



Progress report of the Global network of basins working on climate change adaptation as of April 2022

The global network of basins working on climate change adaptation was created by the secretariat of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), serviced by the United Nations Economic Commission for Europe (UNECE), in cooperation with the International Network of Basin Organizations (INBO) in 2013. It aims to promote cooperation on adaptation in transboundary basins, to compare different methodologies and approaches for adapting to climate change and to promote a shared vision between the participating basins.

The network includes on the one hand several pilot basins where UNECE, INBO and their partners implement activities and, on the other hand, additional basins which primarily work on their adaptation activities themselves in accordance with the agreed decisions of their governing bodies or with the terms of reference of international projects. The network allows for the exchange of experience, learning from each other, establishing contacts between basins and their experts, discussing challenges and lessons learnt etc. The network activities include regular meetings of all basins, larger workshops, trainings and development of guidance.

The following basins are included into the Global network:

1. The Amazon river basin shared by Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela, activities are implemented by the Amazon Cooperation Treaty Organization (ACTO).
2. The Chu Talas river basin, shared by Kazakhstan and Kyrgyzstan¹, activities implemented by the Chu Talas Water Management Commission, United Nations Development Programme (UNDP) and UNECE.
3. The Congo² river basin, shared by Angola, Cameroon, Central African Republic, Gabon, Democratic Republic of the Congo and Republic of the Congo, activities implemented by the International Commission of the Congo-Oubangui-Sangha Bassin (CICOS).
4. The Danube river basin, shared by Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Republic of Moldova, Montenegro, Romania, Serbia, Slovenia, Slovak Republic and Ukraine, activities implemented by the International Commission for the Protection of the Danube River (ICPDR).
5. The Rivers and Wetlands of Dauria Steppes (Upper Amur, Ulz-Torey, Selenge-Baikal basins), shared by China, Mongolia and the Russian Federation, with the activities implemented by WWF Russian Federation, Daurian Biosphere Reserve and Rivers without Boundaries International Coalition.
6. The Dniester river basin, shared by the Republic of Moldova and Ukraine, activities implemented by the Commission on Sustainable Use and Protection of the Dniester River Basin, UNDP/GEF, Organization for Security and Cooperation in Europe (OSCE) and UNECE.
7. The Drin³ river basin, shared by Albania, the Republic of North Macedonia, Kosovo⁴ and Montenegro and Greece, activities implemented by the Global Water Partnership Mediterranean, on behalf of the Drin Core Group.
8. The Lower Mekong River Basin, shared by Cambodia, Laos, Thailand and Vietnam, activities implemented by the Mekong River Commission.
9. The Meuse river basin, shared by Belgium, France, Germany, Luxembourg and the Netherlands, activities implemented by the International Meuse Commission.

10. The Neman river basin, shared by Belarus, Lithuania and the Russian Federation, activities implemented by UNDP, United Nations Educational, Scientific and Cultural Organization (UNESCO) and UNECE.
11. The Niger river basin, shared by Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria, activities implemented by the Niger Basin Authority.
12. The North Western Sahara Aquifer System (NWSAS)⁵, shared by Algeria, Libya, Tunisia, activities implemented by the Sahara and Sahel Observatory (OSS).
13. The Rhine basin, shared by France, Germany, Luxemburg, the Netherlands and Switzerland, activities implemented by the International Commission for the Protection of the Rhine (ICPR).
14. The Sava river basin, shared by Bosnia and Herzegovina, Croatia, Montenegro, Serbia and Slovenia, activities implemented by the Sava River Basin Commission.
15. The Senegal river basin, shared by Guinea, Mali, Mauritania and Senegal, activities implemented by the Senegal River Basin Development Authority.
16. The Sixaola river basin, shared by Costa Rica and Panama, activities implemented by the Binational Commission of the Sixaola River Basin.
17. Lake Victoria basin, shared by Burundi, Kenya, Rwanda, Tanzania, and Uganda, activities implemented by the Lake Victoria Basin Commission.
18. The Volta river basin, shared by Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo, activities implemented by the Volta Basin Authority.

More information about the activities and progress of the pilots and basins 1-18 is provided below⁶.

¹ The listed countries include only the members of the river basin organisations in all basins where they are established.

² The report was not submitted.

³ The report was not submitted.

⁴ United Nations administered territory under Security Council Resolution 1244 (1999).

⁵ The report was not submitted.

⁶ Updates provided by the basins; the UNECE secretariat is not responsible for the correctness of the information.

1. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE AMAZON BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

The Amazon ecosystem is highly vulnerable to climate change. The increase in temperature and the alteration of the water cycle are significantly affecting natural systems with the respective impacts on the socioeconomic systems, including significant impacts on the most vulnerable populations whose livelihood is strongly associated with the integrity of the ecosystem.

According to the recently published *Amazon Assessment Report 2021* (Science Panel for the Amazon), today, the Amazon is about 1.2°C warmer. Higher incidence of extreme hydroclimatic events, with more severe floods and droughts, is impacting Amazonian ecosystems and their functioning. Forests are more susceptible to drought and fires, while floodplain systems are vulnerable to changes in flood regimes. At the same time, the decrease in precipitation in the dry months, affects aquatic ecosystems, negatively impacting their natural habitats and fish reproduction regimes. Likewise, the increase in water temperature can affect temperature-dependent species, and the reduction of dissolved oxygen in the water, which can lead to favoring exotic invasive species.

Sadly, the Amazon is also suffering the gradual loss of its tropical glaciers with significant impacts on water balance in some sub-basins impacting community/urban water supply and environmental functions. In addition, the sea level rise is a factor in coastal erosion affecting important coastal mangroves.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

In 2021, ACTO inaugurated the **Amazon Regional Observatory - ORA**. The Observatory is a comprehensive Information Reference Center on the Amazon Region, where information is produced and shared between institutions, government authorities, scientific institutions, academia and civil society from ACTO Member Countries (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela). The ORA can be accessed at: www.oraotca.org

ACTO also inaugurated the **Situation Room**, receiving data from the **Amazon Hydrological Network (AHN)** and ACTO **Regional Water Quality Monitoring Network (RWQMN)** and systematically tracking various aspects related to water resources and extreme weather events in the Amazon Region. Both networks are being fed with official information from Member Countries and shall operate fully by the end of 2022. Nonetheless, relevant data is already available at ORA.

In 2021, ACTO also launched the **Atlas of Hydroclimatic Vulnerability of the Amazon Region**, which contains 60 thematic maps that specifically represent the different levels of sensitivity and adaptive capacities to climate change in terms of social, economic, and biophysical aspects, providing a basis for estimating the hydroclimatic vulnerability of the Region and contributing for informed decision in strategic planning, water resources and disaster risk management in the Amazon. (<http://otca.org/en/project/atlas-of-hydroclimatic-vulnerability-of-the-amazon-region/>)

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

The **Water Resources Situation Room** established at ACTO in 2021, will have the function of monitoring the hydrological and meteorological conditions in the Amazon basin to identify climatic events and support decision-making for the early adoption of measures to mitigate the effects of events such as floods and droughts. In the case of extreme events, the room will function as a center for managing critical situations, allowing coordination between the responsible institutions of the countries (water agencies, civil defense, etc.).

The Situation Room will be part of the ACTO Amazon Regional Observatory, which will receive the hydrological, climate and water quality monitoring data shared by the countries. Likewise, it will be

integrated with the situation rooms already existing in Ecuador and Brazil (ANA and Amazonian states), and with others that will be implemented in the future in the other countries of the Amazon basin.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Major challenges in transboundary cooperation and climate change adaptation in the Amazon included: lack of regional data and information related to variables relevant to climate change adaptation in order to facilitate decision-making at the basin scale; lack of a regional information platform consolidating official multi-thematic data on the Amazon; lack of hydroclimatic vulnerability mapping of the basin; insufficient tools to respond efficiently to extreme hydroclimatic events; and insufficient availability of financial resources for regional initiatives.

To overcome these challenges, ACTO has advanced in the establishment of regional hydrological and water quality monitoring networks covering the whole basin, adopting a multi-step approach. At the same time, the Organization has inaugurated the Amazon Regional Observatory with a thematic module on Water Resources and a Module on Monitoring Networks to be gradually expanded to include a Module on Climate Change, among others. In addition, ACTO has developed and published the first Atlas of Hydroclimatic Vulnerability of the Amazon Region based on official data and covering the whole basin. Finally, the Organization initiated the implementation of the Strategic Action Program (SAP) which includes actions to address climate change impacts and improve socioeconomic and ecosystems resilience in the basin. Regarding financial resources, this challenge still remains to be fully overcome. So far, the Organization has partnered with other organizations and institutions such as UNEP, IDB, KfW, EU, GIZ, among others, and have promoted South-South cooperation with resources from the Brazilian Cooperation Agency (ABC) and the National Water and Basic Sanitation Agency (ANA) of Brazil.

5. Which lessons learned would you like to share with other basins?

- Incorporating climate change adaptation in all institutional strategies, but mainly in the basin water resources management strategy, actively supports and improves adaptation to critical climate change impacts at the basin and national levels.
- A Regional Organization plays a critical role in providing space for sharing experiences, innovative tools and lessons learned in improving climate resilience; facilitating regional actions and mobilizing and channeling financial resources for adaptation to climate change.
- Availability and analysis of data and information at the basin level support both regional and national decision making for improving approaches and tools for adaptation decision-making and action.
- Transboundary cooperation in border areas is crucial for strengthening both monitoring and early warning systems to quickly and effectively respond to climate change-related extreme events avoiding major losses and damage.
- Institutional strengthening and coordination, decrease in asymmetries among basin countries and public participation are necessary conditions for effective adaptation to climate change.

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?

In the Amazon basin, adaptation to climate change and variability has been included as one of the three Strategic Response Lines of the Strategic Action Program (SAP) for Integrated Water Resources Management adopted by the eight ACTO Member Countries at the ministerial level. Under the SAP, the riparian countries agreed to implement strategic actions oriented to establishing and operating prevention, early warning and risk management systems, and a network of hydrometeorological stations to improve the ability of local governments and people to cope with droughts and floods, while minimizing human and socioeconomic losses. In addition, national actions are addressing issues such as coastal erosion and mangrove loss due to sea level rise; impacts on urban and community water supply in the context of glacier melting; and the use of groundwater alternatives in view of poor superficial water quality due to increased flooding, among others.

Climate change is also considered as an emerging issue in the ACTO Strategic Cooperation Agenda, and considered in the ACTO Program for Biological Diversity and the Forest Program. Currently, ACTO is promoting the development of a Strategic Plan for the Resilient Amazon Initiative with a view to develop a regional Strategy for Climate Change Adaptation in the Amazon Region/Basin.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

Climate change activities at the basin level are mainly financed by regional cooperation initiatives led by ACTO in partnerships with UNEP/GEF, KfW, IDB, ANA/ABC-Brazil, etc. and national counterpart resources.

Currently, ACTO is promoting the development of a specific financing facility tool for climate financing in the Amazon. In addition, the Organization will strengthen the countries' capacities for conservation financing considering climate change adaptation.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

Climate change adaptation activities in the Amazon are carried out in parallel at the transboundary, national and local levels according to the agreed priority issues. Thus, the Amazon Hydrological Network and the Regional Water Quality Network provide regional data and information through the Amazon Regional Observatory, while based on both national and regional monitoring data. Likewise, the regional Situation Room will soon be connected to 8 national situation rooms, and national institutional coordination will provide the respective responses to the alerts issued. Finally, specific national interventions support the implementation of the adaptation priorities in the Amazon.

Finally, the Strategic Action Program will be implemented also through National Action Plans, including adaptation strategies and activities at the national level.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

The protection of freshwater ecosystems and water quality monitoring are included as priority strategic actions in the Strategic Action Program for the Amazon Basin. Through the implementation of the Strategic Action Program and South-South cooperation, ACTO is supporting the establishment and operation of the regional water quality monitoring network in the Amazon and the monitoring and protection of aquatic ecosystems vulnerable to climate change and human impacts.

10. Future planned activities

The Organization will be developing an Amazon Regional Platform of Indigenous Peoples, in the framework of ORA, to facilitate the exchange of good practices and technologies of indigenous peoples related to climate change management, traditional knowledge linked to climate change, experiences in the protection, conservation, recovery and restoration of Amazonian ecosystems and their biodiversity, thus facilitating the flow of information between them and with the government institutions, encouraging the consideration of traditional knowledge systems in national and regional plans and responses.

The Organization will be establishing and implementing a regional aquatic ecosystem monitoring program with focus on ecosystems vulnerable to climate change and human impacts.

Further, ACTO will be promoting the development of a Regional Strategy on Climate Change in the Amazon.

11. Contact details

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2. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE CHU TALAS BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

Climate change will affect the ecosystem of the lower reaches of the Sh(Ch)u river basin, from spring to autumn the flow of the Chu river is reduced, desertification is underway.

<p>2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?</p> <p>1) An assessment was made of the needs for the conservation of important globally significant wetlands in the Chu River basin (Kazakhstan territory). Upon completion of the research, it was concluded that the territory fully complies with the Ramsar criteria, therefore it is recommended to prepare a description according to the Ramsar criteria and include the lower reaches of the Chu in the list from Kazakhstan. Preservation of these ecosystems will contribute to adaptation to climate change;</p> <p>2) In 2021, experts conducted a survey on the safety of the Kirov reservoir dam; and made suggestions and recommendations.</p>
<p>3. Name and short description of the flagship adaptation activity your organization wishes to highlight</p> <p>1) In accordance with the protocol decisions of the 9th meeting of the Working Group on Environmental Protection (11/18/2021) and the 29th meeting of the Chu-Talas Commission (12/09/2021), an assessment of the needs for the conservation of important globally significant wetlands in the Chu river basin on the territory of Kyrgyzstan, starting from the upper reaches of the basin and descending to the middle densely populated Kazakh and Kyrgyz parts of the Chu river basin;</p> <p>2) In accordance with the protocol decisions of the 29th and 30th meetings of the Chu-Talas Commission, the repair and restoration work of the Kirov Dam has begun.</p>
<p>4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?</p> <p>Difficulties in funding the experts who assessed the conservation needs of important globally significant wetlands in the Chu River Basin. In 2021, funds for Kazakh experts were allocated by the OSCE Office in Nur-Sultan. There is no funding for Kyrgyz experts to carry out similar work.</p>
<p>5. Which lessons learned would you like to share with other basins?</p> <p>In connection with climate change, we need to take preventive measures to reduce the risks associated with them. First of all, this is the use of advanced irrigation techniques and technologies, adaptation and cultivation of less moisture-intensive crops, etc. Also, improving the quality of hydrological forecasting, reducing the anthropogenic load on the natural complex.</p>
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>A joint Strategic Action Program for the Chu and Talas river basins for 2022-2030 (SAP) was developed and approved by the protocol decision of the 28th meeting of the Chu-Talas Commission.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>The following SAP activities are currently being implemented:</p> <p>According to Goal 1. The amount of water. At the expense of the state budget (repair and restoration work for the safety of the Kirov dam. In 2022, the Republic of Kazakhstan, in addition to equity participation, allocates 200 million tenge (454.4 thousand US dollars) to replace the cone gate No. 6 of the dam);</p> <p>According to Goal 3. Preservation of ecosystems. At the expense of donors, in particular the OSCE Office in Nur-Sultan (preservation of ecosystems in the lower reaches of the Chu River in Kazakhstan).</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>The National Action Program for the Shu and Talas river basins of the Republic of Kazakhstan has been developed and approved. Approval procedures for the Chu and Talas river basins of the Kyrgyz Republic have been developed and are being finalized.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>SAP Goal 2: Water quality includes the objective of conserving and improving the quality of water resources and reducing their adverse impacts on human health and ecosystems.</p> <p>Research is needed to clarify the types of ecosystems in the Chu and Talas river basins.</p>

10. Future planned activities

Signing by the co-chairs of a joint statement for the implementation of a new project to promote the SAP and seek investments for the implementation of SAP activities

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3. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE IN THE CONGO BASIN

4. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE DANUBE BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

Due to the expected changes in climatic conditions, water availability is likely to decrease in the southern and eastern parts of the Danube River Basin, whereas it will remain unchanged or even increase in the northern and western part. Changes in water availability can highly differ locally and regionally. Nevertheless, a north-westward shift of regions affected by water stress is expected until the end of the 21st century. Runoff is projected to significantly decrease until the end of the 21st century, whereas only little change is projected in the next decades. According to precipitation, changes in runoff seasonality are expected. The assessment of future extreme hydrological events like floods and droughts includes high uncertainty. However, there is consensus that extreme hydrological events will occur more often and be more intense. Following the future increase in air temperature, water temperature will most likely increase in the Danube River Basin.

Due to changes to all temperature-dependent chemical and biological processes, as well as increasing flood and drought events, the pressure on water quality in rivers and lakes will increase. An intensification of extreme events, such as floods and droughts, leads to high impacts for agriculture, forestry and industry, as well as built-up areas and infrastructure. As a consequence of decreasing water availability, a shortage in water supply is expected in some areas. There will not be enough water to meet the requirements for irrigation in agriculture and the vegetation period will shorten in large areas in the south of the Danube River Basin. In contrast, in the northern parts there will be enough water for productive farming. A shift in species distribution and an increasing risk of invasive species is expected due to changing climatic conditions. An increase in air and water temperature, combined with changes in precipitation, water availability, water quality and increasing extreme events, such as floods, low flows and droughts, may lead to changes in ecosystems, life cycles, and biodiversity in the Danube River Basin in the long-term.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

The ICPDR Strategy on Adaptation to Climate Change finalized in 2018 describes the approach of the ICPDR to integrate the issue of climate change adaptation into its activities, in particular in the Danube River Basin Management Plan and the Flood Risk Management Plan. The relevance of the Danube basin wide Climate Change Adaptation Strategy for Danube countries – in addition to national and regional strategies – is in particular seen in the context of promoting action in a multilateral and transboundary context as outlined as one of the key priorities of the EU Strategy on Adaptation to Climate Change. The ICPDR Climate Change Adaptation Strategy serves as a reference document influencing national strategies and activities in general and more specifically providing input for national RBMPs and FRMPs on possible adaptation measures of relevance for the Danube River Basin.

Additionally, end of 2019, the ICPDR adopted the “Effects of climate change (drought, water scarcity, extreme hydrological phenomena and other impacts)” as additional Significant Water Management Issue

(SWMI) in the Danube River Basin. In the preparation of the Danube River Basin Management Plan Update (DRBMP) 2021, a related vision and operational management objectives have been agreed in 2020 to guide the Danube countries in the next 6 years WFD implementation cycle (2021-2027). The vision is outlined as follows: *“The ICPDR’s basin-wide vision to deal with adaptation to and mitigation of water related effects of climate change (drought, water scarcity, extreme hydrological phenomena and other impacts) is to make full use of our wealth of knowledge on River Basin Management to meet the challenges posed by climate change, to achieve resilience and ultimately sustain the inherent ecological and cultural value of the aquatic environment for the Danube River Basin. Preventive measures will be taken to mitigate impacts of climate change, to adapt to it and to minimise the related damages, thus reducing the vulnerability of aquatic ecosystems and water related ecosystems to climate change.”*

Prioritising water management issues for the Danube River Basin until 2027, the ICPDR has adopted the Danube River Basin Management Plan (DRBMP) Update 2021 together with the Danube Flood Risk Management Plan (DFRMP) Update 2021 at the 24th ICPDR Ordinary Meeting in December 2021. The DRBMP Update 2021 sets out further aims to protect and enhance the status of all waters in the basin, and to prevent their deterioration while ensuring sustainable, long-term use of water resources. The plan also includes latest assessments on significant pressures, water status and a programme of measures jointly agreed by the Danube countries for the next six years. It establishes and strengthens several integrated principles for river basin management and connections to other sectors’ policies like energy, transport and adaptation to climate change. The DFRMP Update 2021 represents a key step forward in the ICPDR’s work towards sustainable flood risk management. It strengthens various aspects of flood risk management focusing on prevention, protection and preparedness, including measures for achieving the established objectives and calls for solidarity among all ICPDR Contracting Parties. Throughout 2021, both management plans have been elaborated and reviewed with the involvement of stakeholders and the public alike, throughout the Danube River Basin during the ICPDR’s Public Consultation Process. For the next six years, the work of the ICPDR will be streamlined with the implementation of the plans and the measures contained therein.

During the 4th ICPDR Ministerial Meeting on 8 February 2022, Ministers and Minister Representatives responsible for water management from the Danube River Basin countries Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Montenegro, Moldova, Romania, Serbia, Slovakia, Slovenia and Ukraine and the European Union endorsed the two Management Plans and adopted the ministerial “Danube Declaration”. As for adaption to Climate Change, the Ministers, the Member of the European Commission, and the High Officials as those responsible for the implementation of the Danube River Protection Convention

(6) welcome the objectives and key messages of the updated ICPDR Climate Adaptation Strategy (2018).

(7) reaffirm the “Effects of Climate Change (drought, water scarcity, extreme hydrological phenomena and other impacts)” as a new significant water management issue for the Danube River Basin.

We call for actions to be undertaken in the years 2022 to 2027:

(8) developing sustainable adaptation measures to urgently enhance resilience of aquatic ecosystems to climate change impacts, supporting water balance activities and enhancing cooperation and exchange of good practices on adaptation measures to climate change impacts.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Next to the new SWMI on “Effects of climate change (drought, water scarcity, extreme hydrological phenomena and other impacts)” and its integration in the DRBMP Update 2021 (see answer to question 2), further ICPDR activities such the ICPDR Transnational Monitoring Network (TNMN) and the planned Danube Hydrological Information System (HIS), expanded knowledge and exchange of information on water scarcity and droughts as well as other ICPDR activities such as the planned updated water balance for the Danube River Basin can be mentioned.

A common Danube wide water balance will assist achieving objectives of the EU Water Framework Directive i.e. good chemical, ecological and quantitative status of EU and will be able to contribute to:

- a) Better understanding of main components of water balance on basin and sub-basin levels,
- b) Provision of a framework for evaluation of management policies leading to good quantitative status of water bodies,
- c) Development of a commonly accepted tool to be used for the DRBMP and national RBMPs,
- d) Assessment of the climate change impacts on elements of water balance.

Knowledge about water balances can support the development of RBMPs by providing a coherent framework to cross-evaluate the information on water quantity (including the coherence between water abstraction and water recharge, water flows between water bodies/catchments, storage changes over time, etc.) and provide a sound basis to the quantitative management of water resources. Moreover, it could support water quality assessments by providing essential hydrological information. Water balances are usually linked to models for simulating different components of the balance and different water management scenarios in order to assess (ex-ante) their potential impact on water use, demand and availability, or to learn (ex-post) from the effectiveness of past efforts and applied measures to respond to drought and water scarcity.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Climate change is a cross-cutting issue, causing impacts to different sectors on a transboundary scale. The quality of water and its availability are very much at the heart of the expected changes and therefore require coordinated action in an integrative way. Due to the transboundary character of water and its relevance for various issues and water-related sectors such as its role for biodiversity and the ecosystem, energy, transport, agriculture, floods and droughts, integrated river basin management is key for the ICPDR's approach to climate change adaptation. Building on this basic rationale, work on climate change adaptation is anchored in existing ICPDR structures and planning instruments as well as the corresponding national institutions and structures.

5. Which lessons learned would you like to share with other basins?

The ICPDR approach for integrating climate change adaptation in ICPDR activities includes a joint understanding of scenarios, impacts and adaptation measures and does not include a separate programme of measures, but relevant action is incorporated in the Danube River Basin Management Plan and Flood Risk Management Plan.

The ICPDR Climate Change Adaptation Strategy focuses on issues relevant at the Danube basin-wide level (level A) and needs to be complemented with further detailed planning for adaptation at sub-basin, national and/or sub-unit levels. Consultation on competing uses and priorities to prevent potential conflicts is needed to take into account potential target conflicts and competition between different water-related users and sectors such as agriculture, navigation, water supply, energy, industry, tourism, environment and nature protection. The communication, coordination and stakeholder involvement on climate change adaptation issues between different levels of management in the Danube River Basin is ensured at the national level through the ICPDR and also through different projects. Building resilience against climate change impacts on water resources through capacity building, transboundary cooperation and benefit-sharing is a key priority to address climate change in the Danube River Basin.

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?

The ICPDR Strategy on Adaptation to Climate Change finalized in 2018 describes the approach of the ICPDR to integrate the issue of climate change adaptation into its activities, in particular in the Danube River Basin Management Plan and the Flood Risk Management Plan.

The Danube River Basin Management Plan and Flood Risk Management Plan Updates 2021 were adopted by ICPDR Head of Delegations in December 2021 and endorsed by Danube Ministers in February 2022.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

The ICPDR approach for integrating climate change adaptation in ICPDR activities does not include a separate programme of measures, but relevant action is incorporated in the Danube River Basin Management Plan and Flood Risk Management Plan. Financing of implementation of measures is within the discretion of ICPDR contracting parties.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

The ICPDR Climate Change Adaptation Strategy focuses on issues relevant at the Danube basin-wide level (level A) and needs to be complemented with further detailed planning for adaptation at sub-basin, national and/or sub-unit levels.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

Climate change may affect all types of land use. As a consequence of decreasing water availability, a shortage in water supply is expected. An increased risk of conflicts over water use can occur in the event that no adequate adaptation measures are taken. Possible consequences are difficulties in water supply with an increased risk of water shortages and an over-exploitation of aquifers in the future. An assumed general increase in water demand for households, industry and agriculture, together with pronounced water scarcity during summer in the Lower and Middle Danube Basin and in some areas of the UDRB, is likely to lead to high water stress. Due to a warmer climate, increased water demand by, and water withdrawal for, agriculture, industry, energy and human consumption is probable, especially in the southeast DRB and in the hot season. This includes increased water use, for example, for garden watering and field irrigation, household showers and cooling water for industrial plants.

10. Future planned activities

Awareness of ongoing adaptation processes is created and an exchange takes place between experts working on adaptation at different levels, such as national, sub-basin or international levels. This will be guaranteed through the involvement of national experts in the international working groups of the ICPDR, respectively via existing coordination approaches between the basin-wide and the sub-basin level within the Danube River Basin (Sava, Tisza, Danube Delta, Prut). The ICPDR Strategy on Adaptation to Climate Change is fully taken into account during the next steps of the implementation of the Water Framework Directive and Floods Directive in the Danube River Basin. Closing of knowledge gaps and identification of further research requirements will be constantly aimed for.

The Danube River Basin Management Plan (DRBMP) Update 2021 together with the Danube Flood Risk Management Plan (DFRMP) Update 2021 are prioritising water management issues for the Danube River Basin until 2027. The DRBMP Update 2021 sets out further aims to protect and enhance the status of all waters in the basin, and to prevent their deterioration while ensuring sustainable, long-term use of water resources. The plan also includes latest assessments on significant pressures, water status and a programme of measures jointly agreed by the Danube countries for the next six years. It establishes and strengthens several integrated principles for river basin management and connections to other sectors' policies like energy, transport and adaptation to climate change. The DFRMP Update 2021 represents a key step forward in the ICPDR's work towards sustainable flood risk management. It strengthens various aspects of flood risk management focusing on prevention, protection and preparedness, including measures for achieving the established objectives and calls for solidarity among all ICPDR Contracting Parties. For the next six years until 2027, the work of the ICPDR will be streamlined with the implementation of the plans and the measures contained therein.

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5. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE DAURIA STEPPES RIVERS AND WETLANDS OF UPPER AMUR, ULZ-TOREY AND SELENGE-BAIKAL BASINS

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

We expect an increase in the aridization of the territory that took place in recent decades. The air temperature continues to rise, but in the last three decades its growth has slowed down. The current

trends can significantly reduce the runoff of the river and of the Torey lakes, as well as disrupt the cyclical changes in water content.
<p>2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?</p> <p>No rough synthetic adaptation to climate change in the basin is possible due to the high amplitude of natural changes, high solar insolation and low precipitation levels. Such interference would violate its Outstanding Universal Value (OUV).</p>
<p>3. Name and short description of the flagship adaptation activity your organization wishes to highlight</p> <p>There is a need for the approach to protecting (enclosing) the exits of springs and swampy areas of the floodplain, hummocks from livestock, whose population continues to grow in the Mongolian part of the basin. This approach will not only protect the area from excessive evaporation, but will also contribute to the accumulation of carbon and prevent the destruction of peat.</p>
<p>4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?</p> <p>The main problem we faced is the risk of building a reservoir in Mongolia which will change the hydrological regime of the river. One of the stated goals of the project is adaptation to climate change. The use of a fashionable international trend in this case will cause irreparable damage to the ecosystem and will turn out not to be a boon, but a disaster, including for people. The substantiation of the project shows the absence of a professional assessment of the impact on the environment namely the negative impact caused by such type of the adaptation.</p>
<p>5. Which lessons learned would you like to share with other basins?</p> <p>International and national investors involved in the financing of climate change adaptation measures need to take a tougher approach to science-based project review and audit of their implementation. Otherwise, the results can lead to catastrophes on a regional or planetary scale.</p>
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>There is no separate strategy and plan for the Uldz river basin (apparently). There is only a common document for Mongolia: Ecosystem Based Adaptation Approach to Maintaining Water Security in Critical Water Catchment in Mongolia (UNDP et al., 2017), in which the Uldz basin is considered as a model.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>There is no bilateral Plan and, accordingly, funding.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>No action.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>So far, there are only intentions, but we are actively resisting the plans of the Mongolian side to build a dam on the river, as this will reverse all the successes of the previous thirty years of transboundary cooperation.</p>
<p>10. Future planned activities</p> <p>As soon as the Mongolian side abandons the dam project, which threatens the ecosystem of the river, we are ready to prepare a joint adaptation plan, for which there is a long-term background.</p>
<p>11. Contact details</p> <p>Vadim Kirilyuk, vkiriliuk53@gmail.com</p>

6. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE DNIESTER BASIN

<p>1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?</p> <p>According to World Meteorological Organization reports, the average global temperature has risen by 1.2°C since the start of the industrial era (around the 1850s), and the last decade has been the hottest on</p>

record when compared to the results of previous instrumental meteorological observations. Ukraine's climate has changed significantly over the last 60 years, with accelerating warming since the 1980s resulting in the rates of 0.4-0.6°C per decade.

Ukraine is no exception – we are also observing frequent abnormal meteorological phenomena – long-term heat waves, rivers drying out, an increase in the intensity and frequency of wildfires, anomalous precipitation, etc. This causes changes in the precipitation regime. Rising air temperatures causing increased evaporative demand with uneven precipitation have resulted in lower accumulations of moisture in the soil, leading to an increase in the frequency and intensity of droughts in the last decade.

In 2021, Ukraine approved the Strategy for Environmental Security and Adaptation to Climate Change until 2030, which provides for the assessment of the vulnerability of natural resources to climate change.

In Ukraine, an expert assessment of the impact of climate change in the preparation of river basin management plans was conducted for two river basins - the Dniester and the Don.

One of the main manifestations of regional climate change against the background of global warming is a significant increase in air temperature, changes in thermal regime and precipitation structure, increasing the number of dangerous meteorological phenomena and extreme weather conditions, the damage they cause to various sectors of the economy and population. Such tendencies are typical both for Ukraine as a whole and for the east of the country. The greatest changes have been observed over the last thirty years, which have been the warmest during the period of weather observations.

Dniester river basin

A detailed analysis of climate change in the Dniester basin in the historical past and over the shorter term of 2021–2050 showed that compared to 1981–2010, by the middle of the century one can expect the mean annual, maximum and minimum air temperatures to rise by 1.0°–1.2°C. The increase in the minimum temperature will most likely be greater than the rise in the maximum temperature, because of which the monthly and annual amplitudes will decline. The most significant warming should be expected during the colder parts of the year, especially during the winter months. There could also be a change in precipitation patterns in the Dniester basin by the middle of the twenty-first century. Although the overall annual quantity of precipitation will not change significantly (under the given scenario an increase and decrease in precipitation are equally likely), there could be a substantial redistribution of precipitation among the seasons and months. It is likely that there will be longer stretches without rain, but there will be an increase in the intensity and frequency of heavy precipitation (heavy rains in particular) and the distribution of precipitation throughout the basin will be more uneven. Overall, milder and wetter winters can be expected in the basin, as well as hotter and drier summers; September is expected to be warm and wet, while the autumn months should be drier and warmer.

There is little variation in the expected changes in mean annual and seasonal temperatures within the basin, although the most pronounced increase will be in the lower part of the basin. Also worth noting is the decline in precipitation in the summer in the Lower Dniester (by 4–7 per cent compared to 1981–2010) and in the autumn in the lower and middle reaches (by 6–11 per cent compared to 1981–2010). There could be a substantial increase (of up to 20 per cent) in the maximum intensity of precipitation as well.

An analysis of trends in extreme weather events was performed based on these same assumptions (emissions scenario A1B, comparison with the years 1970–2000). This analysis showed that the following trends, which have been observed in the Dniester basin since the end of the last century, will in all likelihood continue up to the middle of this century: a rise in maximum air temperature, and especially in minimum air temperature; a decrease in the number of days with frost and with very low overnight temperatures; an upward trend in the number of hot days; and an increase in the quantity and uneven distribution of extreme precipitation. These events will also occur with greater frequency. Within the basin, one can expect an increase in the number of rainy days in the upper and middle reaches of the river, and in the number of dry days in the lower part of the river, as well as an increase in the average amount of precipitation per day and in the average maximum daily precipitation.

The greatest changes may occur during the warm periods of the year, especially during the summer months in the Lower Dniester. The most significant increase in average and maximum daily precipitation may occur in the upper course of the river during the autumn months. These changes may lead to a

substantial rise for precipitation during heavy rains (by more than 10–20 mm per day). The largest increase in the frequency of intense precipitation can be expected in the Lower Dniester.

Future climate change will have an impact both on the natural resources and ecosystems of the Dniester basin, and on the population and economy. Resources and sectors of the economy in the Dniester basin most vulnerable to climate change:

Water resources: Increased variability in the flow regime and volume, especially in the middle and lower parts of the Dniester. Deterioration in the quality of surface water as a result of higher temperatures, a decline in flow and anthropogenic pollution. Continued decline in groundwater levels. Further deterioration in the condition of small rivers. Forest resources: A likely shift in the species composition and a change in the altitude range limits of tree species (in the Carpathians). Disappearance of certain moisture-loving species in the middle and lower parts of the Dniester. Probable emergence of new diseases and pests. Ecosystems and wetlands: Decline in biodiversity, shrinking of the geographical range of native species as a result of the drying up of habitats, deterioration in water quality and appearance of invasive species. Ichthyofauna: Reduction in the number of fish species, disappearance or shrinking of spawning grounds, increase in the impact of invasive species. Agriculture: Increase in the frequency and intensity of droughts and other extreme events. Shortage of water for irrigation. Decline in soil fertility as a result of salinization, erosion and landslides. Reduction in productivity and degradation of pasture-lands. Appearance of new crop pests and livestock diseases. Water supply: Drop in groundwater levels, drying up of wells and springs, which are the principal water sources in rural areas.

Possible shortage of accessible water resources in the lower part of the basin and decline in water quality.

Infrastructure: Possible deterioration as a result of direct climate change impacts (such as high summer temperatures, heavy precipitation, flooding). Population: Risk to human life as a result of extreme weather and hydrological events. General vulnerability owing to low income levels among the population, social stratification, deterioration of the demographic situation, decline in the quality of education.

Throughout virtually the entire territory of the Dniester basin one can expect a significant increase in the intensity of floods during warm periods, with a particularly marked increase in the upper reaches (by 30 to 40 per cent) and in the lower part of the river (by as much as 65 per cent). A substantial increase in the intensity of floods can be expected in the summer in the middle reaches of the river (by as much as 80 per cent), while the biggest changes can be expected in September.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

In July 2021, in order to increase its climate ambitions, Ukraine updated its Nationally Determined Contribution to the Paris Agreement setting an ambitious economy-wide target of a 65 % reduction in GHG emissions by 2030 compared to 1990. In regards of climate change adaptation, on 20 October 2021 Ukraine adopted Strategy on Ecological Safety and Climate Change Adaptation until 2030. It also has a short term Action Plan that include the necessity to develop a risk assessment and vulnerability studies for sectors of economy and natural components to climate change integrating adaptation in sectoral and local policies, and ensuring the better use of climate data. It defines ten vulnerable sectors and natural components – biodiversity; water resources; energy; public health; fisheries; agriculture and soils; forestry; cities and territorial communities; transport and infrastructure; coastal areas, and tourism.

A program of measures for the Dniester basin including climate change. has been developed and prepared, which is an integral part of River basin management plans, which are currently being developed in accordance with the water legislation of Ukraine. The approaches set out in the EU guidelines and the experience of EU member states were also taken into account during the development of the program. Estimating the cost of adaptation measure to climate change in the Dniester basin is 235 million euros.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Risk assessment and vulnerability studies for sectors of economy and natural components;
Development of regional pilot strategies for adaptation to climate change and action plans for their implementation;
Development of sectoral pilot strategies for adaptation to climate change and action plans for their implementation;
Educational activities and increasing the level of sectoral cooperation in event planning.

<p>4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?</p> <p>Information about climate change and its impacts is still characterized by uncertainty. Given the particular importance of the hydropower complex of the Dniester reservoirs for adaptation to climate change, it is important to strengthen the climate component of their management.</p> <p>The sharing of hydrometeorological information between Moldova and Ukraine is being carried out at the interstate level under a scientific and technical cooperation agreement between their hydrometeorological services. Specifically, it requires that the neighbors provide each other with timely notification of the occurrence of flooding. In addition to the hydrometeorological services, water resources management authorities in Moldova and Ukraine also share hydrological information.</p> <p>Strengthen the capabilities of the Dniester Commission related to climate change issues.</p>
<p>5. Which lessons learned would you like to share with other basins?</p> <p>When planning activities it is necessary to take into account their impacts on nature as a key element.</p>
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>The assessment of climate change was taken into account in the preparation of the draft River basin management plan</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>Funding for the measures provided for in the river basin management plans is provided from the state and local budgets, as well as other sources not prohibited by law. These measures are financed from the state budget within the limits of expenditures provided by the State Budget of Ukraine for the respective year.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>Measures envisaged in river basin management plans, including mitigation and adaptation to climate change, require public discussion and strategic environmental assessment in accordance with the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context, ratified by law of Ukraine July 1, 2015 № 562-VIII.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>Yes. Ukraine's cross-border cooperation is carried out within the framework of signed bilateral agreements on cooperation in border waters and in accordance with the implementation of the obligations of international conventions. The Treaty between the Government of the Republic of Moldova and the Cabinet of Ministers of Ukraine on Cooperation on the Conservation and Sustainable Development of the Dniester River Basin provides for the establishment of a Commission on Sustainable Use and Protection of the Dniester River Basin. This commission should become the body responsible for the integrated organization of basin-wide cooperation in the area of environmental protection. The measures to support implementation of the Treaty's provisions include the adoption of national and interstate basin management plans, action plans, and programmes aimed at sustainable water use, limiting water pollution, preventing and dealing with the after effects of emergencies, preserving biodiversity, as well as protecting and ensuring the responsible use of aquatic biological resources. The Dniester Commission became one of the key mechanisms for cooperation on environmental protection in the Dniester basin, including cooperation related to climate change issues.</p>
<p>10. Future planned activities</p> <p>It is planned to assess the vulnerability of water resources for all river basins in the preparation of river basin management plans.</p>
<p>11. Contact details</p> <p>Oleksandr Bon, Acting Director of the Department of the Sustainable Natural Resources Management Ministry of Environmental Protection and Natural Resources of Ukraine + 38 (044) 206 31 66</p>

7. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE DRIN BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

Climate change and climate variability have been increasing the frequency, intensity and impact of flooding in the basin. According to future projections, climate change will have serious negative impacts in Drin River Basin (DRB) including increased frequency and intensity of floods and droughts, increased water scarcity, intensified erosion and sedimentation, increased intensity of snow melt, sea level rise, and damage to water quality and ecosystems. Moreover, climate change impacts on water resources will have cascading effects on human health and many parts of the economy and society, as various sectors directly depend on water such as agriculture, energy and hydropower, navigation, health, tourism – as does the environment.

The Drin River Basin countries are increasingly exposed to the impact of climate change. They are experiencing increased periods of extreme heat in the summer months and increased rainfall during the cooler seasons. According to long-term projections, the average annual temperature will increase by 2° C to 3° C by 2050 and precipitation will decrease in the summer, resulting in longer dry periods followed by more sudden heavy rainfalls. This combination increases the likelihood of floods as well as their destructive nature.

Based on the extensive assessments developed and the research conducted as part of the Drin Basin Transboundary Diagnostic Analysis (TDA), the following four key priority and cross-cutting transboundary issues have been identified:

- Deterioration of water quality, which affects all parts of the Drin Basin;
- Variability of the hydrological regime as a result of climate variability;
- Biodiversity degradation;
- Variability of the sediment transport regime, which is affected by natural events, climate variability and change and anthropogenic impacts from gravel extraction, deforestation, poor land-use management and hydropower generation.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

Some results regarding climate change adaptation in the Drin river basin are achieved in frame of the projects:

1. The **Adaptation Fund/UNDP project “Integrated climate-resilient transboundary flood risk management in the Drin River Basin in the Western Balkans”**. The objective of the project is to assist the riparian countries in the implementation of an integrated climate-resilient river basin flood risk management approach in order to improve their existing capacity to manage flood risk at regional, national and local levels and to enhance resilience of vulnerable communities in the Drin river basin to climate-induced floods.

Main achievements

- Activities for extension and upgrade of the hydrometeorological monitoring network in the Drin River Basin have successfully being implemented with installation of in total new 26 stations;
- The cooperation with the National Hydrometeorological Institute reached important project ownership related milestone with signing of **Memorandum of Cooperation** between the Institute and UNDP and sharing historical time series data from the existing hydrological and meteorological stations;
- The spatial data infrastructure was established with collection, review and post processing of all available historic and current datasets from the relevant riparian states` institutions;

- LiDAR surveying method (Light Detection and Ranging) for preparation of DTM (Digital Elevation Model) and DSM (Digital Surface Model) was completed for the Macedonian part of the Drin River and created High-resolution digital terrain model (DTM);
- Development of comprehensive hydrological and hydraulic model for the Drin River Basin have progressed well, especially in the Macedonian component of the project together with the preparation of GIS based socio-economic modeling of high-risk communities;
- Technical documentation for restoration of Sateska river and diversion in its natural riverbed including urban design for infrastructure and main design was completed.
- SESP (Social and Environmental Screening Procedure) of the technical documentation for Sateska river restoration was conducted against Adaptation Fund principles for safeguards. SESP was conducted in parallel with the designing procedure and development of the main design for Sateska river restoration and appropriate ESIA (Environmental and Social Impact Assessment) report and ESMP (Environmental and Social Management Plan) were developed.
- Additionally, according to the national environmental legislation provisions for environmental restoration infrastructure projects, complete Environmental Impact Assessment (EIA) procedure was commencement and appropriate EIA study will be prepared following the principles of participatory approach.

2. The ADA funded project **“Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of Nexus approach”**, will lead in increased awareness regarding the interlinkages among hydropower production, water resources and flood risk management thus leading to policy creation, scaling up the management from sectoral to coordinated, bringing closer hydro-energy, water resources and flood risk management “sectors”.
3. GIZ Project **"Adaptation to Climate Change through Management of Cross-Border Flood Risk Management in the Drin Basin"**, which aims at Preliminary assessment of flood risk in the Drin Basin.

As a result of this project:

- The flood Early Warning System is strengthened
- Flood hazard maps and Flood risk maps developed
- Guidance for development of Flood hazard maps and Flood risk maps was prepared.

This project, funded by the German Federal Ministry for Economic Cooperation and implemented by GIZ, implements the third phase (2018-2021) and is expected to be completed on 31.07.2022

The synergy of all projects under the Drin basin, will lead in increased awareness regarding the interlinkages among hydropower production, water resources and flood risk management thus leading to policy creation, bringing closer hydro-energy, water resources and flood risk management “sectors”.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

For the Sateska River restoration facility, it is important to be known that efforts has to be made for mobilizing additional financial resources since the main design internal estimate for the overall restoration activities (cleaning and regulating of critical riverbed sections, rehabilitation of the diversion structure-water splitting facility and construction of sedimentation tank) and complete functioning of the intervention is above the project available budget for implementation of this structural flood risk minimizing measure.

According to the estimates, there is lack of around 300,000 USD.

Considering the importance of this measure regarding enhanced climate induced flood resilience of the local communities and the flagship feature as crucial structural flood risk measure for the Macedonian part of the project in the basin, it is very important efforts to be made in securing additional funds.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Climate change adaptation challenge includes:

- exchange of risk knowledge and climate information;
- basin level climate change adaptation and flood risk management strategy and plans;
- combination of structural and non-structural interventions;
- institutional capacity.

<p>The project results includes:</p> <ul style="list-style-type: none"> • Implementation of an fully-integrated flood forecasting and early warning system. • Development and implementation of transboundary integrated FRM strategies • Development the underlying capacity of national and regional institutions • Investment in the priority structural and community-based non-structural measures.
<p>5. Which lessons learned would you like to share with other basins?</p> <ul style="list-style-type: none"> • Improving climate and risk informed decision-making, availability and use of climate risk information, • Strengthening hydro-meteorological monitoring networks, • Improving knowledge of climate change induced flood risk, through modelling tools and technologies, • Establishing GIS-based vulnerability, loss and damages assessment tool and database, • Improving institutional arrangements, legislative and policy framework for FRM • Well-developed stakeholder engagement • The committed project implementation team is key ingredient of the project’s success. Capable project implementation team is essential element to successfully confront unexpected changes in the project’s environment, such as political events, economic crises, pandemics etc. This also contributes to the increased project’s effectiveness and efficiency. • Capacity building at national and transboundary levels are key factors for sustaining results.
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>The project will develop and implement transboundary <i>integrated FRM strategies</i> providing the national authorities with robust and innovative solutions for FRM, DRR and climate adaptation, including ecosystem-based gender responsive participatory approaches.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>Climate change activities and measures will be financed through the ongoing and planned projects and national budget.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <ul style="list-style-type: none"> • Improving institutional arrangements, legislative and policy framework for FRM • Well-developed engagement of local authorities • Capacity building (individual as well as institutional) at local, national and transboundary levels are key factors for sustaining results.
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>Climate variability and change was also recognized as a significant factor that is likely to be influencing the four key transboundary problems impacting the Drin Basin’s freshwater and coastal ecosystems and socio-economic status.</p>
<p>10. Future planned activities</p> <p>According to the Annual Work Plan of the Adaptation Fund/UNDP project “Integrated climate-resilient transboundary flood risk management in the Drin River Basin in the Western Balkans”, following activities are foreseen to be implemented in 2022:</p> <ul style="list-style-type: none"> • Finalization of the Institutional capacity development plan for Hydro-Met; • Finalization and completion of the hydrological and hydraulic model for the Drin River Basin. • Completion of the GIS based socio-economic model (undertaking Cost-Benefit analysis (CBA) and Multi-Criteria Analysis (MCA)) • Development of harmonized methods, guidelines and procedures in line with Sendai Framework for recording flood events, undertaking post-event surveys and assessing vulnerability to flooding • Support in implementation of the ‘DisInventar’ database for systematic recording of damage and loss • Delivering training to relevant stakeholders and decision makers on the developed GIS floods management tools

- Continuation in providing support of the regional project component including Initial planning activities on basin wide assessment of FRM Policy Framework and improved long-term cooperation on flood risk management
- Completion of the administrative permitting procedure (urbanization of the Sateska riverbed area and issuance of all necessary permits for commencement of construction works.
- Conducting tender procurement procedure for selection of construction company for executing the main design for restoration of the Sateska riverbed

11. Contact details

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8. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE LAKE VICTORIA BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

- Frequent floods
- Landslides
- Droughts
- Rising and declining water levels in L. Victoria and rivers in LVB e.g. an increase 12.94 meters was recorded in in March 2020

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

- Installed household Rainwater harvesting system in 160 households in drought prone region (Kirehe District) in Rwanda.
- Constructed soil and water conservation (gabions) infrastructure to address landslides and earth movement in flood zones in Kirehe District Rwanda.
- Installed valley tanks (to aid in rainwater harvesting) and water supply system in drought prone region of Kalungi village, Mubende District in Uganda.
- The Drilling and construction of 3 New boreholes and rehabilitation of one for supplementary micro irrigation for rice farming, Tanzania.
- Installation of demo rainwater harvesting system at Ng'haya secondary School (4 tanks of 5000 L), Tanzania.
- Ecosystem Based Adaptation (EbA) interventions, where 400 fruit trees planted (Mangoes, orange) at Ng'haya Secondary School and Busalanga Primary School, Tanzania.
- The construction of three modern fish drying technologies in Busoni and Giteranyi, Burundi.
- Watershed management through construction of 125 kilometres contour lines, Planting of 398, 000 Agroforestry trees, 820, 000 banana grasses and 154, 000 Fruit trees in Burundi.
- Supported the production of 1200 energy saving cooking stoves in Burundi.
- The construction of lined valley tank in Rwobushumi village and upgrading Kyabataka water source to valley tank in Kalungi village, Uganda.
- Construction of 3 institutional energy saving stoves in primary schools in Masaka and local community member have also been trained on construction of energy cooking stove at household level, Uganda.
- Supported EbA through Planting 35ha of land with local tree species (Musambia, Terminalia and Musizi) tree species in Masaka District; and setting up of model farms for improved Pasture management in Mubende district where pasture nurseries (for Cloris Gayana, brochiaria and Centro sema grass species) has been set out in 6 out of 10 model farms, Uganda.

<https://youtu.be/5vxdADPBpZc>

<https://youtu.be/Axfmyij2HZ0>

Regional Interventions

- LVBC through ICPAC conducted regional training of 32 national hydro meteorological experts on downscaling regional climate information to national, subnational and local levels.
- LVBC together with the ICPAC have developed 3 Climate information reports for the project and its sites.
 - Observed Climate Characteristics over LVB.
 - Future Climate Change Projections over LVB.
 - Projected Future Climate Extremes over LVB
- Developed Training materials on Water Catchment Management and Climate Change adaptation, one for government officials (with 12 modules) and another for the NGOs and Private sectors (with 4 modules).
- Conducted training of 208 national government officials and local community on Water Catchment management and adaptation.
- A total of 523 community members (54% women and 46%male) have been trained on climate change adaptation technologies in Uganda, Rwanda, Burundi and Tanzania.
- Provided small grants to local communities and the CbA project proposals have been reviewed and validated across all the partner states: Tanzania (16); Rwanda (20); Kenya (5); Uganda (6); Burundi (12)

<https://youtu.be/-E5AwTzzvoc>

<https://youtu.be/TvuGi-O386o>

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

The Adapting to Climate Change in Lake Victoria Basin (ACC-LVB) is a flagship climate adaptation project implemented by UNEP and executed by LVBC. It is funded by Adaptation Fund with the overall objective to reduce vulnerability to the negative effects of climate change in the five LVB countries (Burundi, Kenya, Rwanda, Tanzania and Uganda) by building climate resilience. There are five expected project outcomes namely:

- Strengthened institutional and technical capacity to integrate climate resilience into transboundary water catchment management.
- Improved delivery of accurate and timely climate information to regional and national policymakers, technical officers and local communities.
- Climate change adaptation technologies transferred to communities to reduce their vulnerability to climate change.
- Regional resilience to climate change promoted through innovative, community-based projects.
- Improved knowledge management frameworks for the collection and maintenance of regional knowledge in transboundary water catchment management and climate change adaptation practices.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

- Coordination and reaching consensus with a diverse range of stakeholders at the regional, national, and subnational levels is time consuming that sometimes lead to delays in executing of project interventions.
 - Technical capacity gaps at different levels in partner states.
 - Balancing regional interests vis a vis national and subnational priorities and needs.
 - Harmonization of policies frameworks in partner countries to ensure convergence and uniformity of addressing regional issues/challenges.
 - Financial constraints to address pressing challenges affecting trans-boundary resources e.g. climate change
- How challenges were handled:**
- Implementing capacity building initiatives.
 - Enhancing monitoring and evaluation activities.
 - The Technical Working Group at the regional level plays a key role.

5. Which lessons learned would you like to share with other basins?

- Application of a regional approach to address challenges facing trans-boundary resources e.g. climate change is an important element in enhancing regional resilience and sustainability.

<ul style="list-style-type: none"> Committed by stakeholders at regional national, subnational, and local levels is key for effective and efficiency implementation of the trans-boundary projects. Small grants to communities can translate into remarkable transformation effects to livelihoods and ecosystems resilience.
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>LVBC developed and is implementing the LVB Climate Change Adaptation Strategy and Action Plan (2018-2023). The strategy and plan are implemented through developing of projects and funding sought from Development Partners. The strategy has not received significant funding for implementation. LVBC will have to conduct a rapid evaluation to ascertain the performance in relation to the plan. LVBC will also have to update the strategy and action plan for the phase after its expiration in 2023.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>Climate change activities are mainly funded by Development Partners. Key ones include Adaptation Fund, World Bank and the Germany Government. This has been through short term projects. LVBC has been pursuing initiatives to enable the institution access global Climate Finance.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>Implemented activities are aligned to national priorities. This is made possible through the participation of Partner States in project design processes.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <ul style="list-style-type: none"> Yes, protection of freshwater ecosystem and water quality is included in the transboundary climate change strategies and plans.
<p>10. Future planned activities</p> <p><i>They include, among others:</i></p> <ul style="list-style-type: none"> Undertake the review of the LVB Climate Change Adaptation Strategy and Action Plan (2018-2023). Strengthen the resilience of communities, economies, and the transboundary ecosystems. Implement climate smart activities, technology and transfer. Promote timely generation and dissemination of climate information. Put in place requisite measures and capacity to access global climate finance at both regional and national levels. Promote resource efficient and cleaner production including green growth.
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9. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE LOWER MEKONG BASIN

<p>1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?</p> <p>MRC’s Climate Change Adaptation Initiative (CCAI) conducted a series of basin wide assessments of climate change impacts on water and water-related resources under several climate change and development scenarios: in hydrology, flood & drought patterns, hydropower production, ecosystem & biodiversity, food security and socio-economics. Specific and unique methodologies have been developed for each of these assessments, mostly based on numerical modelling tools. To illustrate some of these findings: regarding food</p>
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production, for example, the projected impacts of climate change on crop yields are negative for both rice and maize with greater impacts on rice. Projected impacts on fisheries are positive or negative depending on the scenario. The flood zone habitats are likely to experience greater changes than rice paddy habitats. In terms of ecosystems, substantial changes in bioclimatic conditions are projected across the LMB's ecoregions. By 2060, up to 100% of some ecoregions may experience completely novel bioclimatic conditions. Species are highly vulnerable to climate change with large numbers of fish particularly at risk due to their sensitivity to hydrological cues. The range of possible changes in hydrology is enormous. The largest ranges of predicted impact at one specific location (Kratie) associated with climate change and 2060 development scenarios are: the range of annual river flow change is estimated as -38% to +28%; flood season peak flow -30% to +43%; minimum 1-day flow -21% to +79%. Without adaptation there will be significant deterioration of the flood conditions with more losses and people affected. The Mekong delta is impacted by both upstream increases in flow and sea level rise, affecting the largest number of people in the region. Basin development will interact with the impacts from climate change, in some cases exacerbating the change and in some cases mitigating against it. The projected impact of climate change on floods depends in large part on the model applied. Under both the wetter overall model and the increased seasonal variability model the flooded area is projected to increase for floods of all return intervals in a range of 4.6% to 27.3% increase. The biggest proportional changes are projected to occur for the smaller floods with return intervals of 1 in 2 years and 1 in 5 years: under the highest emissions scenario for the wetter overall model, the change projected to 2060 is an increase in flooded area of 38% for a 1 in 2 years flood and of 28% for a 1 in 5 years flood. Under the medium emissions scenario and wetter overall model, the flooded area is projected to increase 27% for a 1 in 2 years flood and 20% for a 1 in 5 years flood.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

In 2021, there are following results achieved in regard with climate change adaptation in the Lower Mekong Basin:

- Mainstreaming of Mekong Climate Change Adaptation Strategy and Action Plan (MASAP) into selected national priority activities on drought management including NDCs
- Mainstreaming of MASAP into MRC regional drought adaptation guideline
- The mainstreaming of Mekong Climate Change Adaptation Strategy and Action Plan perspective into Strategic Plan (SP) 2021 – 2025 has been completed
- The MRC gap assessment against with adaptation fund and GCF requirements for accreditation process and development of a work plan have been done
- The funding proposal for a project on integrating flood and drought management and early warning system for climate change adaptation in the Lower Mekong Basin has been developed and consulted.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

The regional climate change adaptation mainstreaming into MRC regional drought adaptation guideline and selected national flood management activities.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Challenges:

- Different level of climate change impacts and adaptation priorities of each Member Country
- Data monitoring and sharing
- Seeking fund for the transboundary adaptation projects

Overcomes:

- Enhance regional and international cooperation and partnership on adaptation;
- Support access to adaptation finance;
- Enhance monitoring, data collection and sharing;
- Strengthen capacity on development of climate change adaptation strategies and plans; and Improve outreach of the MRC products on climate change and adaptation

5. Which lessons learned would you like to share with other basins?

- Strong leadership to address climate impact at regional level
- Inclusion consultation process with both internal and external stakeholders

- Challenge of defining what transboundary adaptation is and of identifying relevant and feasible actions
- Challenge of convincing countries about the added value of the regional level, on top of existing national levels
- Multiplicity of initiatives and actors in the field of climate change adaptation

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?
 The Mekong Climate Change Adaptation Strategy and Action Plan (MASAP) has been developed. The MASAP is in implementation process.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

The CCAI project has been received financial support from development partners: Australia, Denmark, Finland, Luxembourg, Germany, Sweden and EU.
 Currently the MASAP is being implemented by using MRC's basket fund - from different development partners. As a strategic priority, access to climate funds such as Adaptation Fund and GCF is important for mobilizing fund for the transboundary adaptation projects.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

The regional adaptation strategy and actions are mainstreamed into relevant national strategies, policies and plans. The methodologies and tools that have been developed at the transboundary level can be replicated and/or downscaled at national/local level. The capacity building program targeted the national levels.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

10. Future planned activities

- Support mainstreaming of climate change adaptation to increased climate risks, floods and droughts into regional and national strategies, plans and projects
- Coordinate enhanced access to international climate finance through climate fund accreditation for the Mekong River Commission
- Further identify and facilitate implementation of transboundary projects on climate change adaptation and water resources management
- Operate and maintain integrated databases, information, systems and tools at regional and national levels for climate change adaptation.

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10. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE MEUSE BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

The Meuse Basin had to face several extreme events in the past few years: exceptional low water events from 2018 to 2020 and extreme flashfloods in 2021.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

The International Meuse Commission has organized a seminar for Flood Forecast Services following the extreme events of July 2021. All the proposals from the seminar were approved by our Plenary Assembly and will be implemented in the following months: sharing more data, annual meeting, WebGIS, technical visits...

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Organization of the seminar for Flood Forecast Services following the extreme events of July 2021.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Droughts have consequences in every part of the basin, regardless borders, and floods ignore borders as well. Transboundary cooperation is a key point to face those events and to build a resilient basin against climate change. The International Meuse Commission is the legal and legitimate place for transboundary cooperation within the Meuse River catchment and we tried, through our expert groups, to face droughts with a plan to adapt to exceptional low water events in 2020, and by organizing information and data sharing for water levels and flood forecast between Flood forecast services. Since 2017, the IMC has a shared platform between all the delegations of the basin, allowing the exchange of real-time data on 160 stations along the Meuse and its tributaries. Thus, every flood forecast service can use data from other States or Regions to feed its models and have a better forecast for its own watercourses. Some works are in progress like for example the WebGIS which will be a map of the whole Meuse catchment on our website, with a link to real time water levels and forecasts of every station of the basin.

5. Which lessons learned would you like to share with other basins?

Transboundary cooperation and coordination are essential to overcome challenges related to climate change and to build a resilient basin, able to face extreme events.

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?

No, we don't have any climate change adaptation strategy and plan at the Meuse International River Basin District scale, because every State or Region of the basin already have one.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

All our activities are financed through the contributions of our delegations.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

All our documents and publications are based on the contributions of every State and region. The national/regional level is thus the ground of all our activities, on which we grow transboundary measures.

<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>No, as we don't have any climate change adaptation strategies and plans.</p>
<p>10. Future planned activities</p> <ul style="list-style-type: none"> - March 2022: feedback on the floods of July 2021, share of experience - June 2022: visit of a nuclear powerplant at the border between France and Belgium to understand how water is managed during droughts - September 2020: seminar for flood forecast services, implementation of the objectives of our Flood Risk Management Plan
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11. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE NEMAN BASIN

<p>1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?</p> <p>In recent years, the forecasts of a decrease in river flow in the Neman River basin (especially in the spring and summer months) by territory of Belarus. In 2015, 2016 and 2020, the decrease in river flow was especially significant, resulting in dry and very dry conditions. Fish kills were observed in some sections of the Neman River and its tributaries.</p>
<p>2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?</p> <p>The UNECE pilot project stimulated the development of the National Strategy for Water Resources Management in a Changing Climate for the period up to 2030. This Strategy has successfully passed the Strategic Environmental Assessment (SEA) procedure and approved on 22.02.2022 by the Resolution No 91 of the Council of Minister of the Republic of Belarus.</p> <p>In 2019-2021 the development of a full-scale project proposal "Fostering multi-country cooperation over conjunctive surface and groundwater management in the Bug and Neman Transboundary River Basins and the underlying aquifer systems" was completed. Bug and r. Neman and related aquifers" within the framework of GEF financing (Belarus - Ukraine with the participation of Poland and Lithuania). The proposed project intends to assist Belarus and Ukraine in (i) joining forces with Poland and Lithuania to reach a common understanding of the water resources of the shared basins, of the existing pressures and drivers of change impacting the sustainability of the resources and of the dependent ecosystems, in particular increasing climatic variability and change and to move towards joint planning and management of the basins, (ii) to come to an agreement on the policy, legal and institutional reforms, and the investments that will be needed to improve water security and resilience to the impacts of climatic variability and change, and to the enhance the sustainability of the transboundary freshwater resources and dependent ecosystems in the Bug and Neman basins, and (iii) accelerate the transformative processes by pilot testing of conjunctive management solutions, and by consolidating transboundary coordination and cooperation. To do so, the project will adopt the TDA – SAP approach and methodology, expanded to include an assessment of the present and likely future impacts of climatic variability and change, an attempt to unravel conflicts at the water nexus, the characterization in terms of quantity and quality of the groundwater resources of the region, both confined and unconfined.</p> <p>National project is being implemented in 2021-2022 to assess the risks of fish kill for the early warning system in the Neman River basin, including the development of measures to prevent fish kill phenomena.</p>
<p>3. Name and short description of the flagship adaptation activity your organization wishes to highlight</p>

<p>Justification for the placement of water-retaining and other hydrotechnical structures in the Neman River basin for additional watering of rivers in dry and very dry periods in order to adapt water resources to climate change and reduce the negative impact of this change on water resources.</p> <p>Developments of measures to prevent fish kill for the Neman River basin based on the substantiation of the threshold values for fish of hydrological and hydrochemical indicators, taking into account hydrobiological indicators.</p>
<p>4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?</p> <p>There were no particular challenges in the process of transboundary cooperation and adaptation to climate change. Basically, a compromise was reached on all issues, as evidenced by the agreed project proposal for the future GEF project on the Neman and Western Bug river basins. Some of the difficulties in cross-border communication are related to the COVID-19 epidemic.</p>
<p>5. Which lessons learned would you like to share with other basins?</p> <p>Experience in forecasting runoff and assessing the vulnerability of the Neman River Basin to climate change, as well as joint (Belarus-Lithuania) Strategic Framework for Adaptation of the Neman River Basin to climate change.</p>
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>With the support of UNECE, within the framework of a pilot project, the Strategic Framework for Adaptation of the Neman River Basin to climate change was developed. Some of the measures proposed in this Strategic are being implemented. For example, such measures include increasing the provision of urban and local domestic sewerage systems in small points and in several places with treatment facilities, reconstructing filtration fields, reducing the shortage of wastewater treatment in water bodies, and reconstructing communal treatment facilities.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>Activities in the field of adaptation to climate change are financed from the state budget within the framework of state programs. In addition, there are loan agreements signed in 2019 with the European Bank for Reconstruction and Development (EBRD) in the water sector.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>It is planned to develop and approve the Neman River Basin Management Plan, which will present both measures aimed at solving transboundary problems and measures aimed at solving national level problems.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>Questions with regards to freshwater ecosystems and water quality are included in the National Strategy for Water Resources Management in the Conditions of Climate Change for the period up to 2030.</p> <p>Transboundary cooperation in this field within the framework of adaptation to climate change is supported by a joint coordinated assessment of water bodies in terms of hydrobiological, hydrochemical, hydromorphological, sanitary and microbiological indicators, identification of transboundary problems and measures to address these problems based on this assessment.</p>
<p>10. Future planned activities</p> <p>The project "Fostering multi-country cooperation over conjunctive surface and groundwater management in the Bug and Neman Transboundary River Basins and the underlying aquifer systems" is planned to be implemented under GEF funding support.</p> <p>The Neman River Basin Management Plan is planned to be developed and to approved until 2024.</p>
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12. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE NIGER BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

The impacts of climate change that our basin is experiencing are:

- The decrease of the availability of water resources impacts the yields of agricultural production, animal production, plant production, or hydropower production;
- The changes in rainfall and hydrological cycles, combined with increased silting, disrupts the regime of the river and its tributaries; this deteriorates the navigability of the river, increases the risk of flooding and impacts the security and safety of the region, causes soil degradation and destabilizes the ecosystems adjacent to the river;
- The degradation of water quality impacts the costs of drinking water production, facilitates the circulation of waterborne diseases or modifies the habitats of aquatic ecosystems, and thus impacts fish production;
- The rise of temperatures impacts water availability and other ecosystems, including production systems.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

The concrete results achieved in 2021 with regards to climate change adaptation in the basin are:

- The recovery of 371 ha of degraded land;
- The development/agroforestry of 936 ha of forests;
- The ongoing development of the IWRM Climate Plan for the Niger Basin;
- The ongoing development of the Regional Climate Change Adaptation Strategy in the Niger Basin (RCCAS);
- The start of the implementation mission of the Early Warning System (EWS) for floods and severe low water levels;
- The setting up of the National Coordinations of Users of Natural Resources.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Flagship activity: The protection of the Niger Basin ecosystems.

This activity aims at adapting and strengthening the resilience of populations, resources and ecosystems through the fight against all forms of erosion, in particular wind and water erosion, and the regeneration of the vegetation cover; through 2 sub-activities which are:

Sub-activity 1: Protection of natural resources and ecosystems: This sub-activity aims at protecting water resources, soils and ecosystems and includes the following three components: **(i)** the fight against erosion and silting, through actions of protection of water infrastructures, treatment of Koris, fixation of dunes, protection of river banks and development of river basin; **(ii)** sustainable forestry management and protection of biodiversity and wetlands through forestry and agro-forestry developments as well as support to the sustainable management of Ramsar sites; **(iii)** the fight against water pollution.

Sub-activity 2: Strengthening the shared management of natural resources: This sub-activity aims at building adaptation and intervention capacities of the communities through the development of good practice guides, the popularization of good adaptation practices, the dissemination of agro-climatic information and users' support.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

The major challenges encountered with regard to transboundary cooperation and climate change adaptation are:

- The respect of the commitments taken through the water charter by the Parties in terms of management of shared water resources;

<ul style="list-style-type: none"> - The availability of clean water to allow the continuity of socio-economic activities and the proper functioning of ecosystems; - Data and monitoring of water quality in the Basin; - Sustainable financing of resource protection. <p>To overcome these challenges, the Niger Basin Authority ensures:</p> <ul style="list-style-type: none"> - Awareness raising and advocacy of stakeholders; - The harmonization of national texts on IWRM and NRM in accordance with the water charter and its annexes; - The development of regional and transboundary programs such as PIDACC/NB, NB-ITTAS; - The creation of regional and national funds for climate change adaptation.
<p>5. Which lessons learned would you like to share with other basins?</p> <p>The main lessons learned are:</p> <ul style="list-style-type: none"> - The establishment of a clear vision and instruments to implement the vision; - The establishment of good strategic, operational and investment planning; - The development and implementation of regional integrated development and climate change adaptation programs; - The development and implementation of innovative, autonomous and sustainable financing mechanisms; - Sustainable management of transboundary ecosystems
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>The Regional Climate Change Adaptation Strategy (RCCAS) in the Niger Basin is currently under development.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>Climate change activities are financed by donors and States.</p> <p>However, the NBA is developing, implementing and operationalizing the Regional Climate Change Adaptation Fund and the Payment for Environmental Services Mechanism (FRACC/PES) of the Niger Basin, for a sustainable self-financing of actions.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>The NBA is working to concentrate transboundary adaptation activities and develop transboundary cooperation through hydrodiplomacy.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>Affirmative.</p> <p>The NBA supports the protection of freshwater ecosystems in terms of water quality and quantity and this is an integral part of its Climate Investment Plan (CIP).</p>
<p>10. Future planned activities</p> <p>These are:</p> <ul style="list-style-type: none"> - The finalization of the Regional Climate Change Adaptation Strategy (RCCAS) in the Niger Basin; - The development, implementation and operationalization of the Regional Climate Change Adaptation Fund and the Payment for Environmental Services Mechanism (FRACC/PES); - The institutionalization of the Water-Energy-Food Security NEXUS in NBA tools and interventions;

- The development and implementation of an integrated regional program for multi-use water schemes to achieve food security in the Niger Basin;
- The development and implementation of a regional surface water mobilization program;
- The development and implementation of a hydro-agricultural development program based on sustainable agricultural transformation technologies;
- The joint management of groundwater aquifer systems of Iullemeden-Taoudéni-Tanezrouft;
- The establishment and operationalization of transboundary ecosystems management platforms.

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13. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE NORTHERN WESTERN SAHARA AQUIFER SYSTEM

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

- Degradation of the physico-chemical quality of the NWSAS
- Increase in summer temperature and number of days with sirocco
- Increase in the number of days with sandy wind
- Appearance of phytodiseases.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

- Introduction of new water-saving irrigation techniques.
- Increase in the demand of irrigation water
- Progressive disappearance of rain-fed crops

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

- Integrate awareness raising on the effects of climate change on agricultural yields
- Introduce ecosystem accounting in economic feasibility studies of water-using projects.
- Introduce the economic value of water component.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

- New inclusive public policies for integrated water resources management
- Efforts to mobilize more non-conventional water resources,
- New strategies on the generalization of water-saving irrigation techniques,
- Fight against water losses in distribution networks (drinking water supply and irrigation)
- Water footprint strategies through trade policy tend to support the import of products with high virtual water content.

5. Which lessons learned would you like to share with other basins?

- Dialogue between the different stakeholders of the same basin is the best way to adapt to the hazards of climate change.
- Capitalization of ancestral knowledge.

<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>Development of good management tools, which require an integrated management through a bi and multilateral dialogue and rapprochement.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <ul style="list-style-type: none"> • Regional cooperation through intergovernmental institutions for the realization of thematic studies. • Public and private funds for the building of infrastructures.
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>To improve common awareness and to promote the common interest</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p><i>This is collected as an input to the Global workshop on water and climate change to be organized on 17-18 October in Geneva in a hybrid format.</i></p>
<p>10. Future planned activities</p>
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14. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE RHINE BASIN

<p>1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?</p> <p><i>Detailed impacts were given in previous meetings/workshop reports/templates.</i></p> <p>To sum-up: According to studies, by the middle of the 21st century, up to 20 % higher discharges are to be expected during winters in the Rhine catchment and up to 10 % lower discharges are expected during summers, while regional variations may occur. Thus, effects of climate change modify the discharge pattern of the Rhine and its tributaries. Presumably, periods with floods or low flow will become more frequent and more distinct. A rise in air temperatures leads to higher water temperatures which again – together with low flow – might result in an ecological and chemical modification of water bodies.</p> <p>In July 2021 a heavy rainfall event caused severe flooding on tributaries of the Rhine and in part of the Meuse basin. More than 220 people lost their life and the damage is estimated at 21 billion euros (17 billion for Germany). Due to CC and global/regional warming, it is expected that the likelihood and intensity of such events will increase. This is generally explained by warmer air leading to higher evaporation and air containing more humidity. Thus, this disaster was a wake-up call for the Rhine regions to be better prepared for such local/regional events. A lot of reconstruction and flood risk management improvement measures/actions are being taken by the affected States which can be seen as mitigation/adaptation win-win measures.</p>
<p>2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?</p> <p>Following improvements and products can be mentioned here:</p>

<ul style="list-style-type: none"> - The integration of climate change and its adaptation have been reinforced in the 2nd International Flood Risk Management Plan (IFRMP). See https://www.iksr.org/en/eu-directives/floods-directive/flood-risk-management-plan. The same is true for the 3rd International River Basin Management Plan of the Rhine river basin (IRBMP). See https://www.iksr.org/en/eu-directives/european-water-framework-directive/river-basin-management-plan-2021-1 (English version available soon). - The ICPR has published the new 3rd IRBMP begin of 2022 and by the end of December 2021 has published the 2^d IFRMP (both running from 2022 to 2027). The ICPR is the coordinating platform for the implementation of those two plans. A lot of measures in these two plans are win-win and no-regret measures regarding climate change/evolution and mitigation of negative effects. - The 16th Rhine Ministerial Conference took place on the 13th of February 2020 in Amsterdam. At this occasion, the Programme Rhine 2040 entitled “The Rhine and its Catchment: Sustainably Managed and Climate-resilient” was launched. The ICPR has prepared in 2021 and now has finalised its new working plan for the period 2022-2027 which translates the objectives of the programme Rhine 2040 into concrete actions for the first period of implementation of Rhine 2040.
<p>3. Name and short description of the flagship adaptation activity your organization wishes to highlight Beginning the implementation of the new Programme Rhine 2040 with the objective of having the Rhine river basin climate resilient by 2040. In this frame, preparation in 2022 of the update of the ICPR Climate change adaptation strategy (new expert group will be set up in 2022). The new expert group HCLIM has the task to update discharge projections for the Rhine and its major tributaries by the end of 2023.</p>
<p>4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them? Our main challenge was to develop a common, interdisciplinary and transboundary adaptation strategy and to strengthen its integration into the IRBMP and IFRMP as well as the working plan 2016-2021 of the ICPR. Then to incorporate this topic in a strong way in the new Rhine 2040 programme. A major challenge for the future is the implementation of Rhine 2040 and its elements related to climate change mitigation and adaptation. Important upcoming work will be to update the CC adaptation strategy by 2025 with the first step being the updating of the discharge projections for the Rhine and its major tributaries by the end of 2023.</p> <p>We overcome these challenges mainly by making use of the strong experience of cooperation between states in the Rhine basin, which dates back to 1950. In addition to cooperation between states, we can also count on the enriching contribution of observers (NGOs, other river commissions, etc.) and other important players such as the Commission for the Hydrology of the Rhine, the Central Commission for the Navigation of the Rhine (CCNR) and the UN-ECE.</p>
<p>5. Which lessons learned would you like to share with other basins? There are and will always be some uncertainties about climate change impacts, but the Rhine countries believe the trends to be robust enough to act and implement an (international) adaptation strategy. So far, we have learned that a mix of top-down and bottom-up measures (from the transboundary/international level to the national and regional level and vice-versa) is the best option when developing an adaptation strategy. It is also very important not to reinvent the wheel: try to use available, realized or planned measures, e.g. the ones linked to the WFD and FD implementation or originating from former programmes. Additionally, working on common issues like recent low flow events plays a key role to strengthen exchange, cooperation and mutual understanding between riparian states. And, at least, the topic of CC can be a very good common topic for transboundary cooperation as shown by the decisions taken by the Ministers of the Rhine concerning the launch of the new Rhine 2040 program. Now the objectives and tasks of Rhine 2040 have been transposed into a concrete working plan for 2022-2027.</p>
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented? The CC adaptation strategy of the ICPR was published in 2015, mainstreamed into the work of the ICPR, in particular through river basin and flood risk management plans as well as through the work of the ICPR</p>

regarding the effects of CC on water quality, environment/ecology, low water and uses. The program Rhine 2040 foresees the updating of the strategy by 2025.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

The different states within the ICPR are financing the implementation of CC measures concerning their own territories. The budget of the ICPR is used only for the organization/coordination of the ICPR activities. Furthermore, national and municipal activities related to CC are being implemented and financed directly at a national level but benefit the implementation of the ICPR Climate Change Adaptation Strategy.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

The Climate Change Adaptation Strategy for the Rhine Basin was, amongst others, based on aspects included in the national adaptation strategies of the individual states. On the other hand, the Rhine basin states can inspire themselves from the ICPR Climate Change Adaptation Strategy. Updates and progress reports are being drafted by the ICPR identifying new national developments or knowledge about CC impacts and mitigation measures/actions. Furthermore, climate change adaptation aspects are being implemented by the countries within their implementation of the river basin and flood risk management plans. In the future update of the CC strategy and amongst others the discharge projections we will carefully look at new national developments and studies.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

Guaranteeing the production of drinking water, improving or maintaining the good quality of water, its treatment, the reduction of pollutants (and more recently micropollutants) are historical and in fact central tasks of the ICPR. The improvement of water quality and the aquatic environment, both for humans and nature, are part of the ICPR's CC adaptation strategy and the new Rhine 2040 program. These aspects will be strengthened in the update of the adaptation strategy by 2025.

10. Future planned activities

- In particular, an update of the ICPR's CC adaptation strategy is planned by 2025. This involves a whole range of activities as examining new IPCC scenarios, translating them into regional scenarios and identifying new trends, effects on the uses and environment of the Rhine as well as mitigation measures.
- In this frame, preparation in 2022 of the update of the ICPR Climate change adaptation strategy. The new expert group HCLIM has the task to update discharge projections for the Rhine and its major tributaries by the end of 2023. After this and/or in parallel to this the other working and expert groups of the ICPR will work on the (update of) consequences of CC on floods and low water, water use and availability, water temperature, water quality and the ecology/aquatic environment.

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15. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE SAVA BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

For the assessment of future climate parameters, various global and regional climate models and scenarios have been used. Although there are uncertainties, some common trends have been identified and projected as follows:

- for the future, a further increase in air temperature is expected within the Sava basin by around +1°C in the next 30 years,
- the precipitation change is complex and expected changes are very variable. In general, an increase during the winter and a decrease for the summer months is expected. Summer precipitation deficit is more pronounced in 2041-2070 period,
- Frequent and more intense extreme weather events will take place more often. Longer periods of droughts and shorter and locally distributed periods of intense precipitation in the future are predicted in all countries in the Sava River Basin with an increasing risk of flooding

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

Climate change adaptation has been included in the draft 2nd Sava River Basin Management Plan which was open for public consultation from 23rd November 2021 until 23rd March 2022. It is foreseen that the 2nd SRBMP will be accepted by the Parties to the FASRB (Slovenia, Croatia, Bosnia and Herzegovina and Serbia) in November 2022.

The ISRBC has also coordinated the establishment of the Flood Forecasting and Warning System of the Sava River basin (Sava FFWS). It is a unique system and fully operational. When it comes to transboundary cooperation on flood forecasting in the basin, it strongly contributes to the strengthening of organizations responsible for hydrometeorological services and flood defense in the Sava countries. The Sava FFWS, as a common forecasting platform, is an added value to existing national forecasting and warning systems that provides a better level of preparedness and optimized mitigation measures, thereby significantly contribute to reducing consequences of flooding and preparedness for emerging climate shocks.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

The following future steps have been recommended to be implemented:

- Vulnerability assessment
- Analysis of cost and benefits of climate change adaptation
- Raise awareness and the scale of adaptation by assessment of climate change at the SRB level.
- Identification of principles of measures implementation
- Monitoring and evaluation of adaptation measures

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

Although the comprehensive and recent studies on climate change adaptation provide relevant analysis and recommendations to tackle climate impacts in the coming decades, many gaps have been recognized, given that:

- a number of sectors have not been addressed in the climate change context in the below mentioned studies and plans (e.g., forestry, fishery, aquaculture, spatial and urban planning, infrastructure development, tourism, health)
- for the sectors that have been considered so far (i.e., water management, flood protection, navigation, hydropower use, agriculture), potential adaptation measures have been identified and recommended, however these measures have to be elaborated into more details, so as to allow for prioritization and implementation of basin relevance measures.

5. Which lessons learned would you like to share with other basins?

It has already been proven that the Framework Agreement on the Sava River Basin, signed and ratified by Slovenia, Croatia, Bosnia and Herzegovina and Serbia, along with ISRBC as its implementing body, is a good example of transboundary cooperation on the river basin level. Such approach has made the best use of the experiences and liaisons already existing in the Sava River Basin and facilitate that the issue of climate change would be considered on the national and transnational level by different stakeholder groups.

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?

At the Sava RB level, the following projects have addressed the climate change adaptation:

- Building the link between Flood Risk management planning and climate change assessment in the Sava River Basin, UNECE, 2013
- Water – Food – Energy – Ecosystems Nexus Assessment in the Sava River Basin (finalized in 2015);
- Danube Water Nexus Project – Sava Case Study, implemented by the EC Joint Research Centre (finalized in 2016);
- Water and Climate Adaptation Plan for the Sava River Basin (WATCAP) (finalized in 2015);
- Outline of the Climate Adaptation Strategy and basin-wide priority measures for the Sava River Basin (finalized in 2018)

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

At the ISRBC most of the activities have been financed by external funding sources (World Bank, Ministry of Ecological and Inclusive Transition (Republic of France), International Office for Water and UNECE).

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

The climate change adaptation has been included in the 1st Flood Risk Management Plan and in the 1st and 2nd Sava River Basin Management Plan. These documents are results of close cooperation of professionals from the Sava River Basin countries developed with the involvement of all relevant stakeholders and represent the umbrella documents for the river basin and flood risk management and planning in the transboundary Sava River Basin context and are of use as well on the national levels.

In development of the above-mentioned studies and plans the experts from the Sava countries have been involved through direct contact on workshops and through the permanent expert groups, particular for River Basin Management, for Flood Protection and for Hydrological and Meteorological Issues, established by the ISRBC.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

In the Outline on the Climate Change Adaptation Strategy the following measures have been foreseen.

- Preparation measures for adaptation aiming to support planning process
- Ecosystem -based measures which are based the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change
- Behavior-change measures aiming to raise awareness about possible future conditions, to modify behaviors and practices and to support sustainable management with a focus on the efficient use of water and conservation of good water quality
- Policy measures aiming to support the national, international, and basin-wide coordination of activities.
- Technological measures focusing is on infrastructure which has to be built or improved
- Disaster Risk reduction measures to reduce the risk of disasters and the adverse impacts of natural hazards

The Parties to the FASRB oversee implementing adaptation measures to climate change and apply the principles of subsidiarity and solidarity. In order to respect these provisions, they have agreed to effectively coordinate measures with transboundary effects. The International Sava River Basin Commission has a coordination role in the process of FASRB implementation.

10. Future planned activities

The International Sava River Basin Commission is looking for funding possibilities for development of a climate change adaptation strategy including basin-wide priority measures for the Sava River Basin.

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16. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE SIXAOLA BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

The Sixaola River Basin (Costa Rica-Panama) is susceptible to flooding in the Middle and Lower Basin, which causes serious erosion and sedimentation damage, affecting mangroves and the coast, as well as the infrastructure of both countries (Costa Rica and Panama). In addition, water quality is affected by the use of agrochemicals in some agricultural plantations and by polluting human practices (organic and inorganic waste). All of this is washed down the river and influences the quality of water for human consumption and the ecosystem of flora and fauna of the river, of the mangroves and the coast.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

During 2021, after the COVID-19 pandemic, the Binational Commission of the Sixaola River Binational Basin was reactivated. Several General Assemblies were held and the new Coordinating Unit of the Commission was selected. With these actions, the binational coordination work was resumed, both in person and virtually, with a view to coordinating the activities foreseen in the Project that was approved during 2021 named: "Towards the Integrated Management of Transboundary Water Resources (IWRM) of the Sixaola River Basin shared by Costa Rica and Panama". This US\$4.4 million project is financed by the Global Environment Facility (GEF) and administered by the United Nations Development Program (UNDP) and the Organisation for Tropical Studies (ORT).

The Project aims to "Strengthen transboundary multi-stakeholder action in the Sixaola River Basin shared by Costa Rica and Panama to restore river ecosystems, reduce pollution from agricultural production and reduce the risks of hydro-meteorological disasters", especially by seeking alternatives for adaptation to Climate Change in our Basin.

The basic components of the Project are:

- Improved governance instruments for the joint integrated management of the Binational Sixaola River Basin
- Demonstrative pilot projects that promote collaborative work, replication and implementation and that build capacity, experience and support for the implementation of the Strategic Action Program (new CBCRS Strategic Plan)
- Flood risk management
- Knowledge management

3. Name and short description of the flagship adaptation activity your organisation wishes to highlight

To participate with the Communities of the Binational Basin, in activities that allow the use of best agricultural practices among producers and indigenous communities to reduce pollution risks, as well as coordinate binational programs to monitor the pollution of river and coastal ecosystems. We also plan to lead restoration campaigns and action plans for priority areas along the Basin and promote a long-term strategy for the operation of early warning systems for floods in both countries. To this end, we have received funding from the GEF/UNDP/OET Project.

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

The main challenges during the pandemic were uncertainty, restricted national and international mobility, health measures within and between countries, as well as connectivity and access for various groups and remote communities. All this affected coordination and field work. However, with time we were able to adapt little by little, and make efforts to resume transboundary activities, ordinary and extra-ordinary assemblies, hybrid meetings between both countries, selection of new members, etc. The big challenge lies in enabling all CBCRS members to participate in all the decision-making processes, as well as in the execution of projects in a safe manner.

5. Which lessons learned would you like to share with other basins?
 The role of the transboundary governance mechanism implemented between Costa Rica and Panama (established Legal Framework, Multilactor and multisectoral transboundary participation model, etc.).

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?
 A specific Adaptation Plan was not developed in the Basin; however, several actions were implemented through different projects (already completed or underway) that helped communities and organisations to understand and address the problems and try to adapt to various risks. We currently have financing to develop some important actions, with the objective of obtaining a Strategic Plan for the Sixaola Basin in the medium term, which includes actions, measures, policies and projects for adaptation to climate change that will allow us to meet different needs.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?
 The CBCRS does not have resources of its own. It depends on the contributions (human, technical and logistical) of the representatives of the public institutions of both countries, as well as the in-kind contributions of other representatives of social, local and private organisations. The Executive Secretariats of the Costa Rica-Panama Border Convention, as part of the CBCRS, promote possible international cooperation projects with different organisations and cooperation agencies, to attract resources to finance transboundary actions and projects on various issues, including climate change as such, but also in relation to other issues such as agriculture, health, water resources, risk management, environmental education, etc.

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?
 The CBCRS is a binational (transboundary) Commission between Costa Rica and Panama that oversees the integrated development of the Basin, environmentally, as well as socially, economically and politically. It brings together representatives of different public institutions at the national level with local presence, as well as other social actors, indigenous peoples, private sector, academia, etc. Therefore, the representatives in this Commission are the institutional representatives of the national level. They can also convey the agreements, projects, and other decisions taken in the territory to the higher authorities at the national level so that all necessary measures related to the Basin can be taken.

 Similarly, the Executive Secretariats of the Costa Rica-Panama Border Convention also inform the higher authorities of all actions and decisions taken in the CBCRS, follow up on decisions and projects, participate in meetings as part of the CBCRS, provide advice on issues related to transboundary governance, and promote the query for external resources of international cooperation to support the Basin.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

Water (water resource) has been basic and fundamental in the Sixoala Binational Basin. The Sixoala River, besides being part of the political boundary between Costa Rica and Panama on the Caribbean side between the two countries, is a strategic water source for human consumption, for sustainable production and tourism, for irrigation of the plantations on its banks and for the protection of the surrounding ecosystems.

Water quality is a concern of the CBCRS and some studies have been and will be carried out to monitor water quantity and quality, with some international cooperation projects. The obtained data will be used by the CBCRS, the institutions of both countries, academia, researchers and national and local organisations to make the corresponding decisions.

The issue of adaptation has been considered since the beginnings of this Binational Commission in 2010, in the various projects that have been executed and are currently being executed.

It has also been reflected in the Strategic Plan 2017-2021 in all its dimensions: environmental, economic, social and political-institutional; with specific objectives in various programmed projects. It will also be reflected in the work plans of the CBCRS Coordinating Unit for the period 2022-2024 and in the new Strategic Plan 2022-2032 that will be built during this year, with the support of the GEF/UNDP/OET Project.

10. Future planned activities

- Preparation of the CBCRS Territorial Strategic Plan 2022-2032.
- Elaboration and implementation of the Work Plan of the CBCRS Coordinating Unit 2022-2024.
- Training workshops on topics related to transboundary development, shared waters, transboundary governance, climate change mitigation and adaptation, integrated water resources management (IWRM), risk management, COVID-19, rural community tourism, etc.
- Support the Regional Center for the Western Hemisphere (CREHO) Ramsar; with the proposal to create the Transboundary Wetland Wildlife Refuge Gandoca-Manzanillo (Costa Rica) and the San San Pond Sak Wetland (Panama) as a Transboundary Ramsar Site, which are part of the Sixoala River Binational Basin.
- Implementation of the recommendations of the project "Construction of the sustainable rural community-based tourism model in the transboundary territory of the Sixoala River Binational Basin, Costa Rica-Panama", financed by the Junta de Andalucía (regional government of Andalusia, Spain) and the Central American Strategy for Rural Territorial Development (ECADERT) of the Central American Integration System (SICA).

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17. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE SENEGAL BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

At the level of the Senegal River basin, the impacts of climate change are essentially of three types:

- Rainfall:

It has been noted: i) a rainfall deficit compared to the year 2020 confirming the strong interannual variability shown by various studies, and a low filling of the Manantali dam reservoir; ii) a shortening of the rainy period as well as important stormy rains in a very short time leading to floods in the areas of the basin where the hydrological contributions are usually very low (downstream in the basin)

- Temperature and evapotranspiration:

We recorded higher than usual temperature peaks in the basin,

- Runoff:

We have observed a rapid drying up of the streams and the basins and depressions associated with the river and its tributaries

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

Several adaptation actions have been launched in recent years beyond the strong political commitment of the OMVS authorities. These are the implementation of:

- measures to improve monitoring, planning and management of water resources and risk prevention:
 - Densification and modernization of the hydrological monitoring network: 59 stations are rehabilitated, 26 of which are equipped with automatic remote transmission systems;
 - Setting up of meteorological network in the whole intervention area of SAED (Senegal - 9 stations), SONADER (Mauritania - 3 stations) and ADRS (Mali - 400 rain gauges);
 - Updating of strategic/planning documents with consideration of climate risks (ADT/PAS, SDAGE, Cartography of the Senegal River Basin 1/50000, regional adaptation plan, Development of a CIP);
 - Updating/development of management and planning models (WEAP annual planning time step, WEAP monthly time step, IMOD, Wflow, and Delf 3D);
 - Implementation of a Flood Warning Plan
- Measures to strengthen Basin governance:
 - Strengthening good environmental governance at the regional, national and local levels through support to the operationalization of the water charter;
 - Awareness raising and information to bring about an effective application of the texts and regulations;
 - Capacity building of stakeholders to enable them to fully play their adaptation role (476 people have benefited from a certification training)
- Socio-economic recovery and environmental management measures: 13 pilot adaptation projects with more than 130 intervention sites in the 4 countries, 19037 direct beneficiaries. These projects focused on the restoration and protection of ecosystems, the use/dissemination of hydrometeorological information to better address the impacts of climate change in key development sectors, the promotion of innovative practices for water-use efficiency and improved agricultural production, the diversification of livelihoods of local populations and of energy sources

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Implementation of a remote transmission and remote management system of water infrastructures for water-use efficiency in the Dagana delegation (River Delta)

For a rational and sustainable use of the resource for the satisfaction of the water demand and preservation of the environment in the department of Dagana / region of Saint Louis, the SAED through the OMVS has equipped itself with the latest generation of hydrometeorological measurement instruments and the implementation of a remote transmission and remote management system of data, allowing the regulation of water infrastructures and the diffusion of efficient irrigation instructions at the level of the Senegal River Delta. It also promotes better control of energy costs at pumping stations, thus improving agricultural production. In addition, this system provides relevant hydrological data series to better understand the development of future irrigated areas in the context of climate change, but also to have a tool to assist in operational decision making

figure 1. Map of the Senegal River delta with the eleven (11) priority works benefiting from measurement equipment



The operation of the Water Resources Monitoring and Remote Management System (SSTRE) provides the following results in real time:

Structures and hydraulic axes	<ul style="list-style-type: none"> - Flows - Water levels - Volumes - Temperatures.
Pumping stations	<ul style="list-style-type: none"> • Pump power • Pump levels (low vs. normal) • Discharge level • Mains voltage and pumps

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

The major challenges are of 2 types:

- The identification of specific activities to be implemented taking into account the potential of each area of the basin, the needs of the populations even if we notice similar vulnerabilities. This has required involvement of all relevant stakeholders (technical services, local elected officials, men, women, youth and children) and agreement at the different levels of governance (local, national and regional).
- Ensure the sustainability of investments for adaptation. To do this, we have opted for a community implementation of the activities, even if there is support from a service provider, to supervise and build capacities of the beneficiaries through learning by doing and managing the investments.

5. Which lessons learned would you like to share with other basins?

- Improved knowledge and consideration of groundwater resources contribute significantly to boosting socio-economic activities in transboundary basins
- The establishment of an organizational mechanism, capacity building and networking between stakeholders are guarantees for the sustainability of the adaptation activity implemented
- A good knowledge of the issues related to climate change also facilitates decision making and the adhesion of the population to the implementation and scaling up of adaptation actions.

6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?

Today we have:

- a Strategic Environmental Action Plan for 2037 with adaptation actions
- a Regional Adaptation Plan to Climate Change for 2050

We are developing a climate investment plan that will federate all actions in favor of addressing the impacts of climate change in all OMVS strategic documents for 2050, which will be available by October 2022.

However, we are already implementing pilot adaptation projects to consolidate the achievements of the States in adapting to climate change.

7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?

The measures implemented so far are funded by the OMVS itself and by the GEF up to 16 million dollars

8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?

Through diagnostic surveys or vulnerability assessments, we have been able to characterize what future climate to expect at the basin scale by 2050, identify vulnerable areas and sectors, ensure better consideration of climate change impacts in water planning and management, and propose adaptation solutions at several levels (local, national and regional).

Local and national actions within the framework of the OMVS contribute to transboundary adaptation in the Senegal River Basin. The actions included in our strategic documents respond to vulnerability and not to a demand or requirement of a country. Therefore these actions follow a global coherence which is in general to improve the resilience of populations and ecosystems. Exchange visits are also initiated during the different processes to trigger the same dynamics in all the countries of the basin and share successful experiences.

9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?

Within the framework of adaptation and sustainable management of the environment we have an important component of restoration and protection of ecosystems. In the upper basin, the restoration of the Fouta Djallon massif and the headwaters of springs contribute to improving the flow and the replacement of water tables. And in this framework, an important work is in progress at the OMVS from the setting up of an institutional framework, in this case the Observatory of the Fouta Djallon Massif, to the implementation of concrete actions of reforestation and protection advanced through a transboundary and inter-organization cooperation (OMVS, OMVG, NBA...).

In the delta we are also carrying out activities of restoration and protection of the mangrove (70 ha reforested) as well as fighting against invasive aquatic plants

10. Future planned activities

The finalization of the Climate Investment Plan (CIP) which will allow us to launch the search for funding for climate change adaptation activities and to continue the implementation of ongoing activities with a particular focus on the Fouta Djallon Massif.

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18. ACTIVITIES ON TRANSBOUNDARY WATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE VOLTA BASIN

1. Which climate change impacts are you already experiencing or expecting in your basin (impacts on aquatic ecosystems and water quality, floods, droughts, other types of disasters, etc.)?

- **The extreme events that are frequent in the Volta Basin are:** floods, droughts, loss of terrestrial and aquatic biodiversity, water and land degradation (pollution from various sources and invasive aquatic plants, loss of cultivable land), etc.

2. What are the concrete results achieved in 2021 with regards to climate change adaptation in your basin?

Some results achieved through the implementation of projects and programs:

- Inventory of the consideration of climate change in national plans, policies and governance guidelines for flood and drought management;
 - Collection and validation of data on exposure to climate hazards in all 6 VBA member countries;
 - Capacity building of stakeholders on the determination of drought indicators and on the mapping of areas vulnerable to extreme climate hazards in the Volta Basin;
 - Development of risk maps for 60 pilot sites;
 - Capacity building of stakeholders on Nature-based solutions (NbS) as a mechanism to respond to floods and droughts and on disaster risk reduction in the Volta Basin;
 - Rehabilitation of some main hydrometric data collection stations in Burkina Faso and Ghana;
 - Setting up of hydrometeorological station kit on 06 pilot sites at a rate of 01 per country;
 - Development of a computerized tool for early warning of floods and droughts (VoltAlarm);
 - Data collection tools.
- etc.

3. Name and short description of the flagship adaptation activity your organization wishes to highlight

Development of a Climate Investment Plan taking into account priority actions to strengthen the resilience of populations to the effects of climate change, focusing on "**Nature-based solutions (NbS)**".

4. Which major challenges did you face with regards to transboundary cooperation and climate change adaptation? How did you overcome them?

<p>Allocation/sharing of surface water resources for the satisfaction of various uses in the Volta basin (example of an irrigation project of 6000 Ha in Burkina Faso, from water withdrawals on the tributaries of the Volta, which would cause a significant reduction in the resource available for other downstream countries).</p> <p>Based on the ESIA results and other data on the water needs provided by Burkina Faso, the Executive Directorate conducted an analysis to determine the level of impact on water resource availability. It then provided all the technical elements of appreciation to the five (05) other Member States which, with regards to the clauses of the Convention on the status of the Volta River and the Establishment of Volta Basin Authority (January 2007) and the Water Charter (adopted in May 2019), freely gave their No Objection Notifications for the realization of the project. These Member States have thus demonstrated their high sense of cooperation around this shared resource of the Volta Basin.</p>
<p>5. Which lessons learned would you like to share with other basins?</p> <ul style="list-style-type: none"> - Need to strengthen and operationalize the technical, legal and regulatory tools for the joint management of shared water resources and its related sectors; - Need to set up common projects or common interests to strengthen cooperation and resilience of the populations of shared basins; - Need to put into practice the "user-pays principle", one of the cardinal principles of IWRM, which remains an innovative alternative for sustainable financing of water resource management.
<p>6. What is the status of your basin climate change adaptation strategy and plan? Are they already developed, financed and implemented?</p> <p>The VBA has a Strategic Action Plan 2014-2024 of which some climate change adaptation actions have been the subject of programs financed by GEF/CIWA/WB (Program-VSIP, completed) and the Climate Change Adaptation Fund (Project-VFDM, in progress).</p> <p>The VBA also has a long-term Transboundary Action Plan (currently being validated) for resilience capacity building at the national and cross-border levels to be implemented by the VBA and the other Regional Agencies.</p>
<p>7. How do you finance your climate change activities? How do you plan to finance the implementation of measures?</p> <p>The financing of climate change activities and their implementation on the ground is mainly done through donors such as: GEF, CIWA, WB, CC Adaptation Fund, FFEM/AFD, SIDA, AWF/BAfD, ADA, etc.</p>
<p>8. How did you link transboundary climate change adaptation to adaptation activities at other levels, such as the national level?</p> <p>The VBA has conducted a Transboundary Diagnostic Analysis (TDA 2013-2014) and recently national studies (in the 06 VBA member states) on constraints, challenges and priorities for managing climate change impacts. A process is currently underway to develop a regional Climate Investment Plan.</p>
<p>9. Do you include protection of freshwater ecosystems and water quality into your transboundary climate change adaptation strategies and plans? Are you supporting transboundary cooperation related to protection of freshwater ecosystems in a changing climate and how?</p> <p>The VBA Strategic Action Plan 2014-2024 takes into account the protection of freshwater ecosystems and water quality in the basin.</p> <p>Thus Component 3 of the VSIP Program, funded by GEF/CIWA/WB, has carried out activities on freshwater ecosystem protection and water quality.</p> <p>Also the VFDM Project, financed by the Climate Change Adaptation Fund, through the "Nature-based Solution" approach, takes into account the protection of water areas and water quality.</p>
<p>10. Future planned activities</p> <ul style="list-style-type: none"> • Development of a Master Plan for the Development and Management of the Volta River Basin for the period 2050-60;

- Development of a Regional Action Plan for integrated flood and drought management in the Volta basin;
- Development of a hydraulic model for the allocation and management of water resources, including a water quality monitoring module;
- Strengthening of the surface and groundwater observation network (quantity and quality) in the basin;
- Mapping of withdrawals, assessment of water needs in the basin and development of a computerized monitoring and forecasting tool, coupled with GIS;
- Development of the remaining Annexes of the Water Charter related to the environmental protocol, coordinated management of hydraulic infrastructures, common works and works of common interest, etc.

11. Contact details

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