



Problems And Solutions Of Water Shortage In Central Asia And Uzbekistan

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Annotation. In this state obsujdaetsya vodnaya problema v Tsentralnoy Azii, tayanie lednikov, nexvatka vody v Uzbekistane, problema Aralskogo morya v sotrudnichestve s zarubejnymi organizatsiyami i ee resheniya. [Boymirzaev K. and Mirzahmedov I. **Problems and solutions of water shortage in central asia and Uzbekistan.** Nat Sci 2022; 20(5);18-25]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). <http://www.sciencepub.net/nature>. 4. doi:[10.7537/marsnsj200522.04](https://doi.org/10.7537/marsnsj200522.04).

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1. Introduction

Water is the lifeblood of human life but perhaps the trick of all organisms. Especially the small amount of fresh water on Earth is the basis for the economical and proper use of this water. It is no secret that water and related issues in Central Asia, especially in Uzbekistan, are of not only regional but also global importance. There is a deep scientific research on this issue, and it is gratifying that there are Uzbek scientists among them. One of them is the German Research Center for Geosciences.

The research center conducts more than 1,000 scientific research in the fields of land, environment and water. One of the objectives of the study is to determine the formation of water resources in Central Asia, how wisely they are used, how long this resource will last, when problems will arise and measures to address them. In this regard, a number of scientific studies are being conducted through the study of glaciers and precipitation in the mountains of Uzbekistan. Groundwater has also been studied in recent years.

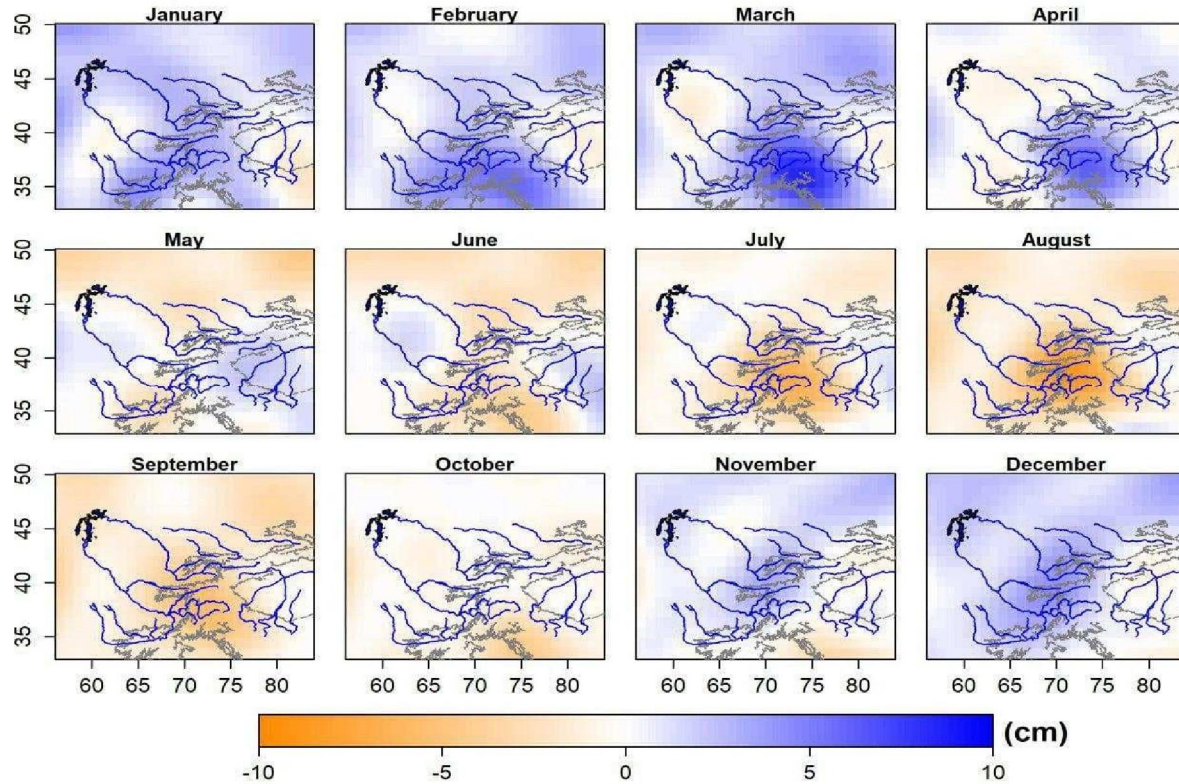
The territory of the Republic of Uzbekistan is full with unique irrigated agricultural regions. For this reason, the reclamation here has been paid special attention since ancient times. After gaining independence, our republic always takes care of the effective use of irrigated lands, increasing the productivity of soil and the yield of agricultural crops. As indicated in the decree of the president of the

Republic of Uzbekistan “on measures for effective use of land and water resources in agriculture” in June 17, 2019, PF – 5742, at the present time, more than 20 million hectares of land, including 3.2 million hectares of irrigated land, are being used to produce food for the needs of the population and to provide the economical system with products.

2. The main part

Central Asia has a very large groundwater base. How much of it is being spent properly, how much is being wasted, how much reserve do we have? While Uzbekistan has a number of goals in its development, finding solutions to water problems is one of the top priorities. Because our country is one of the arid regions and has a great potential and ability to engage in agriculture, of course, this is not possible without water. The fertile part of these lands falls on irrigated lands.

They are now irrigated in the old-fashioned way. If I talk about the losses in numbers, about 50-60 percent of the water taken from the river is lost in evaporation before it reaches the field, the plant. On the other hand, the limited scope of water in the region and the steady increase in the number of people, as a result of which water use will continue as it is now, will exacerbate the scale of the problem. In addition, observations show that climate change will lead to more water shortages in the region at the right time.

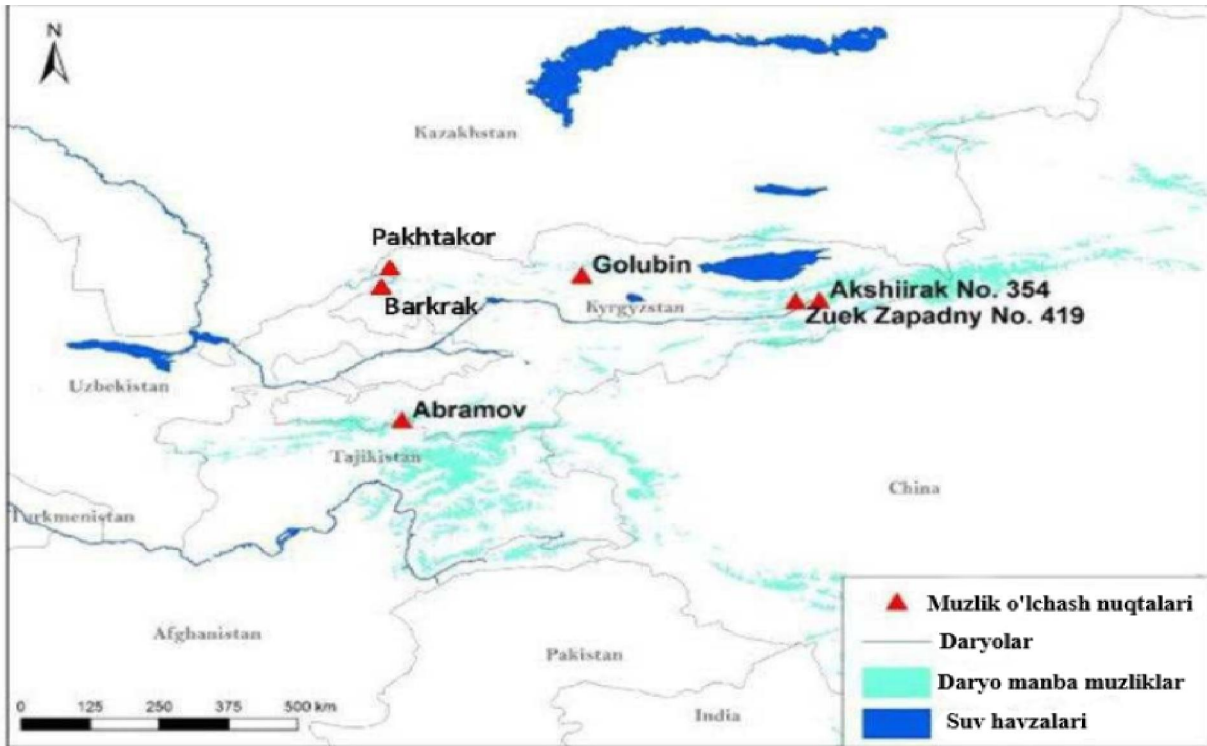


This graph shows the difference in the distribution of water resources from month to month in the Central Asian region. For example, on the map we can see in which regions of our region in February the water increased (blue) and decreased (yellow) compared to January. March water distribution compared to February, April compared to March, and so on. This data is collected daily by the GFZ Potsdam Research Center in collaboration with the US NASA Center via the GRACE satellite launched into space.¹

To do this, we need to take a scientific approach to water problems and implement its results in our lives. We need to make optimal use of water resources. Unless we use science to solve these problems, we cannot move away from using water the old-fashioned way. Meteorological studies have shown that the impact of climate change on mountain glaciers is high because glaciers have their own mass balance. It is known that on hot summer days, some of the ice in the mountains melts, and when winter comes, it accumulates again as snow falls on it. If the ice melts two meters and accumulates again, this is normal.

¹<https://images.app.goo.gl/ebwWamggszg26Q8m6>

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Mountain distribution of Central Asian glaciers and observation points in collaboration with the University of Freiburg, Switzerland.²

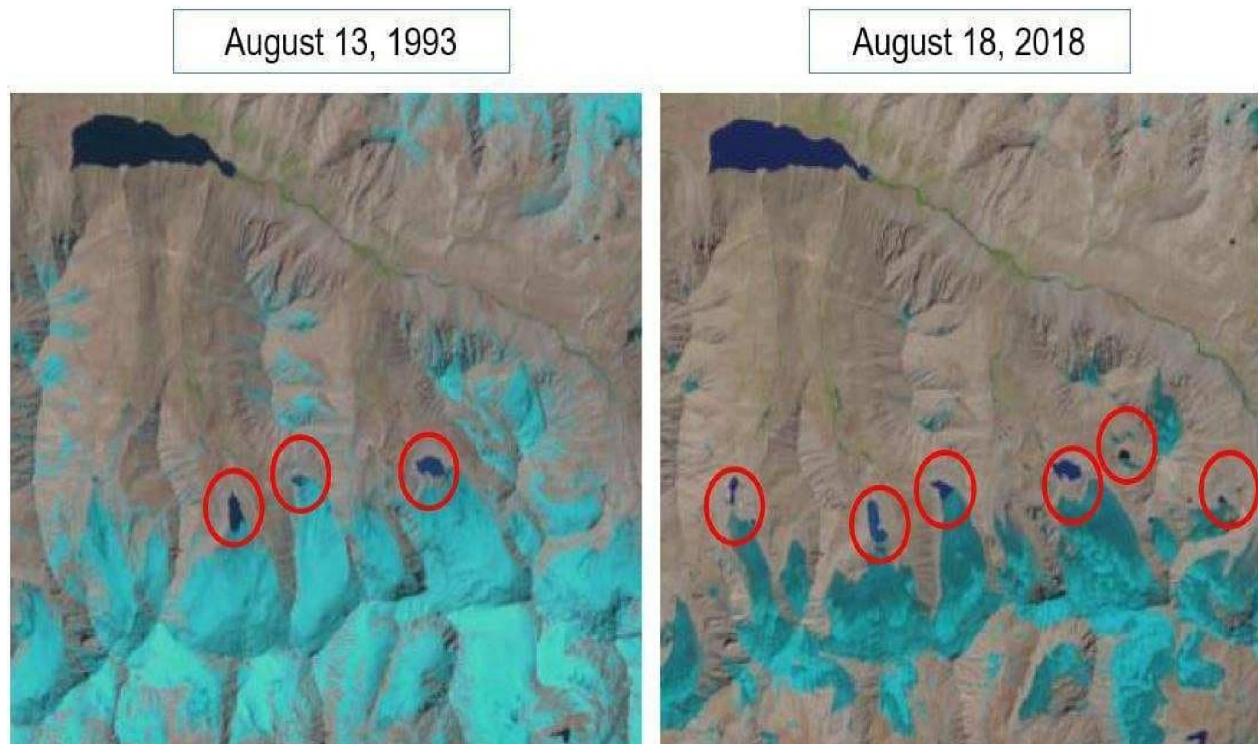
²<https://images.app.goo.gl/ebwWamggszg26Q8m6>

But as a result of global warming, the melting of ice is making up more than it is accumulating, and glaciers are losing their mass. The descent of the glacier is determined by placing a special height mark on the ice. The Barqroq and Pakhtakor glaciers in the Pskom Basin, located at an altitude of 4,000 meters in Uzbekistan, have been marked with a 6-7 meter long mark in cooperation with the University of Freiburg, Switzerland. The following year, inspections showed that the glacier had dropped 3 feet below that mark. This means that the ice has melted by three meters and lost a corresponding amount of mass. Unfortunately, the ice, which is a balance plus, has not yet been observed. This, in turn, indicates that our glaciers in the mountains are constantly melting. Glaciers are very thick, some even more than 200-250 meters. There are

more than 20,000 such glaciers in our region. Dissolved water from them makes up about 20 % of the annual amount of water in the Aral Sea basin.

This seemingly neglected thing can lead to huge problems over the years. Melting of glaciers lasts from the second half of June to the first half of September and coincides with the time of high demand for the same water. Imagine, during the same heat, the water dropped sharply! We need to ask the question now what to do if this happens. Climate change will not only lead to a sharp decline in water resources during the summer, but also to an increase in the number of lakes formed as a result of melting ice in mountainous areas. These lakes have a natural dam and can lead to unexpected floods in mountainous areas in the future.

Picture – 1



Views of dangerous lakes formed in 1993 and 2018 as a result of declining glaciers in the mountainous regions of Central Asia. The depletion of our glaciers is leading to an increase in the number of dangerous lakes. This in turn is a threat to the population living in mountainous areas.³

³<https://images.app.goo.gl/ebwWamggszg26Q8m6>

As a result of climate change, the regime of our rivers is likely to change. If we connect the sharp decrease in water content in summer with the disappearance of glaciers, the probability of an increase in water content in rivers in winter and spring increases. This is due to the decrease in snow in winter. Year after year, the temperature rises, which is hot in winter, and most of the precipitation falls on the ground as rain, not as snow.

Before the glaciers thaw, it is necessary to carry out and carry out a wide range of observational work. To do this, it is necessary to increase the number of scientific stations in Central Asia and place them in mountainous areas. But there are very few observation stations in the mountainous regions of Central Asia. Due to the unique nature of mountainous areas, it is necessary to conduct more observations in these areas, as these areas are a source of water for the Aral Sea. Therefore, it is advisable to increase the number of monitoring stations in mountainous areas as much as possible in the future. This allows us to know how much snow is in the mountains based on the analysis of observational data and to distribute the water correctly in the summer. In carrying out scientific work, in the scientific study of nature, we need observational data. Without them, it is impossible to conduct scientific research effectively. Observational data is obtained from various meteorological stations, hydroposts or groundwater study points, as well as satellite data.

Over the past two years, more than 20 automatic weather stations have been installed in the region to increase the number of stations in the mountains of Central Asia. Of these, four have been installed in Uzbekistan. These are mainly installed in areas with extreme climatic conditions, above 3,000 meters above sea level. It is also impossible to put observation points everywhere. It is also difficult to know exactly what is happening elsewhere through observation points set up in a particular location. Therefore, satellite data should also be used extensively. It is possible to obtain data on a large scale, not on a point basis. These data play a huge role in the study of natural processes. Based on daily analysis of satellite data, for example, it is possible to know how much snow has melted today than yesterday or how much snow has increased daily in winter days, and to calculate the amount of water reserves in the mountains.

In the ranking of countries suffering from water shortages, published by the Institute of World Resources, Uzbekistan ranked 25th out of 164 countries.⁴ Water scarcity is a very pressing issue for Uzbekistan, given that scarcity in a number of regions,

particularly Karakalpakstan, could lead to a social and environmental crisis. Today there is a shortage of water not only for agriculture but also for household needs. In this context, reasonable questions arise as to how much the water shortage will affect the economic and political life of Uzbekistan.

Hydropower resources of Uzbekistan make up only 4.92% of the country's territory, the total water resources are 50-60 km³ per year, of which only 12.2 km³ are formed in the territory of the republic, and the remaining water is outside - the Tien Shan and Pamir, It is formed from snow and glaciers that melt in the summer from the Altai Mountains. The bulk of water resources are used to irrigate crop fields. By 2030, the population of the republic is projected to increase by about 40 million people, which will lead to a decrease in available water resources by 7-8 km². Under these conditions, water scarcity will increase from the current 13-14% to 44-46% by 2030, which will slow down the development of not only agriculture but also other sectors.

According to the World Bank, in 2018, the loss of drinking water in Uzbekistan amounted to 469 million cubic meters, or 32% of the produced drinking water. Significant water losses are taking place against the backdrop of unfavorable forecasts for the future of water supply in Central Asia, in particular in Uzbekistan. By 2050, the World Bank forecasts that water flow in the Syrdarya Basin may decrease by 2-5%, and in the Amudarya Basin by 10-15%, which will increase water shortages. This will affect not only agriculture but also hydropower, as the productivity of hydropower plants in some parts of the region could drop by up to 20 per cent by 2050. In Central Asia, especially in Uzbekistan, the growing shortage of water resources from year to year creates many geocological problems. The situation is complicated by the fact that here surface water resources are fully developed. If the first cause of complication is the consumers of water resources, then the second is their natural changes.

The Aral Sea problem concerns not only Uzbekistan, but also neighboring countries. Every year 135-145 million tons or 17-20 tons of salt per 1 hectare per year. If before 1960 the Aral Sea received about 55 km³ or 45-50% of the average annual river flow, then by 1990 the flow decreased to 6-12 km³, and in dry years it approached zero. Currently, the sea level decreases by 0.5 m per year to 37.0 m; sea level decreased to 32,000 km²; the amount of salt has increased to 40 and more g / l and is still growing. In the late 1980s, the Aral Sea problem began to take on a political significance: the International Fund for Saving the Aral Sea (IFAS) was established through the efforts of Central Asian leaders, and is now the only interstate coordination mechanism in Central

⁴<https://www.gazeta.uz/ru/2019/08/08/water-stress/>

Asia. Experience shows that only the joint efforts of all Central Asian states will prevent the drying up of the Aral Sea. At the same time, unfortunately, the countries of the region do not go beyond the signing of joint declarations and memoranda.

There were many initiatives in the 1990s, but all of them actually remained on paper. For example, on March 26, 1993, in the city of Kyzyl-Orda, Central Asian leaders signed an agreement on joint efforts to resolve the Aral Sea and the Aral Sea region. Article 1, paragraph 3, of the Agreement states: *"Provide the Aral Sea with a guaranteed water supply to the extent that it is able to maintain its reduced but stable water area at an ecologically acceptable level and thus preserve the sea as a natural object."*⁵ The main reason for the failure to solve the problem of the Aral Sea is that it is located mainly in the territory of Kazakhstan and Uzbekistan, and is the "inland sea" of these republics. The rest of the Central Asian republics are engaged in the development of their hydropower and extensive agriculture. In October 2019, Uzbekistan proposed to the world community to declare the Aral Sea zone a zone of ecological innovation and technology. And this issue will be considered at the UN General Assembly in September 2020. Kazakhstan is striving to preserve biodiversity and the lake in the north of the Aral Sea. Over the past 30 years, international organizations have written many analytical notes and recommendations that have been reviewed and recommended. Later, the UN programs on environmental issues in the Aral Sea were implemented.

The main solution to the Aral Sea problem is to create a legal basis for determining the status of the former Aral Sea in Central Asia, that is, when the Aral Sea will become a subject of international relations. This can be done if the Central Asian countries sign an international agreement mediated by the European Union, the United States and the Russian Federation. It should not be forgotten that this will be possible only through the close interaction of the Central Asian republics in solving energy and environmental problems in the region.

The total irrigated area in Uzbekistan is 4.3 million hectares and agriculture is the largest consumer of water resources, accounting for an average of 90-91% of the water used. The Ministry of Water Resources is the main manager of water resources. It is a state body that implements a single policy on water resources management in the country, currently the responsibility for water resources is divided between several government ministries and agencies, which

leads to inefficient use of these resources. In Uzbekistan, the Tashkent Institute of Irrigation and Agricultural Mechanization (TIQMI) has been training personnel for water management since Soviet times. Despite the production of a large number of personnel, development in this area is very slow.

It should be noted that the universities of the republic are trying to establish relations with universities in Germany and the Netherlands. Joint programs to train students are being launched. Despite all the positive shifts, a new generation of irrigator-managers is slowly emerging. The Government of Uzbekistan has developed a concept for the integrated development of Uzbekistan until 2030. According to the document, in the medium term (2019-2025) the following are planned in the water sector:

- Gradual introduction of market mechanisms in the field of water consumption, as well as the principles of public-private partnership in the operation of water facilities in the Republic of Uzbekistan;
- development of irrigation systems through the construction and reconstruction of canals, a network of irrigation canals, hydraulic structures, pressure pipes.

The government also plans to provide 100 percent of the population with high quality drinking water by 2030. Intensive saxophone planting is underway in the former Aral Sea region as part of the government's "Save the Aral Sea" program for 2019-2021. In 2020, the agro-and ecotourism project "My Garden on the Island" will be implemented, aimed at overcoming the consequences of the drying up of the Aral Sea and increasing the number of tourists. The International Innovation Center has created the Moynak and Samanbay experimental fields, formed a gene pool of salt and drought-tolerant desert and ornamental plants, and tested 13 species of flora included in it.

Major international organizations have also been involved in solving similar problems in Uzbekistan. For example, the EBRD (European Bank for Reconstruction and Development) in 2019 invested \$ 576 million (517 million euros) in a new record-breaking 13 private and public sector projects in Uzbekistan, the largest investment in the Central Asian state's history. It has been. In addition, a total of about 700 million euros has been invested in the Kashkadarya Sewerage Reconstruction Project (53.4 million euros) and the Khorezm Sewerage Reconstruction Project (80.2 million euros).

The Central Asian region is (and not only) interdependent on water issues. Unfortunately, the countries of the region do not use water resources fully and efficiently to solve environmental and economic problems. Water-related problems arise in the region, as experts are confident that each country will focus on its national interests to develop its economy. The

⁵<https://www.gazeta.uz/ru/2019/08/08/water-stress/>

problem of water resources is related not only to water itself, but also to energy needs and agriculture.

The main threats of guaranteed water use today are:

- unilateral and uncoordinated management of water resources of transboundary rivers by upstream countries;
- commercialization of water and attitude to water as a commodity in some countries of the region located upstream;
- the desire of upstream countries to build new large hydroelectric dams in the main transboundary tributaries of the Amudarya and Syrdarya.

With the coming to power of President Shavkat Mirziyoyev, Uzbekistan has softened its position and entered into dialogue on water and hydropower. Uzbekistan is interested not only in the development of its hydropower industry, but also in investing in neighboring countries. For example, in January 2020, Tashkent and Dushanbe (Tajikistan) began negotiations on the joint construction of two hydropower plants for \$ 552 million. The built hydropower plants will produce up to 1.4 billion kWh of energy "only for the needs of Uzbekistan." Unfortunately, Central Asia has not yet developed a common code for water use in accordance with international standards. And the potential for conflict in the water sector is likely to persist and intensify in the future.

The main factor in the potential of the conflict is the lack of a single agreement between the Central Asian states on the rational use of transboundary rivers, ie the construction of hydroelectric power stations and reservoirs to develop their economies. So far, the Central Asian republics do not feel like a single ecological, economic, social and political organism, and the conflicting potential remains not only in water, but also in other areas. Despite all the efforts of the government and international organizations, the water problem in Uzbekistan remains relevant. The following recommendations can be made to solve water problems:

- create a common water use code for Central Asia, taking into account the interests of each country and the future of the region;
- increase the number of non-governmental organizations (NGOs) on water issues in the region;
- improving the work of the media, that is, we need journalists who adequately cover water issues;
- it is necessary to establish the Central Asian Institute for joint research of water problems in the region;
- creation of a mobile group of experts (humanitarian engineers, ecologists, sociologists, psychologists) who regularly write memoranda to Central Asian governments on water issues;

- Creating film productions to address environmental issues in Central Asia and attracting pop stars from the region.

3. Conclusion

The results show that if we do not use water efficiently, fully and economically today, it will cause us global problems. The lack of water in the country, in the region, is an obstacle to the socio-economic development of humanity, agriculture and the main region and its states. Fighting the current water shortage problem not only in Uzbekistan, but also in the region and the world community will be of great benefit. In addition, the countries of our region are in mutual agreement and controversial agreements can completely free us from the problem of water scarcity. Only a comprehensive solution to water problems will give clear results. I think that other republics in the region, like Uzbekistan, are connected with the water problem. That is why we need to solve problems together - we need to consult and coordinate our efforts to solve water problems in the Central Asian region. Solving the water problem in general will in a sense stop this from causing both economic and demographic problems. The countries of the region and our country have signed new regulations and laws on the use of water as industrial, agricultural and beverage, regional agreements, the creation and introduction of new irrigation technologies, its balance in water use, quantitative Doing a 10-20 year analysis of resources, not today, will ensure that water problems do not remain for future generations.

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