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STUDYING THE HYDROCHEMICAL REGIME OF SURFACE WATER IN THE Aral Sea BASIN

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ABSTRACT

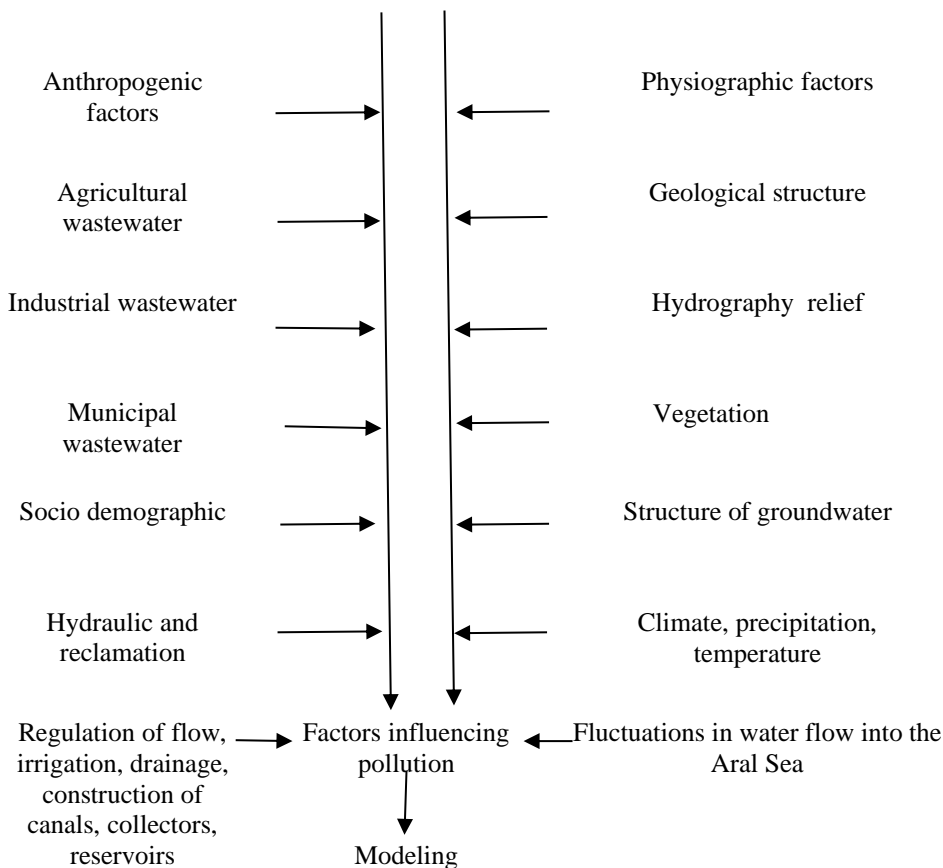
The article discusses the problems of studying the assessment of hydroecological monitoring of the hydro chemical regime of surface waters in the Aral Sea basin. Practical and scientific recommendations for solving these problems are proposed.

KEY WORDS: *Aral Sea basin, hydro chemical regime, hydro ecological monitoring, anthropogenic factors.*

Purpose and objectives of research. The purpose of this research is to conduct hydroecological monitoring of irrigation waters and provide scientific and practical proposals for their use. In accordance with the stated goal, the following tasks are considered in the work: a) study of the hydrochemical regime of surface waters in the Aral Sea basin and the current state of their quality; b) hydrochemical problems that need to be solved; c) ways to solve these problems.

Initial data. The work used the database of the Research Institute of Irrigation and Water Problems at TIIMSH, where a lot of time was devoted to studying changes in the water and hydrochemical regime of river and collector-drainage waters of the Aral Sea basin [1-3]. These studies were carried out by employees of the laboratory of hydrometry and metrology based on the complex basin method.

Main part. Many researchers have repeatedly studied the state of studying the hydrochemical regime of surface waters in the Aral Sea basin and their quality. Until 1970, basic information on the hydrochemistry of river waters in the Aral Sea basin was published in the series of Hydrochemical Yearbooks. Since 1938, they regularly contain information on the chemical composition of these waters (earlier data are fragmentary). Since 1975, due to an increase in the number of chemical elements determined (at selected posts), these data began to be published in Hydrochemical Bulletins. Unfortunately, more or less established mechanisms for exchanging them and other hydrological information ceased after the collapse of the Soviet Union and the establishment of new governments in Central Asia (some exchange continued to be carried out only between specialists). Since then, it has become very difficult to provide an objective assessment of the quality of surface waters in this region, even for different river basins. In this regard, it has become very important to objectively evaluate all hydrochemical information taking into account existing standard methods (Fig. 1).

Components of the Hydroecological Monitoring System of the Aral Sea Basin**Fig. 1. Main components of the hydroecological monitoring system Aral Sea Basin (ASBMS)**

Research into the hydrochemistry of surface waters in the Aral Sea basin continues to decline, especially in Kyrgyzstan, Tajikistan and Turkmenistan and parts of Kazakhstan and Uzbekistan.

According to experimental estimates, the annual volume of water resources in the Aral Sea basin (the salinity of the Aral Sea water was from 9-10 g/l to 115-120 g/l for 1960-2017) is approximately 120 km³. The annual volume of modern runoff of collector-drainage waters, which clearly worsens the hydroecology of the territory, is 33-35 km³, which is 30% of all renewable water resources in the basin. In the Amu Darya basin, which includes the zones of the Karakum Canal along with the Murgab and Tedzhen irrigation districts, the volume of collector waters is 21-22 km³ with an average mineralization of 1.8 to 14.2 g/l. In the Syrdarya basin they include 13-14 km³, with average mineralization from 1.7 to 6.0 g/l. River waters and, especially, collector-drainage waters of the region are heavily polluted.

Analysis of data from hydrochemical bulletins in recent years with the results of our own measurements showed that the waters contain pesticides, heavy metals (cadmium, strontium and others), petroleum products, phenols and other toxic elements. A very alarming hydrochemical situation is developing near the Aral Sea and in the southern Aral region.

Practical solutions to the noted problems require work in the following main areas:

- Development of a scientific research base on all aspects of water quality and water resource protection;
- Adoption of laws and administrative documents on water protection and improvement of their quality;
- Implementation of various engineering, technological and other measures to address the listed problems.

The main conditions for successful implementation of recommendations for hydrochemical studies are as follows:

- Strict implementation of the law "On Water and Water Use", which was adopted in Uzbekistan and the adoption of similar laws by other governments in the region;



- Creation of a comprehensive monitoring network with timely reporting of changes in water quality and assessment and adoption of measures to eliminate negative processes;
- Creation of water protection zones along the banks and buffer strips for ease of water management for the purposes of protection against river water pollution and land degradation.

Conclusion _ one of the dangers for the irrigated zone of Central Asia is the process of salinization of irrigated lands. According to calculations, 50-55 million tons of various salts are supplied to irrigated fields annually.

Theoretical and practical research on hydrology and hydrochemistry of the Aral Sea basin should be conducted jointly with specialists from other countries. In this regard, it is useful to draw on experience gained in other regions, such as the results of agreements between the United States and Mexico, according to which the United States undertakes not to degrade the water quality of the Colorado and Rio Grande rivers before they enter Mexico.

LITERATURE

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