

## Terms of reference

Position:	National expert on modeling the impact of climate change and water management on water resources of Kazakhstan projected until 2100
Project name and reference number:	#00106780 Development of Kazakhstan's Eighth National Communication and Preparation of Two (Fourth and Fifth) Biennial Reports to the UNFCCC
Contract type:	Individual contract
Duty Station:	Home based
Period:	May – November 2021 (45 working days)

### Introduction

The Project “Development of Kazakhstan's Eighth National Communication and Preparation of Two (Fourth and Fifth) Biennial Reports to the UNFCCC” is being implemented by the United Nations Development Programme together with the Government of the Republic of Kazakhstan with financial support from the Global Environment Facility.

The Project will enable Kazakhstan to prepare and submit national reports to the UN Framework Convention on Climate Change - the Eighth National Communication (8NC) and two Biennial reports (BR4 and BR5). The Project is working to prepare information on climate change in Kazakhstan, calculate greenhouse gas (GHG) emissions and on measures taken by the country to reduce them, assess climate change vulnerability and efforts to adapt, raise public's awareness, train specialists and etc. The Project is also trying to involve the public in climate change issues by increasing technical and institutional capacity in GHG inventory, GHG emission forecasting, vulnerability assessment and, in general, NC / BR preparation, as well as assisting the Government in integrating climate change issues into sectoral and national development priorities.

### Rationale

Water is one of the most important elements for human life, and water resources are one of the major drivers of the country's economy. The issue of water shortage has long been recognized all over the world and is being actively studied, especially in the light of climate change and ensuring country's security.

An important point to mention here is that more than 50% of Kazakhstan's total water resources originate outside the country, including the largest rivers of Kazakhstan: the Ural, Irtysh, Syrdarya and Ili originate or partly flow in other states. Meanwhile, those originating in Kazakhstan are mostly small. Climate change also significantly changes the volume of water resources.

Considering the above, it is necessary to assess the impact of climate change on water resources, assess their vulnerability, including the characteristics of the current economic use of water resources in the regions of Kazakhstan and predict the further use of water resources in the face of climate change.

### Objective

Estimation and analysis of the state of water resources under the influence of climate change projected until 2030, 2050 and up to 2100. For 8 water basins (WB) of the Republic of Kazakhstan: Esil, Nura-Sarysu, Tobol-Turgai, Zhayik-Caspian, Aral-Syrdarya, Shu-Talass, Ertiss, Balkhash-Alakol.

### Specific tasks

An expert assessing the impact of climate change on water resources of Kazakhstan performs the following types of work:

- Stage 1. Methodological preparation of the study for the purposes of national communication
  - Create a methodology for forecasting the impact of climate change on water

resources;

- Justify the methodology for the withdrawal of water resources for water management needs;
- Create a scheme for interfacing the methodology and research on the use of WB.

Stage 2. Modeling the river flow of the selected sections of the WB with the statistical method and using the HBV hydrological model.

- Model the river flow using scenario-based climate change (sums of precipitation and air temperature) projecting until 2030, 2050 and 2100.
- Incorporate the forecast data on the withdrawal of water resources for economic needs;
- Process and visualize the modelling results.

Stage 3. Development of the final technical report on the results of studies on the impact of climate change on water resources of Kazakhstan

- Analyze the changes in the river flow of the WB of Kazakhstan under the influence of climate until 2100.
- Develop a technical report on the results of analysis of the impact of climate change on water resources of Kazakhstan (including analysis of the impact of changes in water resources on the microclimate). Separately provide key graphic and tabular material.

Stage 4. Dissemination of information on results of the study.

- Analytical article.
- Material for making infographics.
- Three presentations for a workshop on the study findings for climate change professionals and the general public.

No.	Tasks and outputs	Expected working days	Expected time period	To be reviewed and approved by:
1.	<p>Methodological preparation of the study for the purposes of national communication</p> <p>i) Create a methodology for forecasting the impact of climate change on water resources;</p> <p>ii) Justify the methodology for the withdrawal of water resources for water management needs;</p> <ul style="list-style-type: none"> <li>• Create a scheme for interfacing the methodology and the study on the use of WB and collect statistical data</li> </ul> <p><i>Result 1: Analytical report with the methodology and statistical data on water resources (at least 10 pages)</i></p>	10 days	1 month after contracting	Project Manager and Adaptation Team Leader

2.	<p>Modeling the river flow of the selected sections of the WB with the statistical method and using the HBV hydrological model.</p> <p>i) Model the river flow using scenario-based climate change (sums of precipitation and air temperature) projecting until 2030, 2050 and 2100.</p> <p>ii) Incorporate the forecast data on the withdrawal of water resources for economic needs;</p> <p>iii) Process and visualize the modelling results.</p> <p><i>Result 2: Hydro-climatic model of Kazakhstan</i></p> <p><i>Result 3: Analytical report: "Forecast of the state of water resources of the Republic of Kazakhstan".</i></p>	20 days	4 months after contracting	Project Manager and Adaptation Team Leader
3.	<p>Development of the final technical report on the results of studies on the impact of climate change on water resources of Kazakhstan.</p> <p>i) Analyze the changes in the river flow of the WB of Kazakhstan under the influence of climate until 2100.</p> <p>ii) Develop a technical report on the results of analysis of the impact of climate change on water resources of Kazakhstan (including analysis of the impact of changes in water resources on the microclimate). Separately provide key graphic and tabular material.</p> <p><i>Result 4: Final technical report</i></p>	10 days	6 months after contracting	Project Manager and Adaptation Team Leader
4	<p>Dissemination of information on results of the study.</p> <p>i. Analytical article</p> <p>ii. Material for making infographics</p> <p>iii. Three presentations for a workshop on the study findings for climate change professionals and the general public</p> <p><i>Result 5: Media article for a wide range of readers and analytical article for a scientific journal</i></p> <p><i>Result 6: Materials for the workshop</i></p>	5 days	7 months after contracting	Project Manager and Adaptation Team Leader

**Payment schedule:**

%	Outputs
20%	Outputs 1
30%	Outputs 2 и 3
20%	Outputs 4
30%	Outputs 5 и 6

**Organizational structure:**

The Expert will work closely with the Project team. Expert duties include:

- The Expert shall perform tasks within the Terms of reference timely and with due quality;
- The Expert shall plan activities timely and rationally, perform work and achieve results set within the Terms of reference;
- If necessary, the Expert will hold online consultations with the Project team during the entire period of the Terms of reference;
- The Expert is responsible for the quality of the materials prepared within the Terms of reference;
- The Expert shall fulfil the requirements of the individual contract.

**Deadline to perform tasks**

The contract will be signed for a period of 7 months (45 working days). All the tasks specified above shall be performed within the time period from May till November 2021. The Project Manager and experts will provide their comments and recommendations/approvals within 1 week from the report submission dates.

**Duty station**

Home-based. The work will be carried out at the place of residence/location of the expert.

Abduvakkos Abdurahmanov

Abduvakkos Abdurahmanov  
Programme Specialist and GEF Portfolio Manager  
Date: 11-Mar-2021

Gulmira Sergazina

Gulmira Sergazina  
Project Manager  
Date: 08-Mar-2021