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Analysis of Problems and Solutions in use of Groundwater in Uzbekistan

D.A. Quvvatov, Ph.D.
N.P. Karimov, basic doctoral student
J.O. Rozikulov, intern-teacher
Anti-irrigation of MTU "TIQXMMI" and
Department of "Irrigation and melioration" of the institute of agro-technologies.

Abstract. The article analyzes groundwater, its reserves, quantity, salinity and conditions of use in irrigation on the example of the world and the territory of Uzbekistan. The measures and necessary recommendations for effective use of underground water are presented.

Keywords. Groundwater, mineralization, soil, water resources, irrigation, agriculture.

Water is the most abundant substance in nature and occurs in many different forms and states. Water in a free state makes up surface streams and basins, the main part of underground water, and water in a solid state forms glaciers and snow layers. Water in the atmosphere is found in vapor, liquid and solid state. Most water is found in the Earth's crust as bound water, chemically bound in minerals, and as fine particles held to the surface of rock particles by molecular attraction. Almost 71% of the Earth's surface is covered by water layers. This layer consists of ocean, sea, regional water basins and glaciers. This layer forms the hydrosphere together with the underground water located in the upper part of the earth's crust.

In the earth's crust, water is found in various forms and states, i.e. free and bound forms, vapor, liquid and solid states. Their distribution in the crust is related to the thermodynamic and physico-chemical conditions that change with the increase in the porosity, cracks and depth of the rocks. According to calculations made in recent years, the amount of water in the hydrosphere is approximately 0.9 billion km3 and makes up two-thirds of the world's ocean water reserves. Of these waters, only 23.4 million km3 of underground water located up to a depth of 2000 m in the upper part of the earth's crust and 300 thousand km3 of underground ice located in permafrost regions are included in the world water reserve. The main part of underground water reserves is 10.5 million km3 - fresh waters located at a depth of 500,600 m. Therefore, one-third of fresh water reserves on Earth are made up of underground water [1].

Nowadays, the issue of proper and rational use of underground water and its protection by the population and agricultural consumers is increasingly becoming a problem. As a result of global climate change, anthropogenic effects related to the dehydration of water bodies, reduction of water consumption, and excessive use of underground water sources for the development of agriculture are being observed in our region.

There are different opinions and theories of scientists about underground water, which can be used to obtain specific information and solve a number of problems. In particular, "Groundwater is a convenient water supply. Compared to surface water, it is generally free of many pathogens and less vulnerable to surface-borne contamination. Evaporation losses are low and are not used for surface barriers" - said Professor R.D. Beckie of the University of British Columbia in his article entitled "Groundwater" [2].

The UN report on the state of world water resources was presented at the 9th World Water Forum in Dakar (Senegal) in 2022. According to the report, Earth's inhabitants get half of their drinking water from groundwater. The authors of the UN report on the state of world water resources warned that its pollution is increasing and that it is necessary to protect it for the sake of human health and future.

According to experts, 99% of fresh water in liquid form is part of underground water. Groundwater supplies approximately 50% of the world's water withdrawals and all water used for irrigation. inan provides 25%.

According to forecasts, the world's water consumption will increase by about 1% per year in the next 30 years. The growing water crisis in some regions of the world calls for a more responsible and rational approach to the use of groundwater. "More and more water resources are being polluted, overused and depleted by humans,

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sometimes with irreversible consequences..." said Audrey Azoulay, Director General of UNESCO, in the opening speech of the report [3].

The world's rapid increase in groundwater abstraction began in the 20th century due to intensive water consumption in developing industries and reached unprecedented levels in the 21st century. In 2017, 959 km3 of groundwater was extracted in the world (25% of the world's total fresh water), two-thirds of this volume is accounted for by Asian countries.

Groundwater in Uzbekistan is a relatively small part of water reserves - about 10%. The quality of these waters is considered average. Starting from 2018, permits for drilling wells for water, water use and groundwater consumption will be issued by the State Geological Committee. According to the decision of the government, a permit is not required for drilling and use of a well for personal needs with a depth of 25 m and a capacity of providing no more than 5 m3 of water per day. In the decision, taking into account the current rate of pollution of aquifers, there is a real threat of irreversible loss of more than half of the fresh underground water resources available in Uzbekistan in the coming decades.

Rapid industrial and agricultural development over the past 50 years has had a negative impact on the state of freshwater, according to a 2017 presidential decree. This has led to a reduction of their reserves by 35% and the depletion of individual mines due to arbitrary construction of water intake facilities and uncontrolled water withdrawal. As of 2017, the needs of the population of 69 cities, 335 towns and 2,902 rural settlements are partially met at the expense of underground water reserves.

In our country, special attention is paid to the effective use of surface and underground water. The Law of the Republic of Uzbekistan "On Water and Water Use" is an important legal document in this regard. On 07.12.2022, the decision PQ-439 of the President of the Republic of Uzbekistan "On additional measures to regulate the protection of underground water resources and their rational use" was adopted. In this decision, further improvement of the system of underground water use and well drilling in the republic, strengthening of state and public control over the protection of underground water resources, widespread promotion of the culture of rational use of water among the population, prevention of its quantitative reduction and pollution, and long-term protection of the population issues of providing quality drinking water and necessary measures are described in the perspective [4].

According to the State Committee for Ecology and Environmental Protection of the Republic of Uzbekistan, 97 underground water deposits have been identified in the republic, and their total water resources are 63.9 million m3/day (25% of the total water resources), of which the salinity is 1 g Water up to 25.8 mln.m3/day (40%).

Groundwater is widely used mainly for agricultural and industrial purposes, and a total of 18.6 million m3/day or 6.8 km3/year is taken. Currently, the groundwater monitoring system is analyzing water samples taken from 1465 monitoring wells based on the level of mineralization

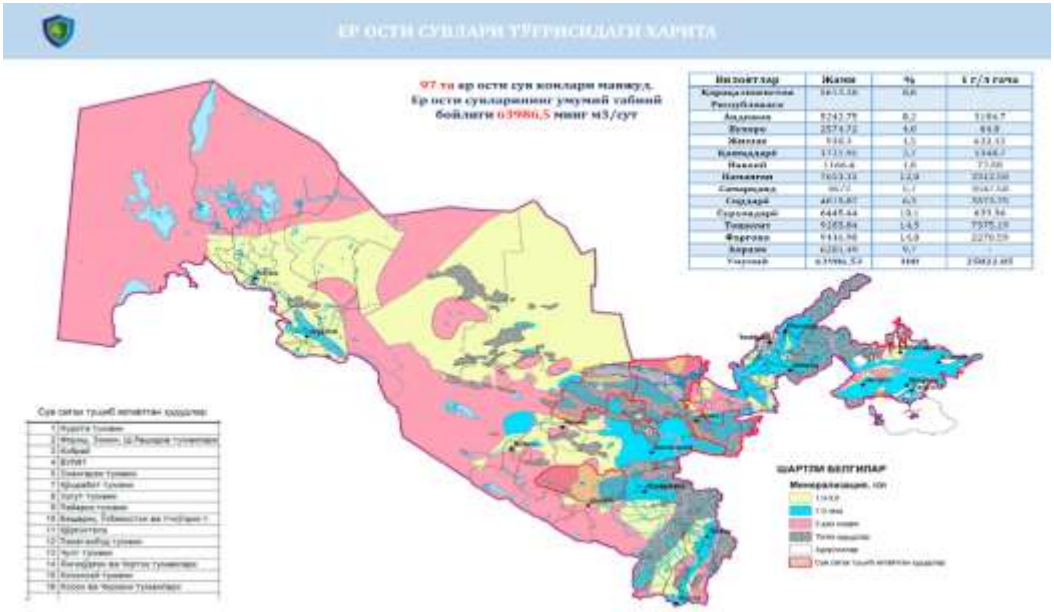

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Figure 1. Groundwater status map based on the information of the State Committee for Ecology and Environmental Protection of the Republic of Uzbekistan.

According to the level of mineralization or the content of dissolved salts, groundwater is usually divided into 4 types: fresh (up to 1 g/l), low salinity (1-10 g/l), medium salinity (10-50 g/l) and high salinity (50 g above) are divided into types.

Underground fresh water reserves are unevenly distributed across the republic, they correspond mainly to 28% in Tashkent region, 14% in Samarkand, 13% in Surkhandarya and Namangan, 12% in Andijan and 8% in Fergana, and make up 67% of the republic's drinking water supply. From this, groundwater is widely used in Fergana (29.1%), Namangan (13.2%), Kashkadarya (10.8%), Samarkand (11.5%), Tashkent (10.3%) regions.

Summary. It is necessary to solve a number of issues in order to supply the population with water and use underground water efficiently and rationally for irrigation. To date, support for users of all types of water-saving technologies in our country, in this regard, in recent years On October 25, 2019, the President's decision "On measures to expand the mechanisms for promoting the introduction of water-saving technologies in agriculture" was adopted in order to consistently continue the work being done. In this decision, the issues of taking significant measures related to the water management sector are determined. Relying on modern knowledge in water management, the need for rational use of water, more practical application of innovative technologies with high water efficiency, and deeper study of foreign experience will increase.

The introduction of modern information technologies and the implementation of methods of remote control of processes in the control and regulation of the rational use of underground water are lagging behind. For this, it is necessary to study the international experience in the field, improve the qualifications of specialists and introduce advanced modern solutions.

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