



Convention of the Protection and Use of  
Transboundary Watercourses and International Lakes  
Core group on pilot projects  
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## **PROGRESS OF THE PILOT PROJECTS ON ADAPTATION TO CLIMATE CHANGE IN TRANSBOUNDARY BASINS**

### **Background and objectives**

1. The programme of pilot projects on adaptation to climate change in transboundary basins under the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) has started in 2010 and aims to
  - (a) Support countries and specifically countries with economies in transition (in Eastern Europe, Caucasus and Central Asia as well as in South-Eastern Europe) in their efforts to develop adaptation strategies and measures; in transboundary basins
  - (b) Assist UNECE countries in implementing the Water Convention and the European Union (EU) Water Framework Directive (WFD) under conditions of a changing climate, also in light of the EU White Paper on adapting to climate change<sup>1</sup>;
  - (c) Create positive examples demonstrating the benefits of and possible mechanisms for transboundary cooperation in adaptation planning and implementation, also beyond the UNECE region;
  - (d) Implement the Guidance on Water and Adaptation to Climate Change;
  - (e) Provide a forum for exchange of experience, good practices and lessons learnt regarding adaptation projects in different parts of the region.
2. The pilot projects mainly focus on developing adaptation strategies which lay the ground for further action and only to a very limited extent, on the funding and implementation of the relevant measures.
3. Depending on the local needs and other existing projects the pilot projects focus on different expected impacts of climate change and climate variability such as increased floods, water scarcity or droughts.
4. The Task Force on Water and Climate facilitates the programme of pilot projects, but is not a decision-making body for the pilots, it acts as a community of practice/ practitioners, a resource tool or platform for advice and sharing experiences which the pilot projects can benefit from. The Working Group on Integrated Water Resources Management (WG IWRM) under the Water Convention is overseeing the implementation of the entire work programme of the Water Convention and thus also the pilot projects programme, but it is also not a decision-making body for the pilot projects.
5. Exchange of experience between the pilot projects is ensured through a platform for this purpose which includes regular meetings, such as the core group meeting, as well as a web-based platform.
6. The programme of pilot projects includes different types of pilot projects: on the one hand, a limited number of pilot projects that are directly supported by the Water Convention secretariat in

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<sup>1</sup> White paper - Adapting to climate change : towards a European framework for action.

cooperation with partners, on the other hand, a number of already ongoing projects and initiatives focusing on climate change adaptation in transboundary basins that have their own implementing framework.

7. The following pilot projects supported directly by the UNECE secretariat are implemented and funded in the framework of the Environment and Security Initiative (ENVSEC) in cooperation with other ENVSEC partner organizations as well as local partners. These projects are the following<sup>2</sup>:

- a) Pilot project on the Chu Talas Basin, shared by Kazakhstan and Kyrgyzstan, implemented by the United Nations Development Programme (UNDP), UNECE and the Organization for Security and Cooperation in Europe (OSCE).
- b) Pilot project on the Dniester Basin, shared by the Republic of Moldova and Ukraine, implemented by the Organization for Security and Cooperation in Europe (OSCE), UNECE and the United Nations Environment Programme (UNEP).
- c) Pilot project on the Sava river basin, shared by Bosnia and Herzegovina, Croatia, Serbia and Slovenia, implemented by the International Sava River Basin Commission and UNECE.
- d) Pilot project on the Neman river basin, shared by Belarus, Lithuania and the Russian Federation, implemented currently by UNECE. This pilot project is currently funded by a separate agreement with Finland, however, it is expected that additional funding will be provided by the Environment and Security Initiative.

8. The following already ongoing activities and projects have also been included in the programme of pilot projects:

- a) Activities regarding water and climate change adaptation in the Rhine basin, shared by Austria, Belgium, France, Germany, Italy, Liechtenstein, Luxemburg, the Netherlands and Switzerland, implemented by the International Commission for the Protection of the Rhine
- b) Project AMICE on the Meuse basin, shared by Belgium, France, Germany, Luxembourg, Netherlands, implemented by 17 partner organizations, lead by the *Etablissement Public de l'Aménagement de la Meuse (EPAMA)*
- c) The project "Dauria going dry" on the Amur/ Argun/ Daursky Biosphere reserve, shared by the Russian Federation, Mongolia and China, implemented by the World Wildlife Fund Russia and Daursky Biosphere,
- d) Activities on water and climate change on the Danube river basin, shared by Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Montenegro, Republic of Moldova, Romania, Serbia, Slovenia, Slovakia and Ukraine, implemented by the International Commission for the Protection of the Danube River (ICPDR).

9. The projects were launched in 2010. First activities have started in most of the pilot projects; however, overall, progress has been slower than expected due to, among others administrative hurdles and political instability in some of the pilot projects countries, especially Kyrgyzstan. It is important to ensure stable project progress in 2011.

10. The following indicative time frame is envisaged:

Summer 2010- end of 2012	Implementation of the pilot projects, exchanges of experience through website and regular meetings.
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<sup>2</sup> More information is included in the annex.

Autumn 2010- autumn 2011	Impact assessment phase for all pilot projects: baseline study, modelling, scenario development, vulnerability assessment
12-14 April 2011	Workshop and fourth Meeting of the Task Force on Water and Climate, exchange of experience between pilot projects and other similar initiatives
4-5 May 2011	Sixth meeting of the Working Group on Integrated Water Resources Management, short presentation and discussion of the pilot projects
21-23 September 2011	Seventh Ministerial Conference “Environment for Europe” in Astana, Kazakhstan, presentation of progress of the pilot projects (form to be discussed)
Autumn 2011- Autumn 2012	Implementation phase of the pilot projects: elaboration of a joint programme of measures
Middle/end of 2012	Review of progress and of completed pilot projects at the meetings of the Working Group on Integrated Water Resources Management as well as at the sixth session of the Meeting of the Parties to the Convention

## **Annex: Description of each pilot project**

### **A) Promoting Cooperation to Adapt to Climate Change in the Chu and Talas Transboundary Basin**

The project aims to improve the adaptive capacity of Kazakhstan and Kyrgyzstan, to support dialogue and cooperation on the needed steps to design an adaptation strategy in the transboundary context and thereby prevent controversy on the use of water resources.

The specific objectives of the project are:

- Modelling of the possible changes in water resources of the Chu-Talas basin associated with climate conditions and elaboration of joint scenarios,
- Preparation of joint vulnerability assessment, focusing on selected areas/sectors of importance for the work of the Commission,
- Development of a package of possible adaptation measures and relevant procedures for the Commission, which may contribute to decreasing potential tensions over changing hydrological regimes. Such procedures and measures will be built into the regular Commission's operations and policies, where appropriate.

The project was delayed due to the political instability in Kyrgyzstan. Up to date, the project team is formed and national experts have started to draft a baseline study in order to identify and assess already ongoing or completed projects and national and international initiatives as well as existing data and impact assessments. This is done through interviews with officials, initial data collection, contact with other previous and ongoing projects, etc. As an integral part of the study, the collected data and information will be processed and later on used as a basis for developing an agreed upon impact assessment, based on joint scenarios and modelling. These activities to be followed up by the vulnerability assessment carried out in order to identify the most vulnerable areas, economic activities, ecosystems and population groups. The focus of the vulnerability assessment will be designed taking into account the work of the Chu-Talas Commission and national priorities.

Based on the results of the vulnerability assessment, adaptation measures, their financing and implementation will be planned jointly with the riparian states, including financing aspects. If possible, contacts to relevant donor institutions will be established. At the same time, the opportunity and options for adapting the Commission's procedures to allow coping with climate change impacts will be discussed and agreed upon so to integrate project findings into the regular commission activities.

#### **Partners**

Facilitating organizations: UNDP (Ms. Natalia Alexeeva, Mr. Amirkhan Kenshimov and Ryspek Apasov), UNECE (Ms. Sonja Koepfel, Mr. Bo Libert and Ms. Francesca Bernardini) and OSCE.

Countries: Kazakhstan: Committee of Water Resources, Ministry of Agriculture

Kyrgyzstan: State Committee of Water Resources and Melioration

Secretariat of the Chu-Talas Commission

Project duration: 3 years, Start: Jan 2010, End: Dec 2012

## **B) Reducing vulnerability to extreme floods and climate change in the Dniester river basin**

The project aims to reduce risks from climate change - and specifically flooding - for security by improving the adaptive capacity of Ukraine and the Republic of Moldova. More specifically, the project aims to expand and further strengthen cooperative management in the Dniester River basin to address cross-border management of floods, taking into account both current climate variability and long-term impacts of climate change on flood risks.

### **Activities in 2010**

- Working group on flood management and adaptation to climate change which will steer the project was created, composed of nominated members from both countries.
- Held two meetings of project participants (June 2010 - Odessa, November 2010 - Kiev).
- Baseline studies carried out by experts in both countries which includes information on ongoing or completed projects and national and international initiatives as well as existing data and impact assessments regarding climate change and flooding, past flooding events and existing vulnerability assessments. The studies were discussed at the second meeting of the working group on flood management and climate change adaptation, held in November 2010 in Kiev, Ukraine. Based on the comments, the baseline studies were finalized.

### **Future planned activities**

Subsequently, the collected data and information will be processed and used as a basis for developing an agreed upon assessment of climate change impacts, with a special focus on flood problems. Modelling and scenario building will help to assess climate change impacts, in particular on the occurrence, frequency and magnitude of extreme floods. Based on the results as well as further information, a vulnerability assessment will be carried out with a special focus on floods in order to identify the most vulnerable areas, economic activities, ecosystems and population groups. Different types of flood risk maps will be produced depending on the needs of the users and the data available, i.e. flood hazard maps and vulnerability or risk maps which will help in the prioritization of measures and areas for further action. Based on the results of the vulnerability assessment, further adaptation and especially flood risk reduction measures will be identified, prioritized and planned jointly by the riparian States, including financing aspects.

Moreover the project will support ongoing efforts in the Republic of Moldova and Ukraine to improve monitoring and forecasts of transboundary floods through the strengthening of the joint system for automated flow monitoring and data exchange (4- 6 new automated flow monitoring stations and data exchange infrastructure). Furthermore, capacity-building on flood alerts and flood communication will be provided through a workshop for national and local experts, the production of local early warning plans, and information material for the general population.

### **Lessons learnt:**

- Often, many more activities and data regarding climate change exist upon which the project should build, they need to be identified at the beginning and throughout the project, establishing partnerships with other organizations working on this area is very useful
- Baseline studies are very important, they should be discussed at stakeholder meetings
- It is crucial to establish a working group with representatives of the government, the water authorities, academia, NGOs and other experts to oversee the project and promote its results at the national and transboundary level

### **Partners:**

Facilitating organizations: OSCE (Ms. Tamara Kutonova), UNECE (Ms. Sonja Koeppel, Mr. Bo Libert, and Ms. Francesca Bernardini) and UNEP (Mr. Nickolai Denisov)

Countries: Ukraine and Republic of Moldova, Plenipotentiaries, Dniester III project stakeholders, Ministries of Environment in both countries, State Water Committee in Ukraine

Project duration: 3 years, Start: 2010, End: Dec 2012

### **C) Building the link between flood risk management planning and climate change assessment in the Sava River Basin**

The project aims to address, through expanded and strengthened collaboration among the countries in the Sava River Basin, issues of transboundary management of floods, taking into account the impacts of climate change under different scenarios and the perspective adaptation measures envisaged.

The *Framework Agreement on the Sava River Basin (FASRB)*, the basic document that encompasses the collaboration of the Parties, namely Bosnia and Herzegovina, Croatia, Serbia and Slovenia in the field of water management in the Sava River Basin, has been supplemented by the *Protocol on Flood Protection to the FASRB* (hereinafter: the *Protocol*), signed in June, 2010. The *Protocol* presents the aims of the Parties in the field of sustainable flood protection, supported by the Permanent Expert Group for Flood Protection (PEG FP) of the International Sava River Basin Commission (ISRBC), namely the development of a Flood Risk Management Plan (FRMP) in the Sava River Basin in accordance with the *EU Floods Directive*, as well as with the *UNECE Guidelines on Sustainable Flood Prevention*, under coordination of the ISRBC.

The pilot project fits very well into the ongoing ISRBC initiatives and provides a strong support to the common activities of the Sava countries in flood risk management in time of changing climate and is in line with the *Protocol*.

Among the activities encompassed by this project, six of them, namely:

- A1 Preparation of an overview of already completed or ongoing activities and their findings regarding flood risk management planning in the Sava River Basin
- A2 Identification and assessment of existing legislation, strategies and plans related to the FRM planning and climate change adaptation (transboundary and national)
- A4 Initial flood vulnerability assessment in the Sava River Basin and identification of the most vulnerable areas
- A6 Preparation of a detailed Sava FRMP Program
- A7 Assessment of data and information needs for preparation of joint FRMP for the Sava River Basin, identification of data sources on national and international level, finding data gaps and defining strategy how to obtain missing data
- A8 Exchange of experience on the implementation of the project with other projects in the programme of pilot projects under the Water Convention and dissemination of the results (partly).

have recently been put to tender, as a single assignment, as they are closely linked together.

Start of the project is expected in March 2011.

Among the ongoing projects in the Sava River Basin, an essential input to the pilot project is expected from the *Water and Climate Adaptation Plan for the Sava River Basin (WATCAP)*, initiated and financed by the World Bank, whose realisation has a slight delay. Additionally, a hydrological model of the Sava River Basin and a hydraulic model of the Sava River, which are under finalisation, will be used in the *WATCAP* project. The foreseen climate modelling will serve as input for the remaining two activities in the pilot project related to the climate change; after the compilation of the climate change scenarios in the region and their expected impacts on the extreme flood events, finally, the preliminary identification and description of possible adaptation measures, as well as a selection of a package of measures according to the *UNECE Guidance on Water and Adaptation to the Climate Change* will be performed.

#### **Partners**

Facilitating organizations: International Sava River Basin Commission (Mr. Dragan Zeljko and Mr. Dejan Komatina), UNECE (Ms. Sonja Koeppel, Ms. Francesca Bernardini and Mr. Bo Libert)

Local partners: National institutions of the Parties (Bosnia and Herzegovina, Croatia, Serbia, Slovenia), responsible for the FASRB implementation

Project duration: 2.5 years, Start: June 2010, End: December 2012

## **D) PILOT PROJECT ON RIVER BASIN MANAGEMENT AND CLIMATE CHANGE ADAPTATION IN THE NEMAN RIVER BASIN**

The overall objective of the project is to improve integrated river basin management and transboundary cooperation in times of a changing climate in the Neman river basin. The project aims to strengthen the capacity to adapt to climate change of the countries sharing the Neman river through supporting dialogue and cooperation on the needed steps to design an adaptation strategy in the transboundary context. It will aim to reach a common understanding on future water availability and water use taking into account possible climate change impacts.

The preparatory phase has taken place from June until December 2010 and was aimed at gaining commitment from countries, identifying focal points and defining the exact project aims and objectives as well as activities. A first preparatory meeting for the project took place on 14 October 2010 in Minsk, Belarus, with participants from all three riparian countries, i.e. Belarus, Lithuanian and Russian Federation. At this meeting participants agreed on the on the overall objectives and activities foreseen as follows:

- 1) Environmental analysis: analyse human activities' pressures and impacts on the status (ecological and chemical) of water bodies in the Neman/ Nemunas river basin and identify priority problems, as it has been done in Lithuania already in the framework of the EU Water Framework directive; if possible this phase will include elaborating a proposal for harmonizing water status (ecological and chemical) indicators, criteria (values), water status classification systems and parameters.
- 2) Baseline study: exchange, analyse, and compare the climate-relevant data and the data for the assessment of socio-economic development scenarios impact on the status of water bodies of the Neman/ Nemunas river basin (possibly through a simple platform) and scenarios as well as models used in all riparian countries for climate change impact assessment;
- 3) Assess future run-off in the entire Neman/ Nemunas river basin under conditions of future climate change as well as different scenarios for socio-economic development:
  - a. Harmonize the climate change and socio-economic development scenarios' impact on the status of the Neman/ Nemunas river basin water bodies assessments done in the different countries, possibly based on the Lithuanian methodology, forecast run-off for the entire basin
  - b. Agree on different joint scenarios on the future water use taking into account planned developments in the use of water resources as much as possible.
  - c. Perform water balance calculations.
- 4) Analyse the hydro-meteorological, hydro-chemical and hydro-biological monitoring systems in the transboundary basin, whether and how they can be optimized for monitoring climate change and extreme events
- 5) Assess and forecast climate change future impacts on water quality to the degree possible.
- 6)

The project outputs will include recommendations for transboundary water management for the basin and for a possible joint adaptation strategy. Discussions will also be held on coordinated adaptation measures/ coordination of river basin management plans.

### **Partners**

Facilitating organizations: UNECE (Ms. Sonja Koeppel)

Local partners: National institutions of the countries (Belarus: Research Institute for the Complex Use of Water Resources, Lithuania: Environmental Protection Agency)

Project duration: 2.5 years, Start: June 2010, End: December 2012

## **E) Jointly developing a transboundary climate change impact assessment in the Rhine**

The 1999 Rhine Convention, together with existing European Union (EU) and national legislation and policies and a strong political commitment in all countries in the Rhine catchment, provides a sound basis for developing and implementing an adaptation strategy on the impacts of climate change. Activities regarding adaptation to climate change have started with an assessment of the state of knowledge on climate change and its expected impact on the water regime in the Rhine, published in 2009. However, already in the 1990s, important measures were being taken regarding flood risk management, increasing the basin's adaptive capacity to respond to future expected climate changes.

Following the severe flooding in the Rhine in 1993 and 1995, the International Commission for the Protection of the Rhine (ICPR) developed and adopted a comprehensive "1998 Action Plan on Floods" covering the period up to 2020. In the context of the implementation of the 1998 Flood Action Plan, the flood damage risk (defined as the product of damage potential (€) and the probability of flooding (1 per year)) has been assessed. In addition, possibilities for reducing flood levels by implementing measures in the catchments' area have been identified. The resulting information was published in the "Rhine Atlas 2001" as one of the elements aiming at increasing peoples' "flood awareness". The flood forecasting system has also been improved, in particular by improved cooperation between water management administrations and weather services.

The Action Plan aims at improving the protection of people and property against floods and at the same time at improving the floodplains of the Rhine. Great efforts have been made towards implementing the Action Plan and almost all measures due to be implemented by 2005 have in fact been undertaken. Their positive effect is demonstrable. In 2007, Rhine ministers confirmed the need to develop adaptation strategies for water management in order to be able to address the effects of climate change, which are clearly discernible.

The implementation of the 1998 Flood Action Plan over the period 1995–2005 was evaluated in 2007. The assessments will be repeated once every five years, the next time covering the period 1995–2010.

### **Adaptation strategy for climate change impacts**

To assess the impacts of the modification of the climate on the hydrological processes and the regime of the Rhine, the Conference of Rhine Ministers charged the ICPR in 2007 to draft a scenario study for the flow regime of the Rhine. This was the starting point for the discussion on adaptation to climate change.

The main steps toward an Adaptation Strategy established by the ICPR are the following:

- Preparation of a synthesis of available literature (2009)
- Development of hydrological scenarios with the help of models (water discharges and temperature) (end of 2010)
- Assessment of the impacts on quality status and uses (2010-2011)
- Identification of possibilities to remediate impacts (2010-2011)
- Development of an adaptation strategy

The ICPR established the climate change expert group KLIMA in spring 2008. The group has mandate to develop hydrological scenarios and to discuss and evaluate climate change effects on the hydrological regime in the Rhine basin



A first step toward the Adaptation Strategy was an assessment of available information (2009) made by the expert group KLIMA entitled “Analysis of the state of knowledge on climate changes so far and of the impact of climate change on the water regime in the Rhine watershed”. This assessment revealed changes in parameters like flood levels and duration, low water levels and duration and water temperature over the last 3–4 decades. A second step, the development of common scenarios for these parameters using a complex mix of different models, will be finalized by the end of 2010.

The recently started assessment of the impacts on quality status and uses will use the hydrological scenarios as a basis and will be carried out in parallel by three thematic Working Groups (Flooding, Ecology and Chemistry). As example of impacts we can mention the increase of rainfall in winter, which increases the risk of flooding, the reduced water levels in summer, which lowers the efficiency of fish ladders at hydropower plants or the increased temperatures in summer, which impair the migration of fish.

The discussion on the Adaptation Strategy has not yet started and will need a horizontal working group involving key members of all thematic Working Groups and a close link to policy level. We can however already say that the eventual adaptation strategy will take account of experience gained with implementing the 1998 Flood Action Plan as well as the wider experience of the ICPR in protecting the Rhine. Synergies between flood protection and ecosystem and water quality improvements will be sought wherever possible, and problems, for e.g. drinking water supply and navigation due to low water levels, will also be addressed.

In this process, the ICPR has a coordinating and guiding role. The actual implementation of measures (including financing them) is the responsibility of the countries in the catchment area.

Contact:

Mr. Ben van de Wetering, International Commission for the Protection of the Rhine

## **F) AMICE: Adaptation of the Meuse to the Impacts of Climate Evolutions**

The Meuse is a transnational, navigable river, one of the largest in the North Western Europe, with a catchment basin incorporating five Member States. Its discharge fluctuates considerably with the seasons: in the winter of 1993 it reached 3100 m<sup>3</sup> per second at the Dutch/Walloon border where normally it is only 10-40 m<sup>3</sup> per second in summer. As a rain-fed river, the Meuse has no glacier and little groundwater storage capacity to cope with precipitation variability. This puts its economic activity, ecological status and priceless cultural heritage at risk.

The project is a unifying force in the Meuse basin, which stretches 950 km from the Langres plateau to Rotterdam. The 17 partner organisations (six river basin managers, six universities and research centres, three public administrations, and an NGO crisis centre) in the river catchment are all working on building a single overall strategy which requires reviewing, testing and quantifying. The partners are working towards a flood-proof, drought-proof understanding of how the Meuse will respond in the future to extreme water events. The International Meuse Commission is hosting the partner meetings.

The recently completed report on flood crisis management is the first ever comparison of crisis organisations and tools in the Meuse basin – fundamental for any timely, effective response to the challenges facing river management authorities and planners up and downstream.

Flooding has massive economic implication and causes huge damage to industry and severe disruption to infrastructures. The control of low waters is essential in the Meuse to guarantee energy production, with nuclear power stations along in Chooz (France) and Tihange (Belgium). Transport services, sustainable agriculture and the provision of drinking water (for 6 million people) all depend on stable water levels.

The AMICE project aims to minimise the economic, social and ecological impacts of climate change for densely populated and built-up floodplains, which – though it may not seem like it – are some of the most vulnerable areas in Europe, at risk from storms, intense rainfall and flash floods. Failure to respond is likely to bring about a reduction in external investment and depopulation. The project is expected to bring positive change for local populations.

### ***Achievements so far:***

- A book on transboundary water management along the river Meuse, first published in Dutch, was translated into French;
- A bibliography on hydrology of the river Meuse was developed;
- A report on hydrological scenario's: "Analysis of climate change, high-flows and low-flows scenarios on the Meuse basin was elaborated;
- Several small projects started, e.g. at the Steenbergse Vliet to improve ecological connections and water retention possibilities. Another project involved removing the top layer from a parcel of agricultural land in order to change it into a wetland.

### ***Difficulties encountered and lessons learnt***

- Modelling of the entire international river basin proves difficult at the frontiers (see below);
- It is useful to involve many stakeholders (17 partners in the AMICE-project), but this leads to challenges in coordination and communication, which were aggravated by difficult relations between some partners and stakeholders
- Importance of political support and willingness: It is uncertain whether AMICE's recommendations will be implemented after the project ends, for example by the International Meuse Commission
- Motivating stakeholders for starting cooperation is difficult, in this regard, financial incentives proved to be a very powerful means

## Hydraulic modelling of the river Meuse from spring to mouth (AMICE project action 6)

(author: Benjamin Dewals)

A questionnaire was sent to Partners concerned and the results processed. It showed fast that hydraulic models exist on the river Meuse from Neufchâteau down to Keizersveer, so almost from spring to mouth. Nevertheless, they differed very much in their type.

Only Wallonia uses a complete 2 dimensional model with the complete shallow water equations and with a fine grid spacing of 5 meters. The unsteady model *WOLF* is run in steady mode. This can be explained by the characteristics of the valley. The downstream part is nearly flat with large floodplains and a large storage capacity which is susceptible to damp the flood wave. An unsteady approach is necessary. An unsteady model is relevant as well in the most upstream part. In contrast, in the central part of the basin, especially where the river crosses the Ardennes, the valleys are much more narrow. It was verified that the storage capacity is so small that a damping of the flood wave can hardly happen. A steady approach makes sense.

A main concern was whether to run the models sequentially or in parallel. To run a hydraulic modeling in subcritical regime, one need to define boundary conditions (BC) both upstream and downstream. Therefore, it makes no sense to run the models sequentially because running models from upstream to downstream, one risks missing the boundary conditions downstream of each model. The same applies when running a model sequentially from downstream.

The peak discharge of the hydrograph used in France matches the uniform discharge used in the upstream reach of Wallonia, and the same applies between Wallonia and the Netherlands.

All models were run a first time using boundary conditions from extrapolated measured data. This was possible because high discharge values in the time series were available. With this methodology, finally consistent results at the borders were obtained.

### *Summary of the modelling process and results:*

- Set up of a transnational modelling methodology having required max. 2 runs of each model to achieve consistency of results across the borders
- Hydraulic simulations run for two time horizons, corresponding to the wet scenario identified in Ac3
- Sensitivity of water elevations with respect to perturbations in discharge :
  - higher in the central part of the basin
  - lower in the upper and lower parts of the basin
  - Mean changes in water depth in the ranges
    - 0.3 – 0.6 for 2021-2050
    - 0.5 – 1.3 m for 2071-2100
- Effect of damping and derivations on hydrographs between Borgharen and Roermond twice stronger for  $Q_{100} + 30\%$  than for  $Q_{100}$
- Reaches mostly contributing to the increase in flooded area as a result of climate change:
  - between Andenne and Monsin (W), especially Ivoz-Ramet - Monsin
  - Lanaken - Kessenich (FL/NL)

### **Contact:**

Ms. Martine Lejeune, RIOU asbl

Ms. Maïté Fournier, EPAMA

## **G) Dauria Going Dry: adaptation to climate change in transboundary headwaters of the Amur River Basin**

### **Background: of the project, situation, expected impacts, partners, level of advancement of the project and future plans:**

Dauria wetlands support globally significant populations of at least 20 bird species on the IUCN Red List of Threatened Species, including the Red-crowned Crane, and resting and feeding areas for several million migratory waterbirds. Indigenous 30-year climate cycle effectively drives the dynamics of Dauria ecosystems, but multiple manifestations of global climate change are also very evident there. Recent rapid socio-economic changes and loss of nomadic heritage in the Dauria Steppe makes ecosystems and local communities less resilient to naturally fluctuating resources and to droughts and floods which have become more extreme through climate change. Drastically different cultures, population density and mode of economic development and water use in the Russian Federation, China and Mongolia, make it very difficult to build transboundary mechanism to protect common water resources. Meanwhile risks for wetland ecosystems and dependent populations are further exacerbated by recent proposals for several inter-basin water transfer projects in the Argun River basin in China and Mongolia.

The Dauria International Protected Area (**DIPA**) was created by Mongolia, China and the Russian Federation in 1994 to protect and study ecosystems of the region. All three countries also have bilateral agreements on transboundary waters, which lack clear mutual obligations. Increasingly altered by human activities, the Argun River basin with Dalai Lake and the still relatively pristine Uldz River basin with Torey lakes form a great comparative pair for a study on transboundary water management options and climate adaptation in Amur River Headwaters.

The project coalition led by Daursky Biosphere (representing DIPA) and WWF Russia is aiming to harmonize transboundary river protection and management in Dauria through

1. -Strategic assessment of river management options in the light of climate adaptation
2. -Establishing wetland monitoring system in both Argun and Uldz basins
3. -Enhancement of protected areas network as one of key adaptation measures -
4. -Awareness raising program program on climate adaptation in transboundary Dauria.

The project seeks to develop and promote science-based adaptation measures to complex cycling climate of Dauria region, which is severely affected by global warming. The project addresses domestic and international policy-making, as well as selected conservation and monitoring practices in the field. It is also planned to create a platform for scientists from interested countries to advance understanding of dynamics in Dauria ecosystems under climatic and anthropogenic influences.

In 2010 the project formed partnerships with the Administration of the Zabaikalsky Province, the International Crane Foundation, the East Asian-Australasian flyway Partnership, the Rivers without Boundaries Coalition, the Institute of Natural Resources and Cryology of Russian Academy of Sciences, and a number of Mongolian and Chinese NGOs and researchers. Some project activities were granted support in 2011 from UNDP/GEF “Russian Steppe Conservation” Project administered by the Russian Ministry of Natural Resources.

#### **Achievements in 2010:**

- 1) Analysis of climate change influence on hydrology in Argun, Onon and Ulz River basins has been started based on hydro meteorological data, remote sensing data and field observations. Data on Torey lakes water regime, area and shape dynamics were derived from satellite imagery, Torey lakes water balance calculated for 1960-2009. WWF Mongolia contributed a study on climate change projections in Dauria for 2020, 2050 and 2080 determined by the models HADLEY and ECHAM and possible consequences for 3 transboundary rivers (Khakh, Kherlen and Onon).
- 2) Data collected on habitat and biota conditions on key water courses and water bodies during the dry phase of climate cycle.
- 3) Analyzed datasets on multi-year observations of wetland plant communities’ succession, abundance and breeding success of waterbirds, etc.

- 4) Developed most of an information base necessary to determine parameters of environmental flows on transboundary watercourses. Collected most relevant case-studies and methodologies from dryland rivers of the world (e.g. Australia, US, etc);
- 5) Developed monitoring system and established 3 field monitoring transects with more than 100 standard observation plots, which allow to discern changes in stream flow, water surface, plant communities succession under climatic fluctuations. Agreed with DIPA partners on transboundary monitoring effort.
- 6) Started establishment of International Bird Observatory: agreed on common monitoring protocols, developed network of observation points for bird migration and nesting periods.
- 7) Delivered Project-related reports at 3 international conferences and published 5 short papers.
- 8) Sustained collection and dissemination of project -related information via English and Russian - language web-sites: [www.arguncrisis.ru](http://www.arguncrisis.ru), [www.dauriarivers.org](http://www.dauriarivers.org) (web-site in Chinese under construction).

#### **Difficulties encountered:**

- Very difficult communication with officials on China side, to the point they officially refuse to recognize that Hailaer (Upper Argun) is a part of transboundary watercourse.
- High level of uncertainty in prediction of future conditions due to simultaneous action of 30-year climate cycle and global climate change
- Lack of awareness on climate cycle and climate change among stakeholders: officials and local population
- Lack of funding (failed to secure governmental contract on environmental flow research)

#### **Lessons learnt that could be of use for the other projects**

- Natural climate fluctuations indigenous to the area may mask presence of linear climate change
- Change in water temperature may affect river ecosystems earlier than change in flow volume (loss of habitat of native species and invasions of exotics)
- Poorly planned human activities initiated in anticipation of climate change (including some adaptation measures) may drastically hurt ecosystem much earlier and more severe than consequences of actual global climate change
- Riverine wetland conservation is an essential component in any basin-wide adaptation Programme and should first of all focus on protecting natural refugia during most unfavorable climate conditions and sustaining environmental flows.

#### **Need for technical support (models, methods, etc.)**

Legal advice on international law that could be foundation for climate adaptation and water management cooperation with non-UNECE neighbours (Mongolia and China)

Help in independent expert evaluation of some project-related materials (e.g. reports on climate change predictions, etc)

Help with climate change modelling if uniform models should be used in all pilots

#### **- Reflection on the Guidance: was it useful, in what respect, were any flaws or omissions found?**

Insufficient guidance on freshwater ecosystem conservation measures as a part of basin-wide adaptation program. Section on key wetland habitat conservation and environmental flow norms should be added\expanded.

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## **H) Development of the ICPDR Adaptation Strategy for the Danube River Basin**

### ***Background***

The ICPDR<sup>3</sup> is a transnational body established by the Danube River Protection Convention, comprising as contracting parties 14 Danube countries and the European Union. The ICPDR is charged with coordinating the trans-boundary aspects for the implementation of the EU Water Framework Directive (WFD) as well as the European Floods Directive (EFD) in the Danube River Basin.

At the Ministerial Meeting in February 2010, the Ministers of the Danube countries asked<sup>4</sup> the ICPDR to develop until the end of 2012 a Climate Change Adaptation Strategy for the Danube River Basin. This strategy should be based on a step-by-step approach and encompass an overview of relevant research and data collection, a vulnerability assessment, ensure that measures and projects are climate proof respectively “no regret measures” and ensure that climate adaptation issues are fully integrated in the second Danube River Basin Management Plan in 2015. Actions related to climate change adaptation in the Danube area are also supported in the frame of the EU Strategy for the Danube Region<sup>5</sup>.

### ***Working arrangements***

For the development of the strategy a team of voluntary experts is currently being set up. The team members are nominated by the Danube countries and by the ICPDR Observer Organisations (stakeholders from different sectors, NGOs and representatives from the scientific community). Several representatives are already nominated or indicated interest in participating in the activity. Germany took on the responsibility of leading the process and is financing a study with the following objectives:

- Summary of ongoing and finalised research and development projects on the adaptation of the water sector to climate change (climate scenarios, impact studies, risk analyses)
- Analysis and assessment of the material
- Identification of required adaptation actions on local, regional, national and international level

The study is developed in coordination with the nominated team of experts, followed by a planned workshop financed by the European Commission where the results will be broadly discussed. The study and the outcome of the workshop will constitute substantial input for the development of the ICPDR Climate Change Adaptation Strategy for the Danube River Basin, which will be drafted during the year 2012. It is planned that the strategy will be adopted by the Heads of Delegation of the ICPDR in December 2012 and thereafter provide an important basis for decisions on climate change adaptation measures to be part of the 2<sup>nd</sup> Danube River Basin Management Plan (Water Framework Directive) and the 1<sup>st</sup> Flood Risk Management Plan (European Flood Directive) to be finalised by 2015.

### ***Timelines***

- January/February 2011: Establishment of the team of voluntary experts
- January 2011 to December 2011: Development of climate change study financed by Germany
- Early 2012: ICPDR workshop on Climate Change Adaptation in the Danube River Basin
- January 2012 to December 2012: Drafting of Climate Change Adaptation Strategy
- December 2012: Adoption of strategy foreseen by the Heads of Delegation to the ICPDR

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<sup>3</sup> [www.icpdr.org](http://www.icpdr.org)

<sup>4</sup> Danube Declaration: <http://www.icpdr.org/icpdr-pages/mm2010.htm>

<sup>5</sup> EU Strategy for the Danube Region: [http://ec.europa.eu/regional\\_policy/cooperation/danube/documents\\_en.htm](http://ec.europa.eu/regional_policy/cooperation/danube/documents_en.htm)

- Thereafter: Implementation of the strategy, i.e. in the decision on measures for the 2<sup>nd</sup> Danube River Basin Management Plan (WFD) and the 1<sup>st</sup> Flood Risk Management Plan (EFD) to be finalised by 2015.

### ***Challenges and opportunities***

The Danube River Basin is with a catchment area of 800.000 km<sup>2</sup> one of the largest river basins in Europe and the most international river basin in the world. It is characterised by significant diversity in terms of landscape (e.g. Alpine area in the upstream-, Danube Delta in the downstream area), climatic conditions, political environments and economic realities.

These facts are posing a challenge for the coordinated adaptation to a changing climate since various activities which are currently being carried out on national and regional level have to be taken into account (e.g. EU, UNECE, Sub-basins, different sectors like navigation, hydropower or flood risk management). However, this variety also opens the opportunity of taking advantage of these ongoing activities in order to benefit from a broad range of experience.