

## **ECOLOGICAL ASSESSMENT OF TCHITCHAKHVI KHEVI RIVER**

**Margalitashvili D., Davitashvili M., Berdzenishvili N., Aleksidze M.**

*Iakob Gogebashvili Telavi State University, 1, Kartuli Universiteti str., Telavi, 2200, Georgia  
nanaka.berdzenishvili@yahoo.com*

**Summary:** *The article discusses the assessment of the ecological condition of the Tchitchakhvi Khevi River and its surroundings. Chemical and microbiological research of river water has been carried out. Water samples were taken for analysis in compliance with the requirements of normative documents. The results of the study showed that the degree of pollution of the river is affected by settlements, agricultural lands, faulty sewage system. The microbiological contamination at the site we have studied as a whole can be assessed as, so far, epidemiologically safe, i.e. moderately contaminated, which can be explained at the expense of river self-cleaning.*

**Key Words:** *Pollution, river self-cleaning, microbiological contamination, anthropogenic, ecosystem.*

**Introduction:** Water is one of the most important factors in the formation of the physical and chemical environment, climate, weather, as well as the maintenance of life on Earth. Water pollution is a significant environmental problem. As a result of anthropogenic impacts, various biogenic or toxic compounds discharged into reservoirs disrupt the balance in the ecosystem, resulting in a decline or complete loss of its self-cleaning ability [1, 2].

Water shortage is not felt in Georgia yet, the main problem in Georgia is that water is polluted from more than 4/5 of industrial enterprises (metallurgy, oil refining, coal mining, chemistry, energy production). Utility companies also emit a significant amount of toxic substances. The main cause of pollution is often the malfunction of water filters and cleaning products [3, 4, 5].

The aim of our research was to study the ecochemical and microbiological condition of one of the rivers of Eastern Georgia, Tchitchakhvi Khevi and the influence of anthropogenic factors on it.

The subject of research is the left tributary of the Stori River - Tchitchakhvi Khevi. The Stori River originates on the south slope of Mount Didgverdi, at 2,950 m above sea level and merges with the Alazani River at Saniore village. The main tributaries of the River are the Usakhelo River (total length: 14 km) and the Tchitchakhvi Khevi (20 km, basin area – 92 km<sup>2</sup>, width of flow – 5-10 m, flow depth – 0.4-0.7 m, flow rate – 1.3-1.6 m/sec, average height of the basin – 2,136 m, overall drop – 2,175 m). We have selected the river Chichakhvi khevi valley as the object of research in the sense that agriculture, livestock and viticulture are well developed in the surrounding villages (Sanyore, Pshaveli, Jughaani, Artana) [6, 9].

**Research methods:** We conducted the research in accordance with the normative documents (general requirements for water sampling LHG, №26.2014.01.03) We took surface samples at a depth of 10-15 cm from the water surface. If it was necessary to take the sample at the bottom, we would take it at a height of 30-50 cm from the bottom. We took water samples superficially in the bathing areas. In those reservoirs with a depth of not less than 0.5 m, samples were taken with a sterile batometer and sterile vessels. When taking several samples with one batometer. Before taking each sample, we sterilized it using flambio. We opened the container just before taking the sample (we opened the paper lid or the bottle from the vials with the stopper so as not to touch the throat of the container and the stopper by hand). After filling, we closed the container with a sterile stopper. When examining indicator microorganisms, we received - 500 ml. In the study of indicator and pathogenic microorganisms in water - 2500 ml [7, 8, 10].

We studied the chemical and microbiological pollution of the Chichakhvi khevi River. The river Chichakhvi khevi is used for swimming, irrigation and drinking of cattle. It is polluted by domestic sewage, industrial

water. The ecological condition of the river is also affected by pesticides and fertilizers used in agriculture. We conducted chemical studies on organoleptic properties, pH, precipitated substances and other typical contaminants. See also BOD and COD. The survey data are presented in table 1.

Table 1. 2019 data of chemical analysis of Chichakhvi khevi river water

Physico-chemical parameters of water	Location – village Saniore	
	Spring	Summer
Smell	0	0
Color	12	19
Transparency	7,6	8
Ph	8,2	7,8
BOD mg/l	2,3	1,3
COD mg/l	2,1	1,9
Dissolved oxygen mg/l	8,4	8,6
Compressed partikles mg/l	61	58

Our further experiments were directed at studying the effects of pesticides on the water system. Due to the fact that the river Chichakhvi khevi flows into areas rich in gardens and vineyards, it is possible to contaminate it with pesticides and fertilizers. Since Chichakhvi khevi is used by the population for irrigation of agricultural lands, we considered it important to determine the change of pesticides in the river water.

Table 2. Microbiological contamination and pesticides of Chichakhvi khevi water content analysis 2019 data

place of sampling	Name of microorganisms					
	Total number of microbes		Coli index <i>E. coli</i>		Pathogenic microorganisms <i>Solmonella</i>	
	spring	summer	spring	summer	spring	summer
<b>village Artana</b>	4,5 x 10 <sup>3</sup>	6,7 x 10 <sup>3</sup>	22 x 10 <sup>3</sup>	30 x 10 <sup>3</sup>	Did not turn out	Did not turn out
	Name and content of pesticides					
	Karate		Icon		Samurai	
	spring	summer	spring	summer	spring	summer
	0,0031	0,0041	0,0029	0,0031	0,0031	0,0037

Based on the results obtained, we can conclude that the microbiological contamination at the site we studied can be assessed as generally epidemiologically safe, ie moderately contaminated, which can be explained at the expense of self-cleaning. The village of Saniore has an open copper quarry, so the number of karate and

icons has increased. Added to this is the excessive consumption of pesticides by the population, so their amount in river water is also increased.

**Conclusion:** Thus, the population of the village of Saniore near the gorge of the river Chichakhvi khevi (where mainly viticulture and horticulture is developed) mainly uses pesticides and fertilizers to fight pests and increase yields, without adhering to any norms, which leads to the accumulation of pesticides in the water. Therefore, we believe that it is necessary not only to monitor water, but also to raise public awareness about the issues that pesticides accumulate in the soil and at the bottom of the river with some violation of their regulation, leading to their involvement in the food chain of living systems. In addition, pesticides and fertilizers accumulate in the vegetative parts and fruits of the plant. As for the pesticides we have chosen - karate, icon and samurai, they cause gastrointestinal pathologies and poisoning in humans. It is therefore of great importance to adhere strictly to the norms when using these pesticides.

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