Water Resources a Factor of the Geopolitical Integration of Russia and the Countries of Central Asia

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Abstract. In the post-Soviet space, mutual interests of the spatial and resource integration of Russia, Kazakhstan and the former Soviet republics of Central Asia remain. The main factors of integration are compact location, mutual interests in economic development, transport integration. The uneven distribution of water resources plays a huge role in the development of the economies of the Central Asian countries. The main water resources of Central Asia are formed in the Pamir mountain system; Tajikistan, Kyrgyzstan have 80% of the water resources of Central Asia and Kazakhstan. In Russia, the main water resources of the Ob-Irtysh system are formed in the lower reaches of the Ob (up to 70% of the water flow). At present, the transfer of a part of the flow from the Irtysh River (from Russia to Central Asia) is impossible: the water content of the Irtysh River has significantly decreased. Not only Kazakhstan, Uzbekistan and Turkmenistan are experiencing water shortages, but also the southern regions of Western Siberia (Russia). The theoretical possibility of transferring part of the water flow of the rivers of the Ob-Irtysh system to the southern regions of Western Siberia and Northern Kazakhstan, where the need for water resources also increases, is considered. The problem can only be solved by a coordinated international water policy and the introduction of effective hydrotechnical technologies (with the participation of Russia).

Keywords: Geopolitical integration · Russia · Central Asia · Water resources · Water flow management and water protection

1 Introduction

After the collapse of the USSR, Kazakhstan and the countries of Central Asia (Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan) embarked on the path of independent political and economic development. Within the framework of the USSR, the countries had a similar structure for the organization of a planned economy, the distribution of labor, as well as their place in the industrial and agricultural sectors of a large single country. The exchange of goods and services, trade took place within the USSR. Cotton was considered a strategic raw material for the USSR. The structure of agriculture in Uzbekistan and Turkmenistan was largely subordinated to the tasks of the USSR, and

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these republics developed cotton growing on irrigated lands to the detriment of subtropical crops. Extensive agriculture required more and more water, which already in the 1970s and 80s led to significant negative changes in the landscape and degradation of the Amudarya and Syrdarya rivers and the entire geosystem of the Aral Sea. It has been estimated that about 70% of developmental problems in the region are caused by freshwater shortage [1, 2]. The countries of Central Asia are still united by a single problem of lack of water resources.

2 Materials and Methods

The review of this problem was carried out by the author, taking into account the materials of meetings on the problem of water resources of the countries of Central Asia [3] (Okruzhayushchaya sreda, voda i bezopasnost' vs. Tsentral'noy Azii (2002) (Environment, water and security in Central Asia)/Report of the UN EEG and REC, Almaty), the current state and prospects of the flow volume of the Amudarya rivers and the Syrdarya (Amudar'ya obzor (Amudarya review) https://unece.org/fileadmin/DAM/env/water/meetings/Assessment/Almaty%20workshop/pdf/breakout_session/surface/Amudarya_overview_rus.pdf. Accessed 30 Jun 2021; Programma basseyna Aral'skogo morya (Aral Sea Basin Program) http://ru-ec-ifas.waterunites-ca.org/aral_basin/107-vodnye-resursy-podrobnaya-informaciya.html). Accessed 30 Jun 2021). The issues of formation of the runoff volume of the Ob-Irtysh river system are also considered [4]. Based on the analysis of the state of water resources, the possible role of Russia in optimizing the water problems of the countries of Central Asia and Kazakhstan is assessed.

3 Results

The countries of Central Asia and Kazakhstan have rebuilt their economies over the 30 years of their independent existence: China, the economically developed countries of Western Europe and the United States now account for a significant share in the structure of exports [5]. Traditionally, Kazakhstan gravitates toward Russia, especially important are the transport routes of the railways, through which the transit and export of products of the Republic of Kazakhstan to other countries (in particular, to China) is carried out. The most difficult economic situation is developing in Uzbekistan, Tajikistan and Kyrgyzstan—due to their peripheral position, relative poverty in minerals, mainly in raw material exports. Tajikistan and Kyrgyzstan are mountainous countries with a small percentage of productive and arable land; a significant part of the territory of Uzbekistan is occupied by desert and semi-desert landscapes. The low development of the economy of these countries gives rise to poverty, political instability, the threat of drug trafficking (we should not forget about the proximity of unstable Afghanistan). Integration programs for Kazakhstan and the former Soviet republics of Central Asia exist both within the framework of an independent bloc of these countries (for example, SPECA—the UN Special Program for the Economies of Central Asia), and in a bloc with Russia (EAEU, SCO). It should be noted that the EAEU (Eurasian Economic Union), which has existed since 2015, currently includes 5 countries—the Russian Federation, Armenia, Belarus,

Kazakhstan, Kyrgyzstan. Uzbekistan partially joined only in 2020 (observer status). This union does not include Tajikistan and Turkmenistan. Turkmenistan is not a member of the SCO (Shanghai Cooperation Organization); it seems that the possibilities of its integration with Russia are minimal. How can Russia increase its geopolitical influence in Kazakhstan and the Central Asian republics? Only by developing partnerships, helping to cover the shortage of resources necessary for life, primarily water resources. The water problem is one of the leading geopolitical problems in the arid territories of Central Asia and Kazakhstan. Surprisingly, it was on this land in the early and late Middle Ages that the developed states of the interfluve of the Amu Darya and Syr Darya (Khorezm, Kushan kingdom) existed with their high level of irrigation culture (canals, ropes, reservoirs, etc.). The motto of the rulers of that time was "If you want to rule the country, first learn how to manage water" [3].

It should be noted that the countries of Central Asia and Kazakhstan have very significant differences in water supply, in the distribution of resources of general and local river flow. Mountainous countries (Tajikistan and Kyrgyzstan) have significant water potential (Table 1).

Table 1. Water resources and their distribution within the countries of Central Asia and Kazakhstan (2021)

Country	Area, thousand km^2	Population, million people	Water resources, km^3		Water supply, thousand m^3/km^2
			Total	Local	
Kazakhstan	2725.0	19.2	90.0–100.0	50.8	34.9
Turkmenistan	488.1	5.5–6.1	25.0–26.3*	1.3	53.3
Uzbekistan	447.4	35.1	50.0–60.0	12.2	122.9
Kyrgyzstan	200.0	6.7	51.9**	50.0	258
Tajikistan	141.4	9.5	64.0***	57.6	452.6

* Of which 22 km^3 is the runoff of the river. Amu Darya
** Total reserves of about 2450 km^3, including water in glaciers and lakes
*** Total reserves of about 890 km^3, including water in glaciers and lakes

The paradox is that there is a lot of water in Central Asia. But what is this water and how exactly is it consumed?

Without affecting the waters of the Caspian Sea, the largest inland water body (the water is brackish, requires expensive water treatment for use in drinking water supply and industry), these are, first of all, the resources of the Pamir and Alay glaciers, the flow of resources of the Pamir and Tien Shan rivers (Amu Darya, Syr Darya, Zeravshan, Chu and others). About 75% of the flow of the Amu Darya (the largest river in Central Asia) is formed in Tajikistan. The total average annual flow of all rivers in the Amudarya basin (with the exception of the Zeravshan River) is estimated at about 74.22 km^3. In accordance with the runoff probability of 5% (in years of high humidity) and 95% (in dry years), the annual runoff can be from 102 to 55.1 km^3 (Amudar'ya obzor

(Amudarya review) https://unece.org/fileadmin/DAM/env/water/meetings/Assessment/Almaty%20workshop/pdf/breakout_session/surface/Amudarya_overview_rus.pdf. Accessed 30 Jun 2021). According to other data, from 58.6 to 109.9 km^3 (in dry and high water years, respectively) (Programma basseyna Aral'skogo morya (Aral Sea Basin Program) http://ru-ec-ifas.waterunites-ca.org/aral_basin/107-vodnye-resursy-podrobnaya-informaciya.html). Accessed 30 Jun 2021). Estimated regional groundwater reserves in the Amudarya basin are 14.7 km^3. Reserves approved for production are estimated at 7.1 km^3 per year. The total volume of actual groundwater extraction in the basin is about 4.8 km^3 (Amudar'ya obzor (Amudarya review) https://unece.org/fileadmin/DAM/env/water/meetings/Assessment/Almaty%20workshop/pdf/breakout_session/surface/Amudarya_overview_rus.pdf. Accessed 30 Jun 2021). The Syr Darya is the second in terms of water content and the first in length in Central Asia. The flow of the Syr Darya is formed in the mountainous part of the territory of Kyrgyzstan (74%). The Syr Darya crosses Uzbekistan and Tajikistan and flows into the Aral Sea in Kazakhstan. The volume of river runoff in the Syrdarya basin: average annual 37.2 km^3/year; 95% security per year—23.5 km^3; in years of 5% supply—up to 51.1 km^3 (Programma basseyna Aral'skogo morya (Aral Sea Basin Program) http://ru-ec-ifas.waterunites-ca.org/aral_basin/107-vodnye-resursy-podrobnaya-informaciya.html). Accessed 30 Jun 2021). The pre-dominant source of food for most rivers is the melt water of seasonal snow cover, with a smaller proportion of water from glaciers, as well as rainwater. It should be noted that it is in the modern era of climate warming that the flow of rivers in Central Asia increases: "in 1957–2000. The Pamir and Alay glaciers, the main sources of river runoff, have lost approximately 20–25% of their accumulated ice reserves over the centuries. Climate warming over the next quarter of a century will most likely lead to intensive melting of glaciers with the irreversible loss of even more ice and a temporary increase in water flow in rivers with predominantly glacial nutrition" [3]. After a significant reduction in glaciers, the water content of the Amudarya and Syrdarya rivers will decrease; this will exacerbate existing water management problems in all five countries of the region. Beginning with the laying of the Karakum Canal (1930s) and especially with massive irrigation construction in the 1950s and 1960s, more and more irrigated lands were included in agricultural circulation in the Central Asian republics. In an arid climate, they sooner or later turned into unproductive salt marshes and barren lands, sharply reducing their productivity. The diverted collector waters filled the Sarykamysh depression (Lake Sarykamysh) and the Arnasay lowland (Lake Aydarkul). The ecological balance in most water bodies of Central Asia and the Aral Sea basin was maintained approximately until the mid-1960s. "In 1966–80. The increase in irrigated land in the region amounted to more than two million hectares, and the final figures for the five Central Asian republics on the eve of the collapse of the USSR (1990) look even more impressive: irrigated areas increased by 1.7 times, and agricultural production—three times. However, from 1960 to 1990, the total water intake in the Aral Sea basin increased from 60.6 to 116.2 cubic meters, km per year, which is equal to the average long-term value of surface water resources formed within the entire basin of the Amudarya and Syrdarya rivers" (Okruzhayushchaya sreda, voda i bezopasnost' vs. Tsentral'noy Azii (2002) (Environment, water and security in Central Asia)/Report of the UN EEG and REC, Almaty). This led to significant anthropogenic desertification. "The share of saline

irrigated land has reached 50% in Uzbekistan and 37% in Turkmenistan. Due to wind, water erosion and secondary salinization, agricultural land in Central Asia has decreased by 16.4 million ha. The area of desertified and degraded lands in Kazakhstan is 179.9 million ha, or 66% of its territory, and in Turkmenistan and Uzbekistan—up to 80%" (Okruzhayushchaya sreda, voda i bezopasnost' vs. Tsentral'noy Azii (2002) (Environment, water and security in Central Asia)/Report of the UN EEG and REC, Almaty). The Aral Sea is a periodically drying body of water. It actively began to be replenished with fresh water from the Amudarya about 127 thousand years ago (the turn of the Amudarya from the Caspian Sea to the Aral Sea in the xerothermal paleoclimatic epoch QIV). The low water period lasted from about the 3rd century to the end of the 17th century, then for about 150 years an intensive rise in sea level was observed. All travelers of the 19th century note (both themselves and according to local residents) that from about 1820–1830 the level of the Aral Sea began to decline. At one time, this was the subject of scientific discussions among geographers—is Central Asia drying up?

Lake Issyk-Kul in the 18th century was also much higher and dumped excess water into the Chu River; which, in turn, did not get lost in the sands, but reached the Syr Darya River and, ultimately, also contributed to the increase in the water content of the Aral Sea. Nevertheless, despite the natural tendencies of lowering the water level, until the 1960s, the level of the Aral Sea fluctuated slightly around the mark of 53.5 m relative to the level of the World Ocean, the volume of the sea was 1066 km^3, the area was 66000 km^2. Since the 1970s, a catastrophic drop in the level begins and significant sections of the bottom are exposed. By 2010, the sea level dropped by 27 m, the area decreased by 7–8 times, and the volume—by 12–13 times. The mineralization of waters before the level decrease was 9–10 g/l, at present in the western basin it is 114–117 g/l (up to 132 g/l at the bottom). In the eastern basin, before its final drying up after 2008, the mineralization reached 211 g/l! [6]. At present, the extreme western hypersaline reservoir remains from the Aral Sea, with waters unsuitable for economic use, and the Small Sea in Kazakhstan, separated from the general basin of the Aral Sea by a dam (replenished by the waters of the Syr Darya). Sea. The Aral Sea disaster is a clear lesson to all mankind about the need to take care of water. Unfortunately, given the current climate situation and prevailing water use in Turkmenistan and Uzbekistan, the restoration of the Aral Sea will not happen in the coming centuries. The republics of Central Asia need water, and it will be especially relevant in the near future, when the water yield of the glaciers and snowfields of Pamir-Alay will significantly decrease. Water can be obtained in two ways—the first and most important is to reduce the intensity of irrigation of irrigated lands and reduce water losses from irrigation canals, to carry out restoration measures to improve the water quality of Sarykamysh and Aydarkul lakes (in the future, in order to use their water resources). Create a small reservoir in the southern part of the Aral Sea, fencing it off with a dam from the north-eastern part of the former sea and bring the waters of the Amu Darya to the remains of the Great Aral. The second way is to request water from Russia. But how much water can Russia supply from the Ob-Irtysh basin without harming the ecology of the rivers and without harming the water supply of its cities and other facilities in the basin of these rivers? The Ob-Irtysh basin covers an area of 2194.4 thousand km^2 within Russia. The basin is rich in surface water resources, the average annual runoff of which is estimated at 405 km^3. More than 9 km^3 is taken for

water use, on average, 300–500-fold dilution of wastewater is carried out. The average figures are encouraging, but let's not forget about the spatial distribution of runoff. The runoff resources of the Ob-Irtysh basin are unevenly distributed. If along the Syrdarya and Amudarya rivers up to 85% of the runoff is formed in the upper reaches; then, in the Ob-Irtysh river system, 68% of the runoff falls on underdeveloped taiga and forest-tundra lands. In the southern part of the basin, closest to Kazakhstan and the republics of Central Asia, water consumption is very high (the industrial Chelyabinsk, Sverdlovsk, Kemerovo and Tyumen regions are located here (coal, oil and gas production, ferrous metallurgy, engineering, mechanical engineering and chemical industry), as well as the agro-developed Altai Territory, Omsk, Kurgan and Novosibirsk regions). In the steppe and forest-steppe parts of the basin, only 1–2.5% of the runoff is formed [4]. There is an acute shortage of water resources (especially for the Omsk and Chelyabinsk regions). Given the above, we can conclude that there is no excess water in the Irtysh. The planned canal to Kazakhstan and Central Asia will have to be run from the lower reaches of the Ob, which will significantly increase the cost of construction and transfer, and hence the price of water. During the late Soviet era, the project to divert part of the flow of northern rivers to the south was canceled as inefficient and environmentally uncalculated (estimated at $20 billion). Sooner or later it will be necessary to build this canal (or conduit). This canal will primarily supply low-water areas in the south of Western Siberia and the southern Trans-Urals. The Russian cities of Yekaterinburg, Chelyabinsk and Omsk need water for their development. It is quite possible to extend the canal (or conduit) to Northern Kazakhstan, incl. The capital of the Republic of Kazakhstan is Nursultan (Astana). From a geopolitical point of view, this would even be desirable. But water from the Ob-Irtysh system will not reach Central Asia; this is impractical and inefficient (construction costs increase, when laying a channel, evaporation and seepage increase). It should not be expected that with the help of the transfer of water from the Ob river system it will be possible to fill the dried-up Aral Sea. The flow volume of the rivers of the Ob-Irtysh system is now completely different from what was accepted for calculations in the early 1980s; it is also decreasing (both due to global warming and due to increased water intake from the regions of Russia and the Republic of Kazakhstan—in the upper reaches of the Irtysh and Ishim rivers). Water in Central Asia is still used inefficiently. A simple transfer of water will not solve the problem—it will "leave into the ground" and will contribute to further anthropogenic desertification. New dead reservoirs will appear, filled with brine from sewage and sewage water.

The problem of water scarcity cannot be postponed for a long time. Climate change in the near future will inevitably lead not only to an increase in temperature, but also to an increase in social tension in countries with a shortage of water resources [7].

4 Conclusions

Central Asia and Kazakhstan are connected by waterways—the Amu Darya and the Syr Darya. Countries should pursue a coherent water policy, i.e. distribute the water resources of the two main rivers in the region: the Syr Darya (in Kyrgyzstan, Uzbekistan and Kazakhstan) and the Amu Darya (in Tajikistan, Uzbekistan and Turkmenistan). The three downstream countries (Kazakhstan, Turkmenistan and Uzbekistan) consume huge

amounts of water to grow cotton. Downstream countries need more and more water for their expanding agricultural sector and growing population. The upstream countries of Kyrgyzstan and Tajikistan need water for power generation, farming, and see water as a valuable commodity for downstream neighbors. In this situation, Russia's technological assistance in resolving water issues, rational and fair distribution of water resources, and reducing losses of local runoff is very important. Also, Russia can provide scientific and technical assistance in changing the structure of water resources management in the water-deficient republics—Kazakhstan, Uzbekistan, Turkmenistan. It is necessary to consider the possibility of building a water conduit from the lower Ob region to the water-deficient territories of southern Russia. It also seems possible to transfer part of the flow of the lower Ob to the northern territories of Kazakhstan. Assistance in solving the water problems of Kazakhstan and the countries of Central Asia will help to strengthen Russia's position in this region.

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