moldova has shown data on the numbers of keystone, flagship and endemic species and species of international importance for one year. Necessary data on the numbers of populations of such species have not been reported.

Within the report by Ukraine, data on changes in numbers in time is only presented for one keystone specie - brown bear.

Belarus has not reported on this indicator as it asserts that all information is included in other tables of the questionnaire and that the task related to the current table is not clearly defined without specifying which concrete species of fauna and flora should be reported on.

Certain countries publish the results of observations in periodic environmental publications and statistical yearbooks and also on websites. There is no information on regular publication of the data on this indicator from Azerbaijan, Kyrgyzstan, the Republic of Moldova and Serbia.

#### Conclusions:

1. From the total of 13 reporting countries, the information from four countries only – Kazakhstan, the Russian Federation, Tajikistan and Uzbekistan, and partially also from Armenia and Ukraine – is sufficient for the needs of the indicator „Trends in the number and distribution of selected particular species“. However, such trends are being traced mainly in the case of hunting animal species that were only under consideration in these countries. In Uzbekistan, these trends are only being traced for animals living in the specially protected territories.
2. Information reported by other countries is of fragmented character and obviously limited to the numbers of endemic species.

Recommendations:

1. It is recommended to those countries which have amount of data available sufficient for the formulation of this indicator to enlarge the list of changes in numbers and distribution of particular species to cover not only hunting species but also other animal species and also flora species.
2. Other countries are recommended strongly to start either data collection or data exchange for the purposes of formulation and subsequent publication of this indicator.

## II. GENERAL CONCLUSIONS

The assessment of data reported by countries on particular indicators is presented in the table below. From the point of view of reporting on indicators, the following conclusions can be formulated:

- The most complete data have been reported by the countries on indicator „Ambient air quality in urban areas“ for which all countries submitted some amount of data in respective time series.
- Relatively complete data have been reported on indicators “Waste generation” and “Final waste disposal“ and especially on sub-indicator “Treatment and disposal of municipal waste”.
- Assessing the indicator “Transboundary movement of hazardous waste”, it seems that inter-agency coordination is insufficient in many countries as the majority of them has ratified or joint the Basel convention and submit to the Secretariat national communications on transboundary movement of hazardous waste regularly.
- When filling the questionnaire, countries have reported sufficiently complete information on endangered and protected species of fauna. However, comparable information on the species of flora is almost missing (with the exception of vascular plants).
- Complex situation can be seen in the case of indicator „Trends in the number and distribution of selected particular species“ as the majority of reporting countries was not able to submit data on populations of particular species characterizing biodiversity.

No one of countries has reported complete data on all studied indicators. Relatively complete and consistent data have been reported by Belarus (with the exception of indicator „Trends in the number and distribution of selected particular species“) and Kazakhstan (with the exception of sub-indicator „Management of non-hazardous industrial waste“). Armenia, the Republic of Moldova and the Russian Federation have available representative data for the majority of indicators.

Assessment of data on indicators reported by countries

Indicator	Albania	Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	The former Yugoslav Republic of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	The Republic of Moldova	Montenegro	Russian Federation	Serbia	Tajikistan	Ukraine	Uzbekistan
Waste generation	?				?	?	?		?		?	?	?	?	?	?
Final disposal of waste:																
Treatment and disposal of municipal waste					?		?				?	?				
Management of non-hazardous waste			?		?	?	?		?			?				
Transboundary movement of hazardous waste	?									?	?				?	?
Ambient air quality in urban areas	?	?			?							?			?	
Threatened and protected species:																
Mammals, birds, fishes			?		?	?								?	?	
Reptiles, amphibians, invertebrates			?		?	?							?	?	?	
Vascular plants, mosses, lichens, fungi, algae		?	?			?				?			?	?	?	
Trends in the number and distribution of selected particular species			?			?			?	?			?	?	?	?

	Full information reported	All parameters required by the definition of indicator are reported
	Information reported partially	Parameters required by the definition of indicator are reported partially
?	Reported information not applicable	Reported information cannot be used for the development of indicator
	Information not reported	