ASSESSMENT OF MICROBIOLOGICAL POLLUTION IN THE KHRAMI RIVER BASIN

Tea Mchedluri
Doctor of biological sciences, professor,
Iakob Gogebashvili Telavi State University, Georgia
E-mail: t.mchedluri@yahoo.com

Elene Petriashvili
Doctor of Biology. Assistant professor
Sokhumi State University.Georgia

Tskitishvili Liliana
PhD Student (Microbiology).
Sokhumi State University.Georgia

Tinatin khokhobashvili
Doctor of Biology. Jumber Lezhava Multi Profile
International Academy of Sciences. Georgia

Abstract:
Pollution of rivers is an important environmental and microbiological problem. As a result of anthropogenic impact, various biogenic or toxic compounds flowing into water bodies disturb the balance in the ecosystem, as a result of which its self-cleaning process decreases. Water pollution is often considered to be the cause of many diseases and increasing mortality. Various waterborne infectious diseases may be caused by pathogenic microorganisms. To assess the ecological safety of rivers, it is necessary to carry out their microbiological analysis. The object of our research was the Khrami River basin of Eastern Georgia. Monitoring was conducted in October 2023. We conducted observations at two points: river Khrami No.1 and river Khrami No.2 (river Khrami and the Mashavera after joining). Total coliform bacteria, E.coli, mesophilic aerobes, facultative anaerobes, coliphages, salmonella, and Streptococcus faecalis were determined to determine the sanitary-microbiological condition of the Khrami river water. Based on the results of the analysis, Salmonella was not detected in any of the river water samples, and the other microbiological indicators exceeded the values allowed by the surface water norms.
The obtained results cannot be considered unexpected, because there is anthropogenic influence in the points taken as the object of our research. The quality of river pollution is affected by settlements, agricultural fields, faulty sewage systems, wastewater from animal husbandry complexes, drainage water of the irrigation system, landfills on the river bank, etc. Maintaining and protecting the desired ecological condition of the river today requires a

special approach and solution. Therefore, to maintain its healthy ecological state, regular monitoring is necessary to determine the source of pollution and the ways of its spread.

Keywords: River Khrami, Water pollution, Contaminants. River basin

Introduction: The Khrami is a river in eastern Georgia, the right tributary of Mtkvari. It originates on the slopes of Trialeti Ridge and flows into a deep valley. The length of the river is 201 km. In the lower waist, it is used for irrigation. Tsalki reservoir and three hydroelectric power stations are built on the Khrami. The right tributaries of Khrami are the Debeda and the Mashavera [1]. 5 irrigation systems are operating on Mashavera, which irrigate 7440 ha of agricultural land. Increasing anthropogenic impact is observed on the river, which causes microbiological water pollution. Khrami river basin is of vital importance for Kvemo Kartli. Therefore, to evaluate its ecological safety and suitability, it is necessary to carry out a microbiological analysis of water.

Research results: In October 2023, we took water samples for microbiological analysis at two points of the Khrami River basin (Khrami River No. 1 and Khrami River No. 2 after the confluence of its tributary the Mashavera). Water sampling, storage, and transportation, as well as laboratory microbiological analysis, were performed by international (ISO) standard methods [2.3]. Total coliform bacteria, E.coli, mesophilic aerobes, and facultative anaerobes, coliphages, salmonella, and streptococcus were determined. The results are given in Table No. 1.

Table No. 1. Microbiological research of the Khrami River water

Defined microorganisms	The River Khrami 2023 წელი		
	№1	№2	Normative no more than
Total coliform bacteria	18280	23050	10000
E-coli	3040	3590	
Streptococcus faecalis	5475	5172	
Mesophilic aerobes and facultative anaerobes 370C	340	640	
Mesophilic aerobes and facultative anaerobes 220C	2000	2200	
coliphages	40	50	100
Salmonella	It was not found		Will not be allowed.

Studies have shown that microbial pollution is increasing along the entire stretch of the river. The number of mesophilic aerobes and facultative anaerobes in 1 ml of water at 220 C ranges from 340 to 640. and at 370C - from 2000 to 2200. The number of total coliform bacteria in 1 liter of water, as well as E-coli and Streptococcus faecalis, which are found in the intestines of humans and warm-blooded animals, are high, and their number is used to evaluate new fecal pollution of water. Salmonella was not found in any of the samples.

Conclusion: Based on the results of the conducted research, we can conclude that the ecological condition of the Khrami River water is affected by its right tributary, the Mashavera River, which is under anthropogenic load. From the results of the water analysis of the Khrami River, it can be seen that it is a microbially polluted river. Its microbiological indicators, except Salmonella, which was not found in any sample, are much higher than the values allowed by surface water norms.

In our opinion, such results cannot be considered unexpected, because the areas taken as the object of research are characterized by developed agriculture, animal husbandry, and industry, due to which the Khrami River is significantly polluted with household-used untreated water runoff from livestock complexes, irrigation system drainage water and others. To maintain/protect the desired ecological condition of the river, regular monitoring is necessary to determine the source of pollution and the ways of its spread.

References

1. Encyclopedia "Georgia", vol. 1, vol.,1997
2. ISO 7899-2:2000 Water quality —Detection and enumeration of intestinal enterococci — Membrane filtration method
3. ISO 17994:2004 Water quality —Criteria for establishing equivalence between microbiological methods
4. Labinskaya A. S, (1983) Microbiology. Publishing House Education. Tbilisi.
5. Mchedluri T. Liparteliani M. ,,RESULTS OF HYDROCHEMICAL RESEARCH OF THE BLACK SEA BASIN RIVERS; European Journal of Agricultural and Rural Education (EJARE). 2021
6. Mchedluri., T. Liparteliani M. ,,RESULTS OF ECOLOGICAL RESEARCH OF THE BLACK SEA (ADJARA TERRITORY) BASIN RIVERS''. International Conference. August 20, 2020. San Francisco, California, USA
7. Mchedluri T, Liparteliani M. (2021) "Eco-chemical condition of the rivers Bartskhana and Adjaristskaliand their classification according to integrated hydro-chemical indicators". Journal of Hard Tissue Biology
8. Mchedluri, T. (2020). Hydrobiology. Tbilisi
9. Mchedluri Tea., Liparteliani Mirangula ,,Microbiological monitoring of the rivers Achariskali and the Bartskhana inWestern Georgia'' Web of Scientists and Scholars: Journal of Multidisciplinary ResearchVolume 1, Issue 1, April, 2023.