



Eurasian Development Bank

# The Irtysh River Basin: Transboundary Challenges and Practical Solutions

Report 25/2

Almaty — 2025

# THE IRTYSH RIVER BASIN: TRANSBOUNDARY CHALLENGES AND PRACTICAL SOLUTIONS

## KEY FINDINGS

ANALYTICAL REPORT '25/2

### TRANS-BOUNDARY RIVER IRTYSH CONNECTS CHINA, KAZAKHSTAN AND RUSSIA IN A SINGLE HYDROLOGICAL SYSTEM



**4,248 km**  
river length



**91.5 km<sup>3</sup>**  
volume of average annual river runoff



**1.65 mln km<sup>2</sup>**  
total area of the Irtysh basin



**17 mln people**  
population living in the Irtysh basin

### DEMOGRAPHY AND GEOGRAPHY — FACTORS INCREASING COMPETITION FOR WATER RESOURCES IN THE IRTYSH BASIN



**China**  
**1/3**  
of XUAR's\*  
water resources



**Kazakhstan**  
**1/3**  
of the total water resources



**Russia**  
**90%**  
of water use —  
Omsk and Omsk region

Increase in water withdrawal amid population growth and vulnerability to water stress

Black Irtysh outflow at risk of complete withdrawal

Risk of environmental disaster in case of excessive water withdrawal in China

Setting limits on inflows from China and transit to the Russia

Tense water and environmental situation in the regions bordering Kazakhstan

Risk of water deficit spreading throughout the river basin in dry years

\* XUAR — Xinjiang Uygur Autonomous Region

### COORDINATION — BASIS FOR WATER BALANCE AND QUALITY IN THE IRTYSH BASIN

#### 1 Strengthening of bilateral co-operation

- Inclusion in the bilateral agreements between Kazakhstan and China and Kazakhstan and Russia of key provisions of international conventions

#### 2 Soft infrastructure development

- Joint monitoring
- Exchange of hydrological information
- Joint research
- Joint training

#### 3 Investment projects coordination

- Shulbinsk HPP, 2<sup>nd</sup> stage
- Semipalatinsk HPP
- Modernisation of the Irtysh-Karaganda Canal
- Krasnogorsk hydrosystem

#### 4 Russia-Kazakhstan-China corridor

- Restoring shipping
- Access to sea routes
- New ports
- New shipyards

### TRILATERAL AGREEMENT — OPTIMAL SOLUTION



Eurasian Development Bank

Vinokurov, E., Ahunbaev, A., Chuyev, S., Adakhayev, A., Sarsembekov, T. (2025) *The Irtysh River Basin: Transboundary Challenges and Practical Solutions*. Report 25/2. Almaty: Eurasian Development Bank.

## **Abstract**

The water resources of the Irtysh River and its tributaries play a key role in the livelihood of almost 30% of the population of Kazakhstan. For Russia, the basin is also of great importance, especially in the context of water supply for the steppe areas of the Omsk region and the city of Omsk. For China, the basin represents a strategic source of water to meet the growing needs of the Xinjiang Uygur Autonomous Region. In order to effectively use transboundary water resources, the three countries need to take comprehensive measures to maintain an ecologically safe level of natural flow in the face of increasing competition for water resources. The Irtysh basin needs comprehensive measures to maintain an environmentally safe level of natural flow throughout the basin under conditions of increasing competition for water resources. The main regulatory measure could be to strengthen bilateral co-operation between Kazakhstan and Russia, as well as Kazakhstan and China, while taking into account the key provisions of international conventions. It is recommended that joint monitoring be implemented, that hydrological information be exchanged, that data transparency be ensured, that joint studies be conducted, and that the use of transboundary water management and transport and logistics infrastructure be coordinated and planned. Of particular interest is the initiative to create a full-fledged multimodal transport corridor connecting Russia, Kazakhstan and China. This project could assist in maintaining the optimal water balance of the Irtysh River and preserving its ecosystem. It has the potential to serve as a foundation for the development of trilateral co-operation principles.

**Keywords:** Irtysh, transboundary water basin, water resources, transport corridor.

**JEL:** F50, N55, Q25, Q53, R41

*The report is based on research conducted by leading institutions in Kazakhstan (the Institute of Geography and Water Security under the Science Committee of the Ministry of Science and Higher Education) and Russia (the Institute of Water and Environmental Problems at the Siberian Branch of the Russian Academy of Sciences). It also draws on strategic documents, concepts, and materials from bilateral meetings and discussions with relevant government officials.*

Reprinting and other forms of copying of the text in whole or in part, including large fragments, as well as posting it on external electronic resources, are permitted with the obligatory reference to the original text.

The electronic version of the report is available on the website of the Eurasian Development Bank: <https://eabr.org/analytics/special-reports/>

© Eurasian Development Bank, 2025



The XUAR's own water resources are estimated at 26.3 km<sup>3</sup>/year, which, according to the norms, can provide water for only 18 million people. In other words, the shortage of water is already evident today. It is anticipated that the population of XUAR will continue to grow in the future. This will inevitably lead to a significant increase in demand for water, food and electricity. Water withdrawal, according to various sources, may increase from the current 1.5–2.0 km<sup>3</sup> to 7 km<sup>3</sup> per year from 9.5 km<sup>3</sup> average annual natural flow. Moreover, projects aimed at transferring water to the XUAR from water-surplus regions of China, construction of new reservoirs, dams, irrigation canal systems, conduits, tunnels, and hydropower plants, and expansion of the capacity of existing reservoirs, dams, irrigation canals, tunnels, and hydropower plants are still likely to be implemented. There is a risk of complete withdrawal of runoff.

In **Kazakhstan**, the water resources of the Irtysh and its tributaries play a pivotal role in the country's economic development. It is a source of livelihood for almost 30% of the population. The basin produces about 45% of Kazakhstan's agricultural output. The Irtysh HPP cascade provides 10% of the country's total electricity generation (80% of hydropower). The projected increase in water withdrawal by China has a direct impact on the economic and environmental situation in the Kazakhstan part of the basin. Possible risks associated with flow withdrawal are significant. In the absence of adequate compensatory measures, an ecological catastrophe may occur: a drop in the level of Lake Zaisan, degradation of the unique floodplain, increased concentration of pollutants, worsening of the epidemiological situation, damage to fisheries and agriculture, industry, the energy sector and other sectors of the economy. In this regard, Kazakhstan in a bilateral format is strengthening co-operation in the Irtysh basin with China and Russia. At the national level, projects for the construction of new reservoirs and hydroelectric power plants are being developed, and water-saving technologies are to be introduced everywhere. An initiative to restore navigation is being promoted. Kazakhstan experts consider the possibility of introducing new principles and norms of water allocation in the basin aimed at fixing water allocation limits with China and Russia.

For **Russia** the active water policy of the upstream countries — Kazakhstan and China — is of decisive importance. It is expected that if China increases withdrawal volumes up to 4.35 km<sup>3</sup>, in a low-water year with 95% water availability, the flow of the Irtysh River coming from the territory of Kazakhstan may decrease almost twice — up to 12.8 km<sup>3</sup>. The flow deficit at the boundary gauging station will spread throughout the river. The predicted changes in the quantity and quality of resources in the next decade pose serious challenges to the socio-economic development of Russia's border regions. This especially concerns the main industrial centre — the city of Omsk and the adjacent Omsk municipal district, which account for 80% of total water withdrawal and 90% of water use in the region. Reduced water flow and increased wastewater disposal may reduce the physical self-purification potential of the Irtysh River water.

The transboundary nature of the Irtysh River means that effective water resources management requires strategic partnerships and co-operation between the three

countries — Kazakhstan, Russia and China — that share the river basin. Practical forms of interaction are needed that meet common interests in order to contribute to economic integration and the resolution of social and environmental problems in the basin. These practical measures can be structured in four main areas.

First of all, it is crucial to **strengthen bilateral interstate co-operation** between Kazakhstan and Russia, as well as between Kazakhstan and China. In this process, it will be vital to incorporate the **key provisions of international conventions into national water legislation and intergovernmental agreements**. The co-operation programmes could include such areas as: ensuring international navigation on the Irtysh River and further down the Ob River; combating water pollution and regulating the safe use of bodies of water; improving the efficiency and safety of water use in periods of floods, low water and drought. Consequently, this approach will establish the requisite legal framework and enable the signing of a trilateral agreement between the countries.

A trilateral agreement is the most optimal solution to strive for. It will create an institutional platform for co-operation, and subsequently allow for more effective transboundary water management and improved security of water use in the river basin. Important task of such agreement is to build mechanisms to maintain water quality in the river itself and a rational water balance for each party. There are prospects for such interaction. Globally, many states have made some progress in adopting watercourse agreements at the basin and sub-basin levels, establishing multilateral mechanisms for joint management. Such mechanisms have been established for more than 40% of international watercourses. One of the possible platforms for the formation of a trilateral agreement is the Shanghai Co-operation Organisation.

Second, within the framework of bilateral co-operation, it is important to **emphasise the development of soft infrastructure**. In transboundary river basins, water use and protection issues should be addressed from the perspective of the unity of the entire river basin and economic integration. It is necessary to establish a system of international integrated monitoring covering a number of issues: formation of water resources; functioning of hydraulic engineering structures (HES); spatial and temporal regimes of HES use, including passportisation of hazardous industries; and declaration of hydraulic safety. It is important that bilateral co-operation programmes be based on a unified and transparent system of monitoring of the Irtysh River flow, all data of which would be available to all parties for making rational decisions on water management. Such a monitoring system would facilitate the creation of a link for effective data exchange and information dissemination. The formation of a coordinated system of training and retraining of personnel seems expedient. It is strategically important to attract interdisciplinary researchers from Kazakhstan, China, and Russia, as well as to establish an interstate research centre on water resources of the transboundary Irtysh River basin.

Third, the **coordinated operation of existing hydraulic structures** (*HPPs, dams, reservoirs, irrigation canals, water supply systems, etc.*) and **planning of future**

**structures** deserve special attention; this is necessary to ensure an appropriate water level to restore the ecological diversity of the Irtysh basin. Priority projects should be aimed at ensuring stability of water supply in the Irtysh River basin without compromising water resources in other countries are also a priority. Such promising projects can be identified. Among them: construction of the 2nd stage of the Shulbinsk HPP in Kazakhstan; construction of the Semipalatinsk HPP (*formerly Bulak HPP*) in Kazakhstan; reconstruction and modernisation of the *Irtysh-Karaganda Canal (named after K. Satpayev)* in Kazakhstan and construction of the Krasnogorsk hydrosystem near the city of Omsk in Russia.

Fourth, a strategic dimension is the creation of a **full-fledged Russia–Kazakhstan–China multimodal transport corridor**, utilising the navigable potential of the rivers of the Ob–Irtysh basin. The Ob and Irtysh rivers can become a link between the Northern Sea Route and the Silk Road, and integrate Eurasian transport corridors into the global transport system. The new multimodal corridor will connect the landlocked countries of Central Asia and the north-western regions of China to Russia’s inland territories and further to the Arctic Ocean. Such a transit route provides additional opportunities for increasing freight traffic and boosting mutual trade. As of today, Kazakhstan and Russia have already started preparing programmes to develop the corridor. A preliminary project for the creation of a Russia–Kazakhstan–China multimodal transport corridor has been jointly developed. Kazakhstan has approved at the national level a roadmap for the development of this corridor with a specific list of investment projects, which are part of the overall strategy for the development of transport and logistics infrastructure until 2029.

This initiative is of interest to all three countries of the Irtysh River basin and can become a basis for trilateral co-operation. An important condition for the integrated use of water transport potential of the Irtysh corridor is the achievement of trilateral agreements (*China–Kazakhstan–Russia*) on the regulation of the Irtysh water regime during the navigation period and the establishment of an international river navigation authority. Such co-operation will facilitate the formation of interstate mechanisms for coordinated water resources management in the Irtysh basin.