River Basin Management from a Climate Policy perspective: case Neman

Aliaksandr Pakhomau, Central Research Institute for Complex Use of Water Resources of Belarus, UNECE Transboundary Project on Climate Adaptation
Pilot projects on adaptation to climate change in transboundary basins

The programme of pilot projects started in 2010, it aims at strengthening the capacity to adapt to climate change and to create positive examples demonstrating the benefits of transboundary cooperation in adaptation planning and implementation. They include joint impact and vulnerability assessment and the development of a basin-wide adaptation strategy.

Pilot projects on the Chu-Talas, Dniester, Sava and Neman are directly implemented by the Water Convention in the framework of the Environment and Security Initiative (ENVSEC) and in cooperation with other organizations such as UNDP, OSCE, UNEP, and WMO.
Short information about river basin

The Neman River Basin (NRB) territory is characterized by a large population size, a high concentration of industrial enterprises and other facilities, including oil/product/gas pipelines, a brisk growth of the hydropower engineering and agricultural sectors and active use of water resources.

This will changes in NRB-flow due to climate change resulting increased risks of dangerous hydrometeorological phenomena, including rain floods and droughts. The problem of low-water periods leading to droughts is more relevant for the NRB.
Goals of the project on river basin management and climate change adaptation in the Neman

• Improve integrated river basin management and transboundary cooperation in times of a changing climate in the Neman river basin.
• Strengthen the capacity to adapt to climate change of the riparian countries through supporting dialogue and cooperation on the needed steps to design an adaptation strategy in the transboundary context.
• Reach a common understanding on future water availability and water use taking into account possible climate change impacts.

Project objectives

• Assessment and forecast of water resources runoff under different climate change scenarios and economic development tendencies with regard to the use of water resources and industrial capacity for the Neman River basin;
• Proposals for common indicators of water bodies status (ecological and chemical), along with respective criteria (values), and systems for classification of water bodies’ state and parameters;
• Improvement of the integrated water resources management using the basin approach in the climate change context;
• Enhancement of transboundary cooperation, including improvement of exchange of information about water resources use between Belarus, Lithuania and Russia.
Main outcome

• Assessment of the current state of the water resources of the Neman River basin

Based on meteorological and hydrological information (average per day, per month season and annual)

Assessment period for current change in runoff and climate: 1961-2010

Assessment period for prognosis change in runoff and climate: 2021-2050
Main outcome

• Elaboration of common climate change scenarios and forecasting of runoff changes, water balances calculated and compared

• Climate change assessment, forecasting and mapping for the Neman River Basin with using multi-model ensemble CMIP5 based on the latest IPCC results of research - 2013 and with A1B and B1 scenarios (IPCC – 2007);
Main outcome

• Assessment and forecast of future climate change impact on water quality
Main outcome

• Assessment and forecast of future climate change impact on water quality

Assessment of projected climate change impacts on dissolved oxygen concentration in summer in the Neman River Basin (A1B scenario, projected in 2021–2050 to compare with 1965-2010)

- Neman - Grodno (upstream)
- Neman - Stolbcy (upstream)
- Vilna - Vileyka (upstream)
- Schara - Slonim (upstream)
- Lake Naroch - Naroch

<table>
<thead>
<tr>
<th>Location</th>
<th>DO (based on observed data and statistical analysis), mg/l</th>
<th>DO mg/l, (Weiss)</th>
<th>DO mg/l, (Benson and Krause)</th>
<th>DO mg/l, (Garcia and Gordon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neman - Grodno</td>
<td>-0.10</td>
<td>-0.05</td>
<td>-0.15</td>
<td>-0.05</td>
</tr>
<tr>
<td>Neman - Stolbcy</td>
<td>-0.20</td>
<td>-0.10</td>
<td>-0.25</td>
<td>-0.10</td>
</tr>
<tr>
<td>Vilna - Vileyka</td>
<td>-0.30</td>
<td>-0.20</td>
<td>-0.35</td>
<td>-0.20</td>
</tr>
<tr>
<td>Schara - Slonim</td>
<td>-0.40</td>
<td>-0.30</td>
<td>-0.45</td>
<td>-0.30</td>
</tr>
<tr>
<td>Lake Naroch - Naroch</td>
<td>-0.50</td>
<td>-0.40</td>
<td>-0.55</td>
<td>-0.40</td>
</tr>
</tbody>
</table>
Main outcome

• Analysis of the meteorological, hydrological, hydrochemical and hydrobiological monitoring systems in the Neman River basin

<table>
<thead>
<tr>
<th>Country (sub-portion of river basin)</th>
<th>New stations</th>
<th>Stations to be upgraded</th>
<th>Stations to be integrated in the overall system (additional to new or upgraded)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meteo</td>
<td>Hydro</td>
<td>Meteo</td>
</tr>
<tr>
<td>Belarus</td>
<td>1</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Lithuania</td>
<td>2</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Kaliningrad Ob.</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td><strong>16</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>
Main outcome

- Development of a common information platform (www.cricuwr.by/neman)
Main outcome

- Development of a common information platform (www.cricuwr.by/neman)

Structure of Internet platform

- Maps of the Neman River Basin
  - Hydrology
  - Meteorology
  - Water quality
  - Vulnerability assessment

- Requests to Databases
  - Hydrology
  - Meteorology
  - Water quality
  - Prognosis on climate change - Hydrology
  - Prognosis on climate change - Meteorology

- Expected impacts of climate change in the Neman river basin, the potential and possible adaptation measures
Main outcome

• Assessment of the Climate Change Impacts of Water Resources and other related natural resources and industries in the Neman River Basin

<table>
<thead>
<tr>
<th>Resource</th>
<th>Impact (risk) features</th>
<th>Adaptation potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water resources</td>
<td>High probability of exposure to the impacts of climate change and variability. Tendency towards a slight increase in the average annual runoff across the basin (with a decrease in Belarus). Increase in the intra-annual runoff redistribution. Decrease of runoff and earlier onset of spring flooding. Growth of probability of dangerous hydrometeorological phenomena (summer droughts and reduced water levels, summer and autumn rain floods). Increase in risks of damages from floods in the upper reaches of the Neman River on the territory of Belarus, in the western part of Lithuania and Kaliningrad Oblast of the Russian Federation, as well as across the basin in general with increased intensity of reclamation of the river flood plains. Increase in water temperatures and possible reduction of the content of dissolved oxygen, deterioration of the hydrobiological indicators of the state of water ecosystems, change in the regime of surface water levels.</td>
<td>Medium</td>
</tr>
<tr>
<td>Groundwaters</td>
<td>Increase in periods of rainfall floods and costs of flood-protection works. Risk of significant reduction of the runoff from small rivers (especially in summer), with lowering of water levels and deterioration of water quality as well as recreational potential. Deterioration of water quality in the Couronian Lagoon. Processes of river bank erosion. Accelerated wash-out of biogenic elements in drainage systems due to deterioration of their condition (mainly in Kaliningrad Oblast).</td>
<td>Low</td>
</tr>
</tbody>
</table>
Main outcome

• Assessment of the Climate Change Impacts of Water Resources and other related natural resources and industries in the Neman River Basin

Possible impacts of climate change in the Neman River Basin

Current adaptation potential: * (coordinated) basin-level actions are needed

- high
- medium
- low
Main outcome

• **Vulnerability assessment of the Neman River Basin to climate change**;
Main outcome

- Vulnerability assessment of the Neman River Basin to climate change;

Generalized map of vulnerability to climate change in the Neman River Basin with account of industries and natural resources.

Vulnerability

- 1
- 2
- 3

Rivers

Lakes

Runoff changes

increase

reduction
Main outcome

- Preparation of strategic framework for basin adaptation

Final versions of the Strategic Framework for the Neman River Basin Adaptation to Climate Change is prepared for publish in Russian, in Lithuanian and in English and was published in February – March 2016.
Main outcome

• **Development of the list of measures within the framework of Strategy of Adaptation to Climate Change in the Neman River Basin (NRB)**
  
  Adaptation measures will be included in the national Neman River Basin Management Plan (Belarus).
  Financing of climate change activities within the entire NRB basin in the frame of international cooperation is planned under International projects.
  Financing of the implementation of adaptation and other water management measure will be under realization of the NRB National Management Plans (Belarus, Lithuania) from the national budget, local budget and other not national sources including private companies and international projects.

• **Technical Protocol on cooperation in the field of water resources protection and use in the NRB between the Ministry of Environment of the Republic of Lithuania and the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus was prepared, discussed and preliminary approved;**
Main outcome

• Definition, discussion and preliminary approval of the list of joint actions (Belarus-Lithuania) for cooperation in 2016-2017 in the development of the joint international management plan for the Neman River Basin.

FUTURE PLANS (general content)

- Implementation of the Strategic Framework for the Neman River Basin
- Adaptation to Climate Change including realization of the next main activities:
  - Setting up an International Commission for the Neman River Basin;
  - Development and implementation of the joint international management plan for the Neman River Basin;
  - Improvement of water use and farming technologies in the context of the climate change;
  - Development and improvement of water supply and sanitation systems and improvement of economic mechanisms in this field;
  - Improvement and harmonization of the monitoring networks and monitoring programs including setting new automated hydrometeorological stations, information exchange and early warning systems;
  - Development of generating capacities using renewable energy sources.
Main outcome

• Definition, discussion and preliminary approval of the list of joint actions (Belarus-Lithuania) for cooperation in 2016-2017 in the development of the joint international management plan for the Neman River Basin.

FUTURE PLANS (short-term and medium-term content)

o Comparison and harmonization of the water bodies designation and classification, assessment systems of status of surface water bodies and groundwater;

o Designation of water bodies in the NRB;

o Classification and presentation of status of surface water and groundwater bodies;

o Identification of significant pressures and impacts of human activity on the status of surface water bodies and groundwater;

o Harmonization of environmental objectives;

o Comparison and harmonization of monitoring programmes;

o Coordination of measures to reach the environmental objectives for the water bodies of the in the NRB.
Regional cooperation examples

Global Water Partnership
INTEGRATED DROUGHT MANAGEMENT PROGRAMME
WORK PACKAGE 1, ACTIVITY 1.4, Output 4: Development of GIS
communication technology platform and database

- 30 GIS maps (short for Geographic Information System) of surface and
groundwater, human pressures and impacts, maps of climate change,
chemical and ecological status of water bodies
- Interactive map and database
- Video film on GIS mapping and transboundary cooperation

The GIS maps were shared among stakeholders in the project countries, and
they will be included in the second round of Neman's and Pregolya river
basin district management plans. The maps will be used in programmes run
by Lithuania and Poland under the EU Water Framework Directive.
Thanks to the collaboration, links have improved between water management
and GIS experts of the neighboring countries. During the first river basin
planning round (2009-2015) there was little cooperation between Lithuania,
Poland and their non-EU neighbors. The GIS project is a good example of
transboundary cooperation between EU and non-EU countries.
Regional cooperation examples

Global Water Partnership
INTEGRATED DROUGHT MANAGEMENT PROGRAMME
WORK PACKAGE 1, ACTIVITY 1.4, Output 4: Development of GIS communication technology platform and database

GIS MAPS OF TRANSBOUNDARY NEMAN AND PREGOLYA RIVER BASINS

Regional cooperation examples

Global Water Partnership
INTEGRATED DROUGHT MANAGEMENT PROGRAMME
WORK PACKAGE 1, ACTIVITY 1.4, Output 4: Development of GIS communication technology platform and database

Source: http://levis-gdb.sggw.pl/neman_pregolya/
### Proposed activities at international levels (draft proposal)

| Project Title: | Fostering multi-country cooperation and conjunctive surface and groundwater management in the Bug and Neman Transboundary River Basins and related aquifers |

**Project components**

1. Improve and harmonize the countries’ knowledge of the transboundary water resources, and of the expected impacts of increased climate variability and change.
2. Facilitating the establishment of cooperation mechanisms among countries sharing the basins and their water resources
3. Testing of conjunctive surface and groundwater management approaches
4. Facilitating countries commitment to joint priority actions
Thank you for attention

More information on:

Water and Climate Change website:
http://www.unece.org/env/water/water_climate_activ.html

Neman web-platform
http://cricuwr.by/neman