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МУНДАРИЖА | СОДЕРЖАНИЕ | CONTENT

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THE IMPORTANCE OF LAND RECLAMATION IN SOLVING THE FOOD PROGRAM IN THE COUNTRIES OF CENTRAL ASIA

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ABSTRACT

On the basis of numerous sources, a quick summary of the current condition of water use in Central Asian countries is offered, as well as descriptions of both advantages and disadvantages of the phenomena and processes were described. The essay emphasizes the need of reclamation work for sustainable agriculture in light of current concerns such as climate change, population growth, water and land scarcity. The severity of the water problem in the Central Asian region necessitates the search for solutions for the parity use of water on an interstate basis using civilized methods were analysed.

Key words: water, water balance, river flow, habitat, basin, interstate agreement, water-saving technologies

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Introduction: For many regions of the world, water is a strategic resource because it is of particular vital importance. Life and economy are completely dependent on water resources, include Central Asia. Taking into account the existing political and geographical relations in the modern understanding, Central Asia is a common name for Kyrgyzstan, Turkmenistan, Tajikistan, Uzbekistan and partly Kazakhstan, and its area is 2% of the Earth's territory. The water resources of the countries of Central Asia are formed due to the flow of transboundary rivers, which for the most part is formed in some countries, flows through the territory of others, and is used by others. Therefore, the water use of each country in the Central Asian region is not autonomous and independent. It has always covered all aspects of mutual cooperation and was based on diplomatic, economic and good neighborly relations between peoples and countries using the common water system of the Aral Sea basin.

The boundaries of the basin include four countries - Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, and also partially include the southern part of Kazakhstan and the northern parts of Afghanistan and the Islamic Republic of Iran.

Table 1 – Territorial characteristics of the Aral Sea basin

Countries	Area, thousand km^2	in percentages
Kyrgyzstan	199,9	7,4
Tajikistan	142,5	5,3
Turkmenistan	491,2	18,2
Uzbekistan	449,3	16,7
Kazakhstan	1103,3	41,0
Total within Central Asian countries	2386,2	88,6
Afghanistan	243,0	9,0
Islamic Republic of Iran	65,0	2,4
Total for the Aral Sea basin	**2694,2**	**100**

Often, the water resources of Central Asian countries are formed on the territory of some states, flow through the territory of others and can be used by third countries. These include water resources in the area of the Amu Darya River basin. The Amudarya River is the main and largest river in terms of water content in Central Asia. From its source to the confluence of the Pyanj and Vakhsh rivers, it is called Vakhandarya, and the total length of the river is 2620 km. After the confluence of the Pyanja and Vakhsha rivers, the river is called Amudarya and has a length of 1415 km to the mouth, of which 744 km the river flows through the territory of Turkmenistan.

In total, the average annual surface runoff in the Amudarya River basin is 79,500 million m^3. In accordance with the probability of increased runoff (up to 30%) in years of high humidity and decreased runoff (up to 70%) in dry years, annual runoff can vary from 103.3 to 61.1 km^3.

Agriculture, which accounts for between 10 and 45 percent of the region's GDP, depends on water. Moreover, it employs from 20 to 50 percent of the working population.

A drought is approaching Central Asia, which could lead to a shortage of drinking and irrigation water, a reduction in fodder and melon crops, a decrease in yield, and a shortage of electricity. Already, in many areas of the region there is an increase in food prices, including seasonal vegetables. If such negative dynamics continue, the food security of the region will be at risk.

The water problem in Central Asia has become especially acute in recent years. The region has been experiencing extreme heat for several seasons in a row. Water shortages are hitting agriculture. Due to rising food prices, not only the socio-economic situation of the local population, but also the food security of the Central Asian republics was under attack.

The situation is aggravated by the “chronic diseases” of the region associated with the distribution of water and the deterioration of the water supply infrastructure.

According to the UN Food and Agriculture Organization (FAO), water reserves in the countries of Central Asia per capita are sufficient (about 2.3 thousand m^3). The problem is not scarcity, but misuse.

The aridity of climatic conditions and the transboundary nature of the main water sources determine the exceptional importance of the water sector of the economy, since fresh water resources are a vital and key factor in the economic and social development of the country and the stability of the entire Central Asian region.

Central Asia is one of the ancient regions of development of irrigated agriculture. Irrigated agriculture in the Aral Sea basin existed four thousand years till now.

The land resources of the Central Asian countries account for 4% of the total world area. Kazakhstan has the largest area and highest proportion of farmland in the region, with 77.5% of the country used for crop and livestock production. Then come the Republics of Turkmenistan and Uzbekistan.

The total area with constructed irrigation systems in the five countries of Central Asia covers 10.0 million hectares, which is 3.3% of the irrigated areas in the world. This area represents 73% of the area with irrigation systems in all 54 African countries combined (13.7 million hectares). Two-

thirds of the areas with irrigation systems are located in Uzbekistan and Turkmenistan, while such areas in Kyrgyzstan and Tajikistan together account for 19%. The Aral Sea basin contains most of the areas with built systems - almost 9.8 million hectares or 75% of the total area. Without Afghanistan, this figure rises to 85%. Areas with fully regulated irrigation amount to 9.15 million hectares and are by far the most common form of irrigation in Central Asia, accounting for 91% of areas with built irrigation systems.

In the Central Asian region, 33% of the total cultivated area is irrigated, compared to 20% in the world. The highest level of irrigation is in Turkmenistan: 102% of sown irrigated land (в Туркменистане: 102% посевных орошаемых земель); The area of irrigated land exceeds the cultivated area, since it includes irrigated permanent pastures, while permanent pastures are not included in the category of cultivated areas.

Turkmenistan is followed by Uzbekistan - 89% of irrigated areas and Tajikistan - 85%. In Kazakhstan, the irrigated area under cultivation is only 9%.

Irrigation in Central Asia is based on a system of reservoirs, pumps and canals and is one of the most technically complex in the world.

The main source of irrigation water in Central Asia is surface water, averaging 92.6% with a range from 82% to 99.8%. The fairly developed engineering irrigation and drainage system of Central Asia, built over the period from 1960 to 1990, includes a widely developed network of gravity irrigation over an area of more than 7 million hectares with large gravity irrigation canals with a head flow rate of up to 700 m^3/s and the length of individual up to 1400 km, as well as mechanical irrigation systems on an area of more than 2 million hectares with unique cascades of machine canals with a water lift height of up to 350 m and flow rates of up to 350 m^3/s.

The specific length of main and inter-farm canals in the region is 17.93 m/ha, of which 28% have anti-filtration coatings, 77% of water intake structures on these canals are equipped with water meters. The efficiency coefficient (COP) of off-farm irrigation systems on average for the region is 0.77 and varies across republics from 0.62 (Tajikistan) to 0.83 (Kazakhstan and Uzbekistan). The specific length of on-farm irrigation networks is 33.8 m/ha. Of these, about 21% are reinforced with trays, closed pipelines and other types of anti-filtration coatings.

The length of the on-farm network varies across the republics from 18 m/ha (Turkmenistan) to 40 m/ha (Tajikistan and Uzbekistan), and the efficiency of the on-farm network from 0.7 (Turkmenistan) to 0.75 (Kazakhstan and Uzbekistan). The weighted average efficiency of on-farm systems is 0.73. The efficiency of irrigation systems in general varies between 0.54-0.74 and corresponds to an average of 0.64. In terms of technical level, on-farm systems differ sharply from each other depending on the stages of development. Systems built in the last 35-40 years are mostly represented by trays lined with channels, closed pipelines, and have an efficiency factor of 0.82-0.85.

Half of the cultivated land is in oases (they are naturally drained and have fertile soils). The other half of the land requires a complex and expensive reclamation measures, including not only drainage and leveling, but also improving the soil structure.

The unirrigated area (pastures, meadows, fallow lands) covers about 54 million hectares. This includes 2 million hectares of rainfed arable land, but their productivity on average is no more than one tenth of the productivity of irrigated land.

Currently, rainfed lands do not play a significant role in the gross agricultural production of the Aral Sea basin, with the exception of an extensive livestock system (cattle and sheep). However, increasing the productivity of rain-fed lands is an important task. Some crops (for example, grain) that are currently intensively grown in irrigated areas can be transferred to rain-fed areas, thereby significantly reducing the amount of irrigation water withdrawn from the basin.

Land is distributed unevenly across countries: Kazakhstan and Turkmenistan have enough land, while the other three countries have a shortage of land. A “land deficit” appears in Tajikistan and Kyrgyzstan and in some regions of Uzbekistan (Khorezm, Samarkand, Fergana Valley).

FAO reports say that Central Asian countries are among the top ten water consumers in the world: Turkmenistan (5319 m^3/year), Kazakhstan (2345 m^3/year), Uzbekistan (2295 m^3/year), Kyrgyzstan (1989 m^3/year), Tajikistan (1895 m^3/year). In addition, to obtain a unit of production in

the agriculture of Central Asian countries, 2.5-3 times more water is consumed than in developed countries.

Central Asia, unfortunately, ranks lowest in terms of water use efficiency in world rankings. International experts are confident that with the wise use of water and land resources in the countries of the region, 56% of water can be saved.

All Central Asian countries are vulnerable to the effects of climate change. Insufficient precipitation in arid regions makes the land unproductive, so irrigation is necessary. Irrigation farming is the oldest method of growing crops, allowing for stable harvests in areas with insufficient seasonal rainfall.

With the development of irrigation, new phenomena arise that were not previously typical for this territory. Irrigation changes hydrogeological conditions, water-physical and chemical properties of soils. Irrigation has a multifaceted impact on the nature of the area: it transforms the climate, vegetation, micro- and mesorelief, soils and their water regime. Some transformations as a result of irrigation are beneficial and significantly increase crop yields, while some have an adverse effect, causing degradation processes.

Among the unfavorable phenomena and processes that can arise as a result of irrigation are the rise of groundwater levels, secondary salinization, alkalinization, destructuring, and over-compaction of soils. In irrigation systems, the phenomenon of irrigation erosion is widespread; high peptization of the clayey substance of the arable horizon is observed, as well as its removal into the subsolonetz horizon, low porosity, active crust formation, and irrigation carbonization.

The situation is aggravated by salinization, swampy soils, ineffective water accounting, and low coefficient of irrigation networks, leading to water loss. Meanwhile, due to salinization and waterlogging of irrigated lands, a huge amount of water is spent on leaching of saline lands.

In order to avoid negative phenomena and processes on irrigated lands, it is necessary to take into account the natural, climatic and soil conditions of each area and carry out specific reclamation measures for irrigation, and ensure sustainable management of soil resources.

In addition, most often farmers do not have the incentive or desire to abandon traditional methods of irrigated agriculture in favor of water-saving technologies. There are also no analytical tools for assessing the availability of irrigation water for making rational decisions.

In the climatic conditions of Central Asia, farmers should switch to improved irrigation methods. This will save 20-25% of water in each household. Drip and sprinkler irrigation, which have begun to be used more actively on farms, are also feasible and cost-effective.

To track water consumption, digital water metering technologies, geographic information systems, remote sensing and water metering monitoring are being introduced. It is necessary to introduce innovative technologies to assess the productivity of water used, from the farm level to the basin level.

Another area of solution is agricultural practices that help save water resources. This is the use of laser leveling, ridge sowing, and leaving plant residues.

Summary: In conclusion, it is worth noting that in the countries reviewed, the legislative framework for the wider introduction of water conservation is being intensively developed. For the broader development of a water conservation system, it is important for all states in the region to:

- establish close ties and cooperation in the exchange of information, achievements and innovative solutions in water conservation;
- establish country indicators for the use of water conservation based on needs, financial capabilities, technical implementation, etc.;

References:

1. Духовный В.А., Мухамеджанов Ш.Ш., Саидов Р.Р. Орошение и дренаж в странах Центральной Азии, Кавказа и Восточной Европы. Ташкент 2017.
2. Sh. Khamraev, V. Dukhovny, A. Kadyrov, V. Sokolov Water Resources Management in Uzbekistan. Tashkent, 2011.

3. Орошаемое земледелие Узбекистана Существуют ли резервы водообеспеченности для устойчивого развития. НИЦ МКВК, Ташкент, 2017
4. CAWATERinfo. Водно-экологический портал Центральной Азии. www.cawater-info,net/daily/
5. Станчин И.М. Проблема использования водных ресурсов в среднеазиатском регионе// Проблемы рекультивации отходов быта, промышленного и сельскохозяйственного производства: IV международная научная экологическая конференция. 2015. С. 722-726.
6. FAO. 2011. The state of the world's land and water resources for food and agriculture (SOLAW) – Managing systems at risk. Food and Agriculture Organization of the United Nations, Rome and Earthscan, London. Ссылка: https://www.fao.org/3/i1688e/i1688e00.htm (дата доступа: 06.09.2022)
7. Land and water use options for climate change adaptation and mitigation in agriculture. SOLAW Background Thematic Report - TR04A. Ссылка: www.fao.org/fileadmin/templates/solaw/files/thematic_reports/TR_04a_web.pdf (дата доступа: 22.08.2022)
8. ФАО, МФСР, ЮНИСЕФ, ВПП и ВОЗ. 2022. Краткий обзор. Положение дел в области продовольственной безопасности и питания в мире – 2022. Переориентация политики в области продовольствия и сельского хозяйства в интересах повышения экономической доступности здорового питания. Рим, ФАО. https://www.fao.org/documents/card/ru/c/cc0640ru
9. Dankova, R., Burton, M., Salman, M., Clark, A.K. & Pek, E. 2022. Modernizing irrigation in Central Asia: concept and approaches. Directions in Investment, No. 6. Rome, FAO and The World Bank. https://doi.org/10.4060/cb8230en
10. ФАО. 2021. Состояние мировых земельных и водных ресурсов для производства продовольствия и ведения сельского хозяйства: системы на пределе. Сводный доклад 2021. Рим. https://doi.org/10.4060/cb7654ru