



**National Committee on Irrigation and Drainage
(UzNCID)
Ministry of Water Resources of the Republic of Uzbekistan**

IRRIGATION AND DRAINAGE IN REPUBLIC OF UZBEKISTAN HISTORY AND MODERN STATE



**Towards the 70th anniversary of the
International Commission on Irrigation and Drainage**

Tashkent 2020

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UZBEKISTAN: BACKGROUND INFORMATION

Along with Liechtenstein, Uzbekistan is one of the only two doubly landlocked countries in the world. Uzbekistan has an area of 448,840 square kilometers. Uzbekistan lies between latitudes 37° and 46° N, and longitudes 56° and 74° E. It stretches 1,425 kilometers from west to east and 930 kilometers from north to south. Bordering Kazakhstan and the Aral Sea to the north and northwest, Turkmenistan to the southwest, Tajikistan to the southeast and Kyrgyzstan to the northeast, Uzbekistan is one of the largest Central Asian states and the only Central Asian state to border all the other four. Uzbekistan also shares a short border (less than 150 km) with Afghanistan to the south.



Figure 1. Map of Uzbekistan

Uzbekistan is Central Asia's most populous country. Over 33,725 million people live in Uzbekistan (1 October 2019) – about half of total population in Central Asia. Rural population is 49,5 % and urban – 50,5 %. The population of Uzbekistan is very young: 34.1% of its people are younger than 14. According to official sources, population in Uzbekistan representing more than 130 ethnic and linguistic groups among which Uzbeks comprise a majority (80%) of the total population. Uzbek language is the official state language.

Republic of Uzbekistan administratively encompasses: The Republic of Karakalpakstan, 12 veloyats (provinces), 159 tumans (rural districts), 119 large and average cities, 114 urban-type settlements, and 1472 villages. Major cities include Andijan, Bukhara, Samarkand, Namangan and the capital Tashkent.

Uzbekistan declared its independence from Soviet Union on August 31, 1991. The Republic of Uzbekistan is a presidential constitutional republic. The government exercises executive power. Legislative power is vested in the two chambers of the Supreme Assembly, the Senate and the Legislative Chamber (Parliament).

The most territory of Uzbekistan has a continental, dry (arid) climate, with little precipitation expected annually (100–200 millimeters). The average summer high temperature tends to be 40 °C, while the average winter low temperature is around –23 °C. Less than 10% of its territory is intensively cultivated irrigated land in river valleys and oases. The rest is vast desert (Kyzyl Kum) and mountains.

WATER RESOURCES OF UZBEKISTAN

In Uzbekistan, available water supply is formed by renewable surface and underground waters of natural origin, as well as by return water of anthropogenic origin. Water resources are mainly formed in the transboundary river basins.

The Amudarya is the biggest river in Central Asia. Its length from the headwaters of the Pyandzh to the Aral Sea is 2540 km, with a catchment area of 309000 km². It is called the Amudarya from the point where the Pyandzh joins with the Vaksh. Three large right tributaries (Kafirnigan, Surhandarya and Sherabad) and one left (Kunduz) flow into the Amudarya river within the middle reach. Further downstream towards the Aral Sea it has no tributaries. It is fed largely by water from melted snow, thus maximum discharges are observed in summer and minimum ones in January-February. In terms of sediment the Amudarya carries the highest load of all the rivers in Central Asia and one of the highest levels in the world. The main flow of the Amudarya river originates on the territory of Tajikistan. The river then flows along the border between Afghanistan and Uzbekistan, across Turkmenian territory and then again returns to Uzbekistan where it discharges into the Aral Sea.

In terms of water availability the Syrdarya is the second most important river in Central Asia but the largest in terms of length. From the Naryn headwaters its length is 3019 km, with a catchment area of 219000 km². Its headwaters lie in the Central (Interior) Tien-Shan mountains. The river is known as the Syrdarya after the point where the Naryn joins with the

Karadarya. The river has glacial and snow feeding, with a prevalence of the latter. The water regime is characterized by a spring-summer flood, which begins in April. The largest discharge is in June. The main part of the Syrdarya run-off originates in the Kyrgyz Republic. The Syrdarya then flows across Uzbekistan and Tajikistan and discharges into the Aral Sea in Kazakhstan.

Flow distribution over zones of formation within the states is done with help of GIS technologies. Data presented show (Table 1) that in Kyrgyz Republic 25.1%, in Tajikistan-52%, in Uzbekistan-9.6%, in Kazakhstan-2.1%, in Turkmenistan-1.2%, in Afghanistan and Iran-10% of total surface resources are formed. Thus, it is clear that Uzbekistan very depended from his upper neighbors for water, as well as country has own available water resources less than 20% of demanded for uses.

**Table 1. Total natural river flow by origin in the Aral Sea basin
(multiyear flow, km³/year)**

State	River basin		Aral Sea basin	
	Syrdarya	Amudarya	km ³	%
Kazakhstan	2.426	–	2.426	2.1
Kyrgyz Republic	27.605	1.604	29.209	25.1
Tajikistan	1.005	59.578	60.583	52.0
Turkmenistan	–	1.549	1.549	1.2
Uzbekistan	6.167	5.056	11.223	9.6
Afghanistan and Iran	–	11.593	11.593	10.0
Total Aral Sea basin	37.203	79.280	116.483	100

The total land area in the Republic of Uzbekistan is 44,892.4 thousand hectares, which are divided into 8 categories depending on the purpose and procedure for using land, including: agricultural land; lands of settlements; lands for industry, transport, communications, defense and intended for other purposes; lands of environmental protection, health and recreation; lands of historical and cultural significance; lands of the forest fund; lands of water fund; land stock.

Agricultural lands belong to fertile lands, are considered the main means of national wealth, agricultural production and ensuring food security of the country. The total area of agricultural land is 20,236.3 thousand hectares, of which arable land is 3988.5 thousand hectares, perennial plantings - 383.1 thousand hectares, fallow lands - 76 thousand hectares, hayfields and pastures - 11028.3 thousand hectares, other lands - 4760.4 thousand hectares.

Due to the arid climate, agricultural production is almost entirely dependent on irrigation, and only about 752,900 hectares (18%) of arable land are rainfed.

Table 2: Socio-Economic Indicators of the Republic of Uzbekistan

Total Area	448,900 km ² , 55th country in the world according to a size of its territory
Population	33,724,500 persons as of 1 October 2019 (42th in the world); an average density – 74.1 persons per one sq. km.
National Currency	UZ Sum (1 USD = 9,516 UZ SUM; for 25 December 2019). 05.09.2017 – liberalization of currency market.
Gross Domestic Product (GDP)	407,514.5 billion UZ Sum or 50,485 billion USD in 2018 Pattern of GDP (2018): Agriculture – 28,8%, Industry – 28.4%, Services – 31,6%, Net taxes– 11.2%
Industry (including Construction)	Total production: UZ Sum 115,818 billion (2018)
Agriculture	Total production – UZ Sum 117,315 billion (2018), including: the crop sector – 53,2%; livestock sector – 46,8%
Key Agricultural Production	Raw cotton, wheat, vegetables, fruits, grape, melons, silk, astrakhan fur, meat, eggs, and milk
Key Export Goods and Their Share in Export in 2018	Raw cotton (3.4%), energy resources (13.8%), services (25.2%), nonferrous and ferrous materials (6.6%), machinery and equipment (2.6%), chemical production (6.4%), foodstuffs (6.3%), other (35.7%)
Key Goods for Import in 2018	Machinery and equipment (38.9%), energy resources (5.7%), chemical production (16.5%), services (7.5%), nonferrous and ferrous materials (9.8%), foodstuffs (9.8%), other (11.8%)
Rating in the World Economy	7th place in cotton lint production, 2nd place in astrakhan fur production, 4th place in gold reserves, 7th place in gold extraction, 7th place in uranium mining, and 14th place in gas production
Data Source	The State Committee of the Republic of Uzbekistan on Statistics: www.stat.uz

WATER NEEDS AND USE IN UZBEKISTAN

The current annual water demand of all sectors of the economy is about 64.2 km³ (see table 3 below). In the long run, the demand for drinking water supply from industry, industry and rural areas will increase, while in irrigated agriculture it will decrease due to water-saving technologies and measures to increase fertility. At the level of 2030, the total required water volume for Uzbekistan should not exceed 60.1 km³ per year.

According to the Basin Master-Plans (Schemes), the limit (quota) of Uzbekistan as a whole for the basins of the Amudarya and Syrdarya rivers is 63.02 km³ / year with a 100% availability. In case of less water availability in dry years, water withdrawal limits are reduced.

Table 3. Actual and prospective water consumption (demand) by sectors in Uzbekistan (million m³ per year)

Water consumers (by priority)	Total water requirement	including by source		
		Surface Water	Underground Water	Return Water
2018				
Domestic utilities	5320	2200	3120	0
Industry	1885	855	1030	0
Rural water supply	485	415	70	0
Fisheries	640	460	0	180
Energy	770	770	0	0
Irrigated Agriculture	55100	50000	1100	4000
Total	64200	54700	5320	4180
2030				
Domestic utilities	6200	2450	3750	0
Industry	3500	1580	1920	0
Rural water supply	950	810	140	0
Fisheries	640	460	0	180
Energy	780	780	0	0
Irrigated Agriculture	48000	46800	700	500
Total	60070	52880	6510	680

Source: Scheme for the Integrated Use of Water Resources of the Republic of Uzbekistan until 2027. Consolidated explanatory note. Association "Vodproekt" under the Ministry of Water resources of the Republic of Uzbekistan. Tashkent. 2018.

The country's total annual water withdrawal in the 1980s was about 66.1 km³. After gaining independence, Uzbekistan clearly shows a tendency to decrease in water consumption and water withdrawal. In particular, during the period 2011-2015, the total water intake amounted to about 53 km³ per year (Table 4). However, in the last two years it has fixed at level about 55 km³ per year.

Table 4. Dynamics of actual water withdrawal from rivers (million m³)

1960		1980		1990		2000		2010		2018	
Total	Irrigation	Total	Irrigation	Total	Irrigation	Total	Irrigation	Total	Irrigation	Total	Irrigation
30780	27900	64910	55510	56611	58156	53265	35687	56611	44718	54700	50000

It should be noted that the population of the republic from 1980 to the present time has grown from 15 million people to more than 33.7 million people. As a result of population growth, the specific indicator of water consumption per person significantly reduced.

An analysis of the use of the water withdrawal limit shows that since 2005 Uzbekistan receives water on average 85.0%, and in dry years, like 2008 and 2011, about 70-75% of the total annual limit.

Present-day irrigated farming remains one of the most important economic sectors in Uzbekistan, which provides 15.3% of GDP; but what is the most significant that it is the factor of social stability under ensuring 28% of employment (as of 2018).

Thanks to understanding of the social value of irrigation and the wise state policy in the water sector over years of independence, Uzbekistan has managed to maintain its irrigation potential.

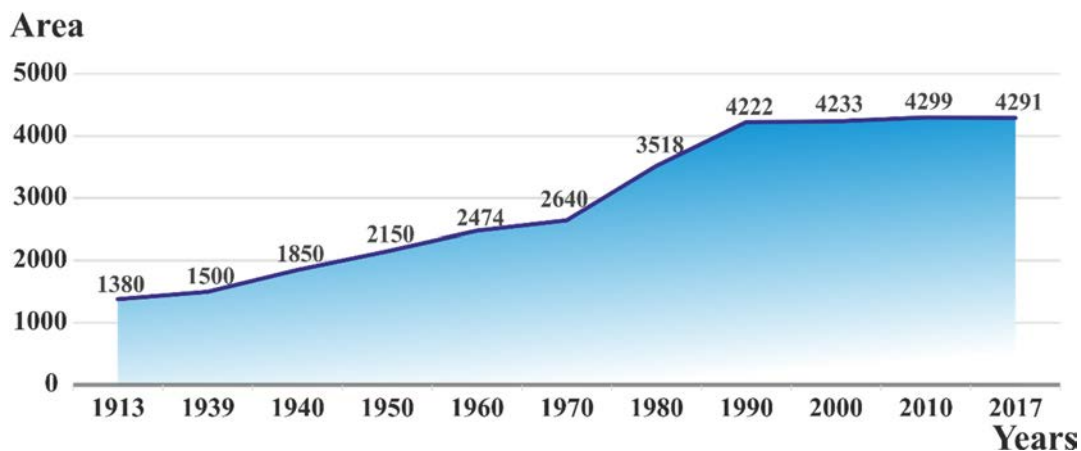


Figure 2. Trends of Irrigation Development in Uzbekistan (area, 000' ha)

IRRIGATION DEVELOPMENT IN UZBEKISTAN BEFORE INDEPENDENCE

In order to understand the value of irrigation for nations of Uzbekistan it is necessary to review, once more, the history of water development.

Archaeological studies testify that ancient spring irrigation along river bed and liman irrigation in the Amudarya and Syrdarya deltas represents the modern irrigation practice in its first stages. Over the centuries the local population was improving the skill of irrigation, water diversion from rivers, and water applications on fields under crops. In Uzbekistan, the folk proverb says: “Where there is water there life exists.” Indeed, in those places where there is water the oases are flourishing, cities are growing, agriculture and industry are in progress, but where there is not water there are only barren deserts.



Figure 3. Remnants of the Ancient Bridge – Water Divider in the Zarafshan Valley (Shodman Malik, the 16th Century AD)

In the Middle Ages, engineering practice of water resources management that included water diversion from large rivers with constructing various water intake structures, cleaning of irrigation canals, water distribution among water users, etc. has arisen in Central Asian oases. All this process was governed by

water professionals (“mirobs”)¹ and at the same time, highly experienced peasants (“dekhkans”) – land users were engaged in the farming practice.

Ruling regimes have always taken care of the water resources management system; and some features of the former approaches can be interesting ones even for present-day water managers.

A person who was appointed by the monarch and had the special rights and duties (Grand Water Vizier – Chief Mirob) has managed this important economic sector on the behalf of the state; and mirobs appointed for managing the big irrigation canals, as well as aryk - aksakals (managers of secondary irrigation canals) were directly subordinated to him.



Figure 4. The head structure at the Dustlik (“Friendship”) canal (in the Soviet years, the Kirov Canal. It starts from the derivation channel of the Farhad hydroelectric station.

Construction began in 1907 and was completed in 1913)

As a rule, water application was made over juyaks (irrigated plots), but some crops such as alfalfa or rice were irrigated by flooding over the levelled parcels of arable land that were bordered by small earth levees for retaining a certain level of water.

When water available in the main irrigation canal and outlets was insufficient for simultaneous irrigation of the whole command area, water delivery into laterals and ariqs was managed according to the principle

¹ The word “mirob” originated from the combination of two words: Arabic word “amir” (a manager) and Persian word “ob” (water). Ariq or arik – a tertiary irrigation canal or irrigation ditch in Central Asia

“mardiqurak” (the local term of water rotation - that means water application in the strictly scheduled time). “Mardiqurak” implied one water application during twenty-four hours (a day plus a night). Such a rigorous measure under distributing irrigation water due to restricted water resources had some positive effects: it raised the standard of discipline because water users had to irrigate their plots in good time with obligatory implementation of nighttime water applications, preventing over-irrigation and land waterlogging.

This measure contributed to sufficiently - economical and rational use of irrigation water. In addition, some of secondary canals and ariqs within the irrigation system were out of operation, in rotation, reducing water losses due to seepage and evaporation.

All works relating to construction, repairing, and cleaning of ariqs and water infrastructure that was necessary for water supply to water users within the local community were being carried out based on public works (“khashars”) with using labor and resources of water users in proportion to their irrigated area under the guidance of a community’s leader (“qosh boshy” in the Zarafshan Valley or “aryk-aksakal” in the Tashkent Oasis).

Legal regulation of water use and irrigation practice, and settling of disputable matters were being implemented based on the Sharia Laws and were the competence of imam-khotibs of mosques or qaziys (Sharia judges). It should be specially stressed that the Islam, as opposed to other world religions, has always paid attention of paramount importance to water-and-land relations.

Apart from legal regulation in the field of water and land use, the Islam successfully inculcated in the mind of its believers the ethic norms of attitude to water that is the sacred gift: God- given gift!

On the rivers with steep slopes and powerful stream, water intake structures were being built using large fractions of rocks. On the rivers with slow flow the bar-rages were being built, on the large rivers, water intake structures had many outlet canals. Sometimes the large dams were erected.

A chigir (Persian wheel) was the most widespread water-lifting device that could lift water up to 4 m high and even higher. When water was being lifted from deep ariqs the water-lifting wheels were turned by draft animals. By 1917 only in the low reaches of the Amudarya River the number of chigirs has amounted to more than 60,000 that were in operation till the 1930s; and some of them were preserved up to the present time.

General costs of the Russian tsarist government for capital irrigation works in Turkestan over the period of 35 years of the colonial rule amounted to only 36.5 million Roubles. In total, 80,000 hectares were irrigated over this period.

A notable official of the tsarist government, Prince V. I. Masalsky, who has directly governed the process of irrigation in Turkestan, wrote: “During our rule in Central Asia we made quite a lot for this region, but, as fate has willed, our activity almost did not touch its key need - legal normalization of water use.

The Russian government that faced the vast water sector with the time-honored governing system in the region has considered it is impossible to interfere in this unfamiliar business and has delegated responsibility for organization of water use to the local population.”

In early XX, two surveys over irrigated cotton land were undertaken in Turkistan: by senator, count K.K.Palen (1907), who estimated 1,472,000 desyatinas² of irrigation; and, by Prince V.I.Masalsky (1912), who made estimation of 1,955.000 desyatinas of irrigation. In 1916, 534,000 hectares were sown with cotton, while in 1922, cotton occupied only 42,700 hectares. In 1922, the areas under cotton amounted to only 42,700 hectares³.

In 1925, after implementing the water-and-land reform in Uzbekistan, intensive rehabilitation of agricultural sector has started. In December 1925, the Central Executive Committee of the Uzbek Soviet Socialistic Republic approved Decrees on the nationalization of land and water and declared land and water reform. The reform has led to dramatic transformations in rural structure by the end of 1928. The share of “peasants of average means” increased up to 61% of rural population through “privatization”. More than new 500 collective farms were established, and administrative-command political leverage of new regime has become the main incentive of production for the farmers.

Due to irrigation works implemented over this period, the area of irrigated lands has reached level of 1913 by the beginning of 1928. Construction of large number of big irrigation canals and water-works in Tashkent, Fergana, and Samarkand provinces has allowed to develop additionally more than 72,000 hectares and to increase the total area under cotton in Uzbekistan up to 468,000 hectares.

The Ravatkhodja weir on the Zarafshan River was one of the largest waterworks in that time. Construction of this dam provided guaranteed water diversion for the upper part of Zarafshan Valley. Introduction of new integrated methods of irrigation construction was started under developing the irrigated scheme in the Dalverzin Steppe (construction works were completed in 1932). The Dalverzin Main Canal (flow rate of 35 m³/sec), as well as the intensive irrigation and drainage networks were built creating conditions for irrigation developing of first 24,000 hectares in the Dalverzin Steppe.

In 1932 due to large-scale irrigation construction, 112,000 hectares of virgin lands were developed with setting up cotton-growing state farms. Significant works aimed at rehabilitation and modernization of existing irrigation systems such as the Narpay Canal in the Zarafshan Valley and the

² desyatina is an archaic land measurement used in tsarist Russia - is equal to 2.702 English acres or 10,926.512 square meters

³ “Water in Central Asia: Past, Present, Future”; Victor A. Dukhovny, Joop de Schutter

Lower-Khan Irrigation System in the Angren-Chirchik river basin were being implemented along with construction of new irrigation systems.



Figure 5. The Ravatkhodja Hydrostructure on the Zarafshan River

At the beginning of the 1930s, such large-scale land reclamation objects as the Sarykul system of collector-drains (a tail flow rate of $60 \text{ m}^3/\text{sec}$), Assakin escape structure (a carrying capacity of $150 \text{ m}^3/\text{sec}$), drainage networks in Bukhara and Khorezm provinces were built. Reconstruction of the Shakhrud irrigation system in Bukhara Province was of great economic and social importance: as a result of this activity not only the land reclamation conditions were improved over the area about 100,000 hectares but also malaria foci were annihilated.

Since 1932, Uzbekistan has become the main cotton supplier (over 60%) in the USSR. As compared to 1913, cotton area expanded twofold, from 432,500 hectares to 876,400 hectares in 1937, whereas gross output increased threefold and amounted to 1.5 million tons. Consequently, this demanded increased water supply.

In spring of 1939, thousands of dekhkans were mobilized for irrigation works in the Lyagan Steppe in the Fergana Valley. Works were simultaneously started along the whole 32-km route of the Lyagan Canal. Construction was completed during 17 days instead of one year according to the project schedule. Earth works amounted to $293,000 \text{ m}^3$. Remarkable initiative of Fergana dekhkans was taken up in all provinces of the republic. Thanks to the method

of so-called People's building works, 46 irrigation canals 454 km long in total (2.5 million m³ of earth works) were built.

In autumn of 1939, during the unprecedentedly-short period (45 days), Uzbekistan's dekhkans have built the Great Fergana Canal 270 km long with a carrying capacity of 100 m³/sec for transfer of water from the Naryn River abounding in water via the Qoradaryo River to the system of streams Shaarikhan-say, Isfaramsay, Sokh, and Isfara, where water users often faced water shortage.

The Great Fergana Canal is the main canal that along its route crosses the existing irrigation, drainage, and road infrastructure, as well as the railway. The 365 water structures were built along the canal's route. Putting the Great Fergana Canal into operation enabled the water authorities to irrigate about 100,000 hectares of virgin lands.



Figure 6. Thousands of dekhkans were mobilized for construction of the Great Fergana Canal in autumn of 1939 (discharge 100 m³/sec, length 270 km. It was constructed during the only 45 days by “khashar” method)

In 1940, using the experience of public works in the Fergana Valley, the similar irrigation canals were built including the North Fergana Canal, South Fergana Canal, Tashkent Canal, Tashsaka Canal in Khorezm Province, the Lenin Canal in Karakalpakstan, as well as the large Kamyrravat Hydroscheme on the Qoradarya River.

In Uzbekistan, during the Second World War (1941 to 1945), works aimed at irrigation of waste land within boundaries of collective farms were implemented for cultivating cereal crops, vegetables, and watermelons. Based on the method of People's building works, the Farkhad dam was built, and later

on it allowed starting development of virgin lands in the Golodnaya Steppe (Hungry Steppe). The North Tashkent Canal and Upper Tashkent Canal were also built in a short space of time.

In postwar years, all national resources were directed on further developing the national economy. Construction of the Kattakurgan Reservoir with the storage capacity of 600 million m³ on the Zarafshan River was completed, and this measure allowed improving water availability for irrigation in Samarkand Province and developing virgin land for further raising of the rate of cotton production. In addition, due to construction of hydroschemes with dams on the rivers and head regulators on main irrigation canals, the system of small scattered water intakes was eliminated. The Sarykurgan weir on the Sokh River (the command area of 120,000 hectares) can be referred to such hydroschemes.

In Tashkent Province the following works were implemented: construction of the North Tashkent Canal was completed; reconstruction of this canal with erecting three reinforced concrete culverts under the channel of the Angren River and constructing the system of in-channel dams; the Iskander Canal was widened and lengthened for water supply through the bypass gallery of the Chirchik Hydropower Plant, and Tyubuguz Reservoir on the Angren River with a storage capacity of 260 million m³. For improving irrigated land condition and disposal of waste irrigation waters and brackish groundwater into the natural water receivers – the North-Bagdad Collector-Drain the ramified drainage system was built in Fergana Province (earth works exceeded one million m³).



Figure 7. The Great Fergana Canal today

In the Fergana Valley, the headwork of the Great Fergana Canal and Kuyganyar Dam were reconstructed, and moreover, the headworks of the South Fergana Canal were upgraded.

Since 1956 Uzbekistan passed from irrigation of small-scale areas towards integrated development of huge tracts over virgin land (up to hundreds of thousands of hectares per year) located mainly in desert and semi-desert unpopulated regions of the republic with severe climatic conditions. The key priority was given to the zonal irrigation developments within the main oases of the country.



Figure 8. Pumping hall of the Babatag Pumping Station in Surkhadarya province

THE CURRENT IRRIGATION AND DRAINAGE SYSTEMS IN UZBEKISTAN

In Uzbekistan, a total length of the inter-farm and on-farm irrigation networks amount to 27,868 km and 154,957 km, respectively. 60 percent of inter-farm canals and 77 percent of on-farm canals have an earth (not lined) channel.

The area of more than 2.2 million hectares is irrigated by pumps that consume electricity of 7,5 billion kWh a year. The following examples show a scale of pumping irrigation: the Karshi Pumping Cascade lifts 200 m³/sec of water up to 157 m essentially for irrigation of 335,000 hectares in the Karshi

Steppe; a cascade of pumping stations along the Amu-Bukhara Canal lift 216.4 m³/sec of water up to 115 m for irrigation of 315,000 hectares. The Ministry of Water Resources is funding operation and maintenance of 1687 pumping stations where 5284 pump units with total annual capacity of 59.6 billion m³ of water.



Figure 9. “Kampirravot” dam built on the Karadarya river. It was designed in 1962 and was completed in 1968-1982. The total length 1020 m. Dam is massive concrete with double buttresses-875 m. Maximum height 115 m.

Over 27,400 water structures and 19,700 gauging points were built on main and inter-farm irrigation canals, and there are over 73,200 water structures and 61,000 gauging points on the on-farm network. As a whole, the main and inter-farm irrigation canals were sufficiently equipped with waterworks.

More than 143,300 km of the drainage network including 33,675 km of main, inter-district and inter-farm collector-drains and 72,144 km of on-farm drainage network (including 36,740 km of subsurface drains) were built on the irrigated area of over 3 million hectares. There are 7,871 tube-wells including 3,802 drainage tube-wells and 4,069 tube-wells for irrigation in the operations by the Water Ministry.

55 big (with capacity more 10 million m³) water reservoirs are under operation recently in Uzbekistan. Reservoirs regulate the regime of natural river flow, making it favorable for economic use and promoting the increase of irrigated areas and their water availability. A total storage capacity of all reservoirs exceeds 21,4 km³ including about 17,4 km³ of an active storage of water.



Figure 10. Takhiatash hydrostructure on the Amudarya river in Karakalpakstan (the biggest water weir in Central Asia completed in 1974) – capacity more than 11000 m³/sec

Most of reservoirs have been built more than 30 years ago. Over the period of their operation all reservoirs were subjected to sedimentation that has led to loss of initial active storage almost on 20 to 35 percent.



Figure 11. Charvak water reservoir (Tashkent province) in winter

ACTUAL ISSUES OF THE WATER SECTOR IN UZBEKISTAN

Only 9.6% of total runoff of transboundary rivers in the Aral Sea basin is formed within Uzbekistan. In other words, Uzbekistan is quite dependent from other riparian countries from the point of view of available water resources.

The existing reality of interstate relations in Central Asia is directly related to the global political processes that take place after disintegration of the USSR in 1991. New conditions predetermine both the freedom of choice of further ways for development of the world politics' entities and the exclusive complicacy of this choice. At the same time, the independence has granted a chance to look at the surrounding world by "other eyes." Recognizing the fact that the global security depends on joint efforts in elaborating the ways of sustainable development by most of nations has become one of advantages inherent in the new system of international relations.

In 2007, Uzbekistan has joined to the international conventions "The UN Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes" (prepared by the UN Economic Commission for Europe, 1992) and "The United Nations Convention on the Law of Non-navigational Uses of International Water-courses (1997) and proved its respect and commitment to the principles of the international water legislation, as well as they can resolve the water issues in the region.

In September 2017, at the 72nd Session of the UN General Assembly the President of Uzbekistan H.E. Mr. Shavkat Mirziyoyev said: "The issue of shared water resources is key for security and stability in Central Asia. I am sure that there is no alternative to addressing the water problem other than considering the interests of all countries in the region," and then continued: "A peaceful and economically prosperous Central Asia is our most important goal and key task. Uzbekistan is determined to engage in dialogue, constructive interaction and strengthening the good-neighborliness. We stand ready for reasonable compromises with the countries of Central Asia on all issues without exception." The Head of Uzbekistan has set that addressing of shared water use issues in the region is to be one of priorities for foreign policy of Uzbekistan.

LAND RECLAMATION ISSUES

The current conditions of irrigated lands and irrigation and drainage systems restrain the further growth of crop productivity and incomes of rural commodity producers. Lack of the integrated and systematic approach under developing the land reclamation projects and reliable sources of their financing, as well as insufficient activity of water management organizations and water users associations has led to reducing the scope of reclamation works and to the rise of groundwater table and salinity on the irrigated fields. As a result, in 2007 over half of irrigated lands in the republic were affected by salinization to the different extent; at the same time, condition of over 16% of irrigated lands in the private farms was unsatisfactory.

In October 2007, the First President of the Republic of Uzbekistan Mr. Islam Karimov has signed the decree on formation of the Fund for Reclamation of Irrigated Lands in the framework of the Ministry of Finance.

At the expense of the Fund for Reclamation of Irrigated lands a large quantity of earth- moving machinery (bulldozers, excavators, etc.) was purchased using these funds. About US\$ 110 million annually Fund allocated for implementation of the Irrigated Land Reclamation Program.



Figure 12. The Main South Drain Collector under construction in Karakalpakstan

President of the Republic of Uzbekistan Shavkat .Mirziyoyev signed on 27th November 2017 Decree on the state program for irrigation development and irrigated land reclamation over the period 2018 to 2021. This decree stipulates construction and modernization - through the Reclamation Fund - of 2,227 km of collector-drainage network and 238 vertical drainage wells, as well as repair of 34,800 km of collector-drainage network and 1,087 vertical drainage wells.

THE ARAL SEA CRISIS

Anthropogenic factors (the main ones are intensive irrigation and the development of hydropower), together with natural factors (aridity of the climate - a combination of high air temperatures, high evaporation and little precipitation) led to the death of the Aral Sea. The less water flowed into the sea along the Amudarya and Syrdarya Rivers - the less its depth and volume of water became, the faster it warmed up, evaporation went easier, which accelerated its drying.

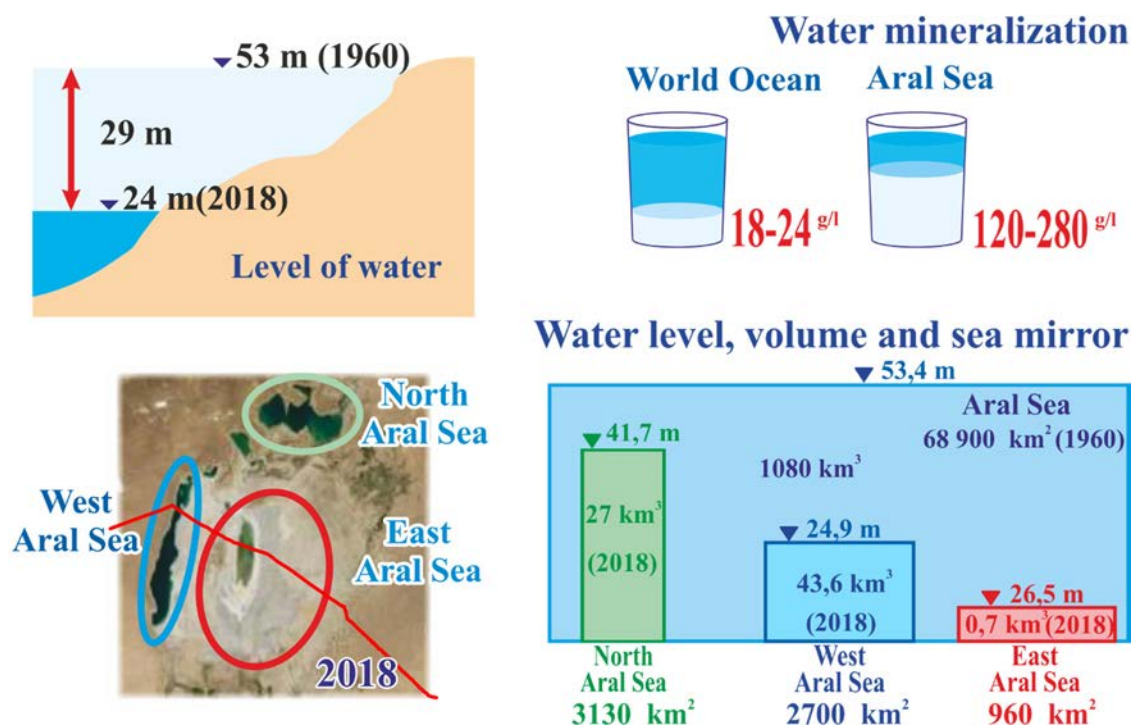


Figure 13. The Aral Sea Ecological Crisis

Much has been done by the countries to mitigate the consequences of the Aral Sea disaster, the socio-economic conditions in the regional countries have changed, the water situation in the region has changed dramatically. In the Aral

Basin, as elsewhere in the world, the impacts of climate change are really observed. Many other factors also indicate that it is time to change practices regarding the creation of ecosystem resilience with economic growth.

The Summit of Heads of Founders of IFAS held on August 24, 2018 in Turkmenistan showed that, against the background of the general warming of the political climate in the region, the environmental health issues of the common rivers of Central Asia and the Aral Sea problem have again risen to the top of the priorities of the leaders of the countries.

It is not just an understanding that sustainable development and the improvement of life depends on the conservation and sustainable utilization of natural resources. Our countries have certain opportunities for progress in the restoration of rivers and ecosystems, carrying out their recovery at the national and regional levels.

In this regard, the initiative of the President of Uzbekistan, voiced at the IFAS Summit - to declare the Aral Sea area a Ecological innovations and technologies zone, is proposed as a guide for future actions leading to fundamentally changes in the ideology of addressing complex challenges in the Aral Sea Region. In addition to drawing attention to the ecological crisis and reducing its negative consequences, innovative mechanism to address the root causes of the problems are also required.

It is also proposed to consider the Aral Sea zone as an integrated, water-ecological system (with a possible subdivision into sub-zones: the Northern and Southern Aral Sea). This will facilitate the consolidation of impacts from the various efforts of the Aral Sea basin countries (including Afghanistan) for the innovative development of the region.

THE INSTITUTIONAL SET-UP OF WATER RESOURCES MANAGEMENT

Currently the fundamental national legislative act in the field of regulation of water relations is the Law of the Republic of Uzbekistan "On Water and Water Use" dated from May 6, 1993 No. 837-XII, which was amended and supplemented in recent years (1997-2017).

Issues of water use and water consumption, including the establishment of water withdrawal limits (quotas), are regulated by the "Regulation on the Procedure for Water Use and Water Consumption in the Republic of Uzbekistan" (entered into force on April 01, 2013), approved by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan (dated March 19, 2013 No. 82).

National governance in the field of water use is carried out by the Cabinet of Ministers of the Republic of Uzbekistan, local government bodies, as well as specially authorized state bodies for regulating water use directly or through basin (territorial) administrations and other state bodies.

By law, specially authorized bodies of state administration in the field of regulation of water use define in accordance with within their competence:

- 1) Ministry of Water Resources of the Republic of Uzbekistan (surface waters);
- 2) The State Committee of the Republic of Uzbekistan on Geology and Mineral Resources (groundwater);
- 3) The State Inspectorate for the Supervision of Geological Subsoil Research, the Safe Conduct of Work in Industry, Mining and the Domestic Sector under the Cabinet of Ministers of the Republic of Uzbekistan (thermal and mineral waters).

The Ministry of Water Resources was created in accordance with Decrees of the President of the Republic of Uzbekistan No. UP-5330 dated February 12, 2018 “On organizational measures for the radical improvement of the system of state management in agriculture and water resources”, and No. PP-3672 dated April 17, 2018 “On measures to organize the activities of the Ministry of Water Resources of the Republic Uzbekistan”.

On October 9, 2019 there was released the new Decree of the President of the Republic of Uzbekistan “On measures to further improve the water management system”. By this document priority areas under leadership of the Ministry of Water Resources by the end of 2022 were identified:

- Timely and high-quality development of the Concept for strategic development of water resources in 2020–2030;
- Phased (starting from 2020) implementation of mechanisms for covering a part of the operational costs for the delivery of water by water consumers;
- Bringing the share of land irrigated using water-saving technologies to at least 10 percent of the total area of irrigated land by actively assisting agricultural producers to introduce water-saving irrigation technologies, expanding the production of modern irrigation systems by attracting private investment;
- Institutional, technical and technological development of water management, integration of science with production in this area;
- Ensuring timely and high-quality construction and installation works at water facilities, reducing their cost by introducing modern technologies.

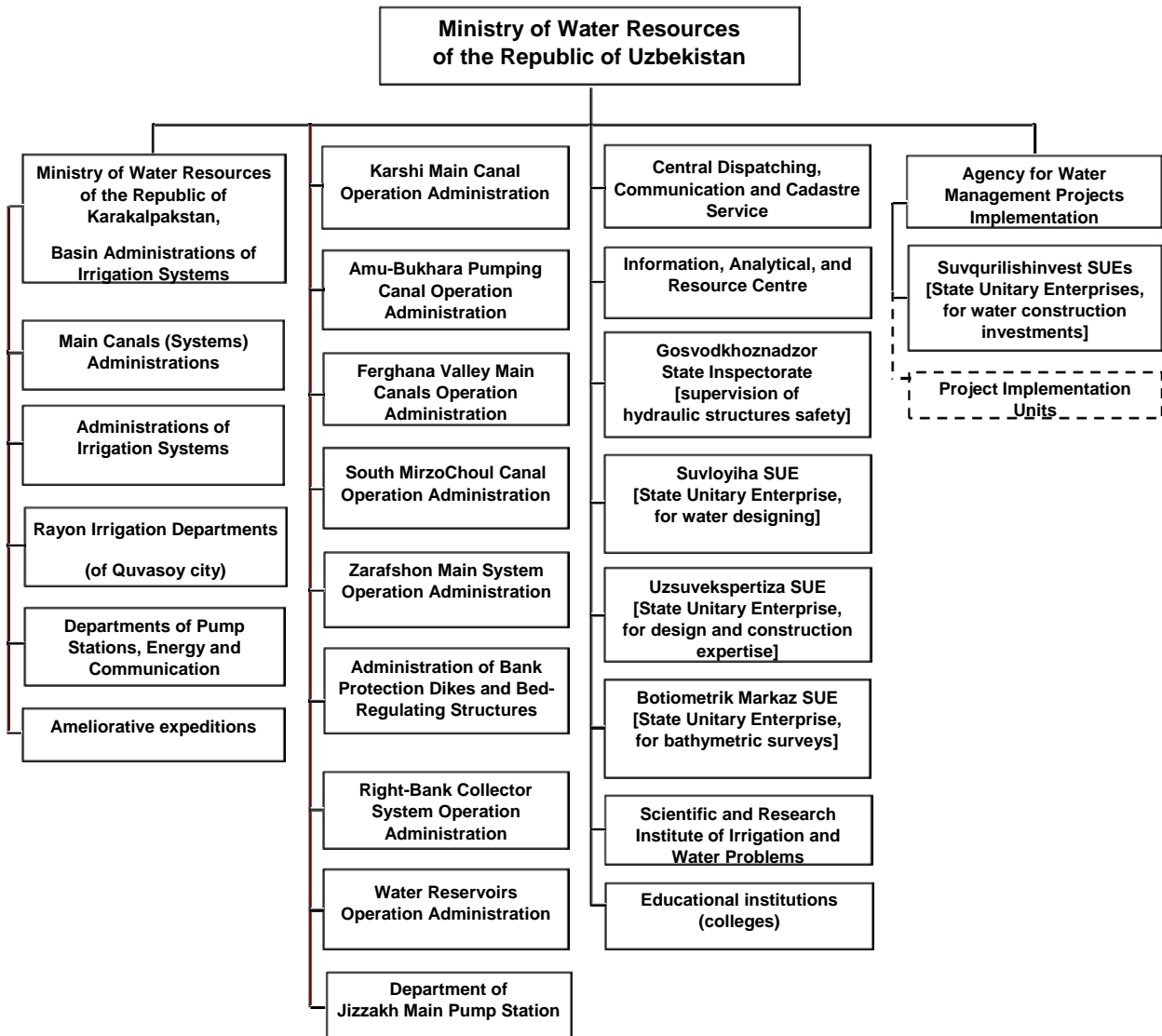


Figure 14. Institutional Structure of the Ministry of Water Resources

Also, Presidential Decree from 9th October 2019 established proper performance indicators which will be the key pathway for the Ministry of Water Resources in coming three years:

- Reduction of at least 15 percent of operating costs through the introduction of market mechanisms in the field of water resources management, the development of public-private partnerships in the water sector;
- Innovative development of water management, active implementation of the results of scientific developments, advanced methods of water management and operation of water facilities;
- Increasing the efficiency of irrigation systems by at least 1 percent annually on average in the country through the adoption of comprehensive measures aimed at the modernization, reconstruction and repair of irrigation systems of water management using modern

- technologies;
- Reduction of electricity consumption at water facilities by at least 10 percent due to the widespread introduction of energy-saving and energy-efficient technologies, as well as the introduction of effective methods for regulating the operation of pumping stations;
 - Reducing the proportion of saline land to 45 percent by improving the mechanisms for maintaining the water-salt balance, maintaining favorable levels of groundwater, as well as improving the effectiveness of reclamation work;
 - Automation of the water control and accounting system at 300 structures and hydroelectric facilities of the water sector through the introduction of modern information and communication technologies in the management of water facilities and operation;
 - Radical development of the activities of water consumer associations by strengthening their legal status, increasing the role of water consumer associations in the field of water resources management, and also contributing to the financial stability of their activities.

ACTIVITIES AT THE INTERNATIONAL LEVEL

The Uzbekistan's achievements in the sphere of water resources management appreciated by the world water community. That was confirmed by active participation and contribution to activities of international water organizations such as the World Water Council, Global Water Partnership, International Commission on Irrigation and Drainage, International Network of Basin Organizations, Asian Pacific Water Forum, etc.

After gaining independence, delegations of water professionals from Uzbekistan participated at all ICID congresses since 1993, at 2nd World Water Forum in the Netherlands and all next World Water Forums held in Japan, Mexico, Turkey, France, Korea and Brazil.

The Republic of Uzbekistan has been a member of the ICID since 1993. The National Committee of the Republic of Uzbekistan carries out its detail under the Ministry of Water Resources of the Republic of Uzbekistan.

In Indonesia, on the island of Bali, on September 6, 2019, at the 70th meeting of the International Executive Council of the International Commission on Irrigation and Drainage (ICID), the Minister of Water Resources of the Republic of Uzbekistan, Mr. Sh. Hamraev, was unanimously elected as Vice President of the ICID for 2019 -2022 years.

The Ministry of Water Resources of the Republic of Uzbekistan is using ICID as platform to promote new philosophy: that People and the Earth will be saved not so much by saving technologies such as sustainable consumption and new labor management. But also, we have to set a new culture of water governance with an open soul of policy makers to overcome ambitions and barriers towards common water and food security and achievement of the SDGs 2030.



Figure 15. President of ICDC, Mr. Felix Britz Reinders (in the center), Minister of Water Resources of the Republic of Uzbekistan, Vice-president of ICID, Mr. Shavkat Khamraev (in the left), Secretary of the UZNCID, Mr. Lutfulla Mukhamednazarov (in the right)

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**National Committee on Irrigation and Drainage
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Ministry of Water Resources of the Republic of Uzbekistan**

