ASSESSMENT OF THE ECOLOGICAL CONDITION OF OPEN WATER BODIES BASED ON MICROBIOLOGICAL CHANGES

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Annotation: Bioindication of the ecological state of open water bodies based on microbiological indicators is an important tool for environmental monitoring. Microbiological communities rapidly respond to changes in aquatic environmental conditions and reflect the level of anthropogenic impact. The assessment of water body conditions is carried out using sanitary-indicator microorganisms and total microbial counts, which makes it possible to determine the degree of water pollution and its sanitary safety. The article presents the results of microbiological studies of the Kuyimazar reservoir, used for drinking water supply.

Keywords: ecosystem, water body, bioindication, ecological status, microbiology, microbiological communities, sanitary indicator microorganisms, surface water bodies.

Аннотация: Биоиндикация экологического состояния открытых водоёмов на основе микробиологических показателей является важным инструментом экологического мониторинга. Микробиологические сообщества оперативно реагируют на изменения условий водной среды и отражают уровень антропогенного воздействия. Оценка состояния водоёмов проводится по санитарно-показательным микроорганизмам и общему микробному числу, что позволяет определить степень загрязнённости воды и её санитарную безопасность. В статье представлены результаты микробиологических исследований водохранилища Куйимазар, используемого для питьевого водоснабжения.

Ключевые слова: экосистема, водоём, биоиндикация, экологическое состояние, микробиология, микробиологические сообщества, санитарно-показательные микроорганизмы, поверхностные водоёмы.

Currently, the unfavorable environmental impact is having a negative effect on nature, including various open and closed water bodies. Surface water bodies, which are used for various purposes, such as drinking water supply and recreation, are no exception. Therefore, it is necessary to determine the microbiological composition of water samples, compare them with accepted standards, and based on the interpretation and analysis of the results obtained, develop specific recommendations through continuous ecological, hydrobiological, and microbiological monitoring of all water bodies.

Compliance with these developed recommendations ensures the safety of water use by the population.

Pathogenic microorganisms and pathogenic indicators (PI), entering water bodies through various pathways, remain in the water for varying periods and determine the degree of its contamination. It is known that the presence of these microorganisms in water samples, regardless of the number of days, makes the water unsuitable for drinking according to all standards. When open water bodies are used for recreational purposes, the above-mentioned standards are also taken into account.

In order to prevent waterborne infectious diseases, it is necessary to determine the degree of contamination of water samples by various microorganisms. The assessment of water contamination by the sanitary indicator microorganism *Escherichia coli*, along with the determination of several other parameters, is regulated by normative documents adopted in our country. However, in accordance with international standards (ISO), additional criteria need to be included in the regulatory documentation.

We started by determining parameters such as the number of total microorganisms (TM) and coliform bacteria (CB), as well as analyzing the obtained results. The comparison of the obtained data was carried out in accordance with SanPiN and M No. 0172-04, as well as with the requirements of 'Drinking Water: Hygienic Requirements and Quality Control,' established in the Uzbekistan standard GOST 950–2011.

The research was conducted on the Kuyimozor reservoir, which provides the city of Bukhara with drinking water.

The results of the conducted research showed that in water samples taken from the Kuyimozor reservoir, in spring, at an air temperature of 27.8°C and water temperature of 17.2°C, the total number of coliform bacteria (CB) in 1 dm³ of water near the shore surface of the reservoir was 12 ± 4.8 CFU/dm³, while in summer, at an air temperature of 30.9°C and water temperature of 25.1°C, this value increased to 1400 ± 1.4 CFU/dm³.

Microbiological and Ecological Condition of Water Samples from the Kuyimozor Reservoir

Objects	**Seasons**	**Air temperature, °C**	**Water temperature, °C**	**Name of the indicators**	
				CB in 1 dm³	**TM in 1 dm³ ³**
GOST 950–2011				≤ 500	≤ 100
Coastal zone of a reservoir	**Spring**	27,8	17,2	12±4,8	158±1,9
	Summer	30,9	25,1	1400±1,4	280±7,5
Drinking water intake point	**Spring**	27,8	17,3	29±3,1	40±5,2
	Summer	30,9	25,3	450±2,7	50±6,3

If we consider that according to the regulatory documents, the number of coliform bacteria (CB) in 1 dm³ should not exceed 500 CFU, then in spring, with an air temperature of 27.8°C and a water temperature of 17.2°C, the value was

41.67 times below the established norm. In summer, with an air temperature of 30.9°C and a water temperature of 25.3°C, the parameter was 1400 ± 1.4 CFU/dm³, which significantly exceeds the norm by 2.8 times.

Conclusion:

As a result of the research, it was found that in the water samples taken from the Kuyimozor reservoir, the total number of coliform bacteria (CB) in 1 dm³ of water in the middle part of the reservoir was 2 times lower in spring than in summer. This change confirmed how seasonal and environmental conditions affect microbiological changes. In summer, the parameters obtained from the Kuyimozor reservoir were significantly higher. These parameters were 1.28 times higher than the values from the shore zone of the reservoir and the drinking water intake site (1400 ± 1.4 and 450 ± 2.7 CFU/dm³) during the spring period.

It has been established that microbiological and hydrobiological changes caused by seasonal and external factors directly negatively affect the ecological condition of the water body. In particular, the intensification of abiotic factors (such as temperature, chemical composition of water) and biotic factors (types of microorganisms, their quantity) deteriorates the ecological condition of the water body. This, in turn, may lead to the deterioration of water resources and their non-compliance with sanitary standards, posing a threat to public health.

Based on this, it is necessary to strengthen ecological monitoring of water bodies and deepen the analyses, as microbiological and hydrobiological parameters always reflect ecological threats. To maintain the sustainable ecological condition of water bodies, a continuous control over the use of water resources and recommendations should be developed, as well as expanding microbiological monitoring.

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