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ANALYSIS OF THE ECOLOGICAL STATE OF WATER IN THE SALAR CANAL PASSING THROUGH THE TASHKENT REGION

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Annotation. *This article is devoted to the analysis of the ecological state of the water of the Salar channel, one of the main sources of water in the Tashkent region, the identification of pollution sources, the assessment of hydrochemical indicators and their impact on the ecosystem, as well as the description of the growing level of water pollution with heavy metals.*

Key words: *water quality, heavy metals, resource, radioactive element, concentration, ecosystem, hydroecology, hydrology, optical emission spectrometer.*

INTRODUCTION

In recent years, our country has paid increased attention to environmental protection, public health protection, and environmental safety. In accordance with the Resolution of the Kengash of the Senate of the Oliy Majlis of the Republic of Uzbekistan dated August 1, 2023 No. PK-547-IV "On the protection, rational and efficient use of water resources, improving water resources management mechanisms, strengthening the legislative framework of the sphere", paragraph 3 of the resolution gives instructions to study problems in the field of protection, rational and efficient use of water resources and take specific measures to eliminate them. New standards for maximum permissible emissions of pollutants into open water bodies and terrain and Instructions for registration have been developed.

Water pollution results in deterioration of water quality, changes in the aquatic ecosystem, as well as the death of aquatic organisms, the spread of various diseases into the environment and the proliferation of plants in water bodies.

Excessive accumulation of biogenic substances in water bodies, the development of blue-green algae, disruption of the taste and smell of water, the appearance and increase of toxic substances, the death of fish and aquatic animals, the overgrowing of water bodies with grass - all these are signs of eutrophication of water bodies, that is, the reasons for the increase in biogenic substances (nitrogen, phosphorus) in water bodies.

Water pollution manifests itself in a negative change in its organoleptic, physical, chemical and biological properties (an increase in the amount of salts,

biogenic elements, toxic heavy metals, radioactive elements in the water and the proliferation of pathogenic bacteria).

As a result of water pollution under the influence of natural and anthropogenic factors, features of a change in the qualitative characteristics of water resources in a negative direction are observed. As a result, water becomes unsuitable for previously used purposes in terms of quality indicators.

Evidence of this is the extreme limitation of fresh water resources in nature, that is, their limitation, the extremely uneven distribution and placement of certain fresh water resources across regions, the increasing pollution of fresh water as a result of natural factors and especially human economic activity. The ever-increasing demand of mankind for water, the large amount of useless and wasteful water consumption in water resource use systems, the discharge of polluted wastewater into the aquatic environment without full or complete purification, as well as the addition of secondary water, incomplete reuse of wastewater - all this indicates the need to protect water resources from pollution and depletion.

MATERIALS AND METHODS

The ecological state of water bodies is associated with hydroecological and hydrological factors. In the territory of Tashkent region there are such large water bodies as the Chirchik River, the Bozsu Canal, and the Tuyabuguz Reservoir. These water bodies can be polluted by industrial waste, agricultural wastewater, and natural factors [2].

In addition, the Salar Canal, which originates from the left tributary of the Bozsuv, is one of the important waterways of the city of Tashkent and the Tashkent region and is used for water supply and irrigation of industrial enterprises [2]. The Salar Canal is the left branch of the Bozsuv Canal and receives water from the Bozsuv Canal in the Kibray district. The main part of the Salar is located in the lower outlet channel of the Salar hydroelectric power station, passes through the south of the Zangiata district and ends in the Yangiyul district. This canal, with a total length of 60 km, is 10-15 m wide and 1-2 m deep. The main water intake is designed for a capacity of 20 m3 / sec [3].

Samples were taken from the water entering the fish farm "KHORROT Abziban FISH HOUS" (Karasu aryk), located in the Yangiyul district of the Tashkent region, and on 13.06.2025, using the "Labwan Benchtop Dissolved Oxygen Meter", the pH-hydrogen, the amount of O2-oxygen, 0C-temperature, electrical conductivity (COND) were determined. (Table 2).

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Table 1

Harm of heavy metals

Metal	Plankton	Crayfish	Mollusk	Fish
Copper	+++	+++	+++	+++
Zinc	+	++	++	++
Lead	-	+	+	+++
Mercury	+++	+++	+++	+++
Cadmium	-	++	++	++++

Degree of toxicity

- no ++++ strong +++ very much ++ less + very little

This study aims to assess the ecological state of the Salar Canal flowing through the Tashkent region. Observations were carried out in March-June 2025 in the upper (Kibray district), middle (Tashkent city) and lower (Yangiyul district) parts of the canal. At each point, hydrochemical analyses of water samples were carried out (pH, oxygen (O2) mg/l, nitrites (NO2) mg/l, mineralization, total hardness, calcium, magnesium, alkalinity, chlorides, ammonium nitrogen, ammonia).

Water quality complies with the State Standards of the Republic of Uzbekistan GOST R 56828.12-2016 (the best available technology. Classification of water bodies. Technological regulation of wastewater waste in centralized systems for promoting information on wastewater of settlements) comes into force on 01.07.2017 and is assessed accordingly [5]. The analyses were carried out in the laboratory of the "Research Institute of Fish Farming" and in modern laboratories of the Research Institute of Horticulture, Viticulture and Winemaking named after Academician M. Mirzaev using an optical emission spectrometer AVIO-200 ISP. Statistical analysis of the obtained data was also carried out using the computer program Microsoft Excel.

RESULTS

According to the results of the study, the water quality in the upper part of the Salar canal is relatively satisfactory and corresponds to class III (moderately polluted). In the middle and lower parts, the content of iron and cadmium, oil products, ammonium and nitrites in the water exceeds the norm. Especially in the lower part, the water is black, turbid and has a characteristic odor, according to hydrobiological indicators, it belongs to class III (polluted). A decrease in the amount of oxygen dissolved in water and a decrease in biodiversity were observed. This situation indicates a serious violation of the ecological balance of the canal.

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Table 2

Technological indicators			
pH	**O_2 (mg/l)**	**temperature (°C)**	**Electrical conductivity (COND)**
7-7.30	3-3.50	22.3	656µS

The results of Table 2 show that the pH content in the water corresponds to the permissible norm of 7-7.30. The amount of oxygen in the water is 3-3.50 mg/l less. The temperature is 22-300°C. The conductivity is above 656µS/ms, 0-500 µS/cm is convenient for most fish species.

Using the optical emission spectrometer "AVIO-200 ISP" the presence of micro- and microelements, as well as heavy metals in the water was detected. High concentrations of these substances can have a negative impact on the aquatic ecosystem (Table 3).

Table 3

Composition of elements in water					
Arik Karasu					
№	**Element**	**Average value, mg/l**	**Permissible level, mg/l**	**Relative indicator, mg/l**	**Below or above the permissible limit**
1.	**Copper**	0,132	UZB 1,0	0.13	below
2.	**Manganese**	0.543	UZB 0,1	5.43	higher
3.	**Zinc**	0.311	WHO 5,0	0.06	below
4.	**Iron**	9.654	WHO 0.3	32.18	higher
5.	**Sodium**	371.03	UZB 200	1.86	higher
6.	**Calcium**	779.702	UZB 180	4.33	higher
7.	**Chromium**	0.595	UZB 0,05	11.90	higher
8.	**Cobalt**	0.008	WHO 0,1	0.08	below
9.	**Nickel**	0.209	WHO 0.07	2.99	higher
10.	**Lead**	0.069	WHO 0,01	6.90	higher
11.	**Cadmium**	0.023	WHO 0,003	7.67	higher

CONCLUSION

To improve the ecological state of water bodies in Tashkent region, it is necessary to strengthen hydroecological monitoring, widely apply bioindication methods, and improve the water resources management strategy. Water quality control in accordance with WHO and FAO standards is of great importance.

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