

ECOLOGICAL MONITORING OF THE RIVERS CHOROKHI AND KUBISTSKALI

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Abstract: Ecochemical and biological monitoring of surface waters and water quality control is the only means by which the actual existing ecological condition of rivers can be checked. This problem is especially important for our country, because the impact and intensity of anthropogenic impacts on ecosystems in Georgia have changed dramatically over the last 20 years (large production facilities have been replaced by small enterprises) and the state often does not monitor them continuously. These problems often lead to contamination of reservoirs.

In order to avoid this problem, we considered it important to study the rivers of the Black Sea Basin (Georgian sector) – the Chorokhi and the Kubistskali. We conducted the studies seasonally. Standard procedures for field analysis were written prior to fieldwork, in particular, portable equipment and standard solutions were tested. Sampling and transportation were carried out in accordance with the methods of international European standards. We conducted ecological monitoring of the rivers Kubistskali and Chorokhi in 2021 seasonally. Their physical properties, index of chemical contamination, heavy metals and biogenic elements were studied. The monitoring results showed that the anthropogenic pollution is expressed on the mentioned rivers, however, under the influence of self-treatment processes, the ecological condition of the studied section of the rivers is satisfactory.

Keywords: The Black Sea, Hydro-chemical research, the river Kubistskali, The river Chorokhi Heavy metals

Research methods: Hydro-chemical analyzes are carried out using modern methods that meet and comply with European standards, such as: ion-selective chromatography(ICS-1000) ISO100304-1: 2007), spectral-photometry Specord 205ISO7150-1: 2010;Membrane filtration ISO9308-1, ISO7899-2, Atomic-absorption method-Plasmaemission spectrometer ICP-MS, field portable device Horiba (ISO 6058:1984; ISO6059:1984; ISO 9297:1989)

Introduction: Water resources are of great importance not only for nature, but also for human life, to provide favorable living conditions for the population and to maintain an ecologically clean environment. It is an essential resource for multifaceted human activities. The common shortage of fresh water in many countries is due to the fact that it contains poorly treated wastewater, industrial waste and more. Harmful wastes in the biosphere: Pesticides, heavy metals, poisons, synthetic detergents, petroleum products, biogenic substances and many other substances of human agricultural action are not natural to the river in their composition and volume. Thus, they are not involved in metabolism and are its pollutants (Mchedluri., T. Liparteliani, M 2020).

The stability of the aquatic ecosystem depends on the balance of aquatic populations. For the most part, a certain balance is maintained between the associations of microorganisms in water systems. Chemicals in contact with wastewater alter the sanitary regime of the reservoir as well as upset the balance between microbial populations. Household wastewater causes fecal contamination of reservoirs. Toxic substances in rivers can lead to mass poisoning of ichthyofauna and even to other organisms through food chains.

Wastewater usually contains various toxic substances, so it is necessary to make sure that their concentration does not exceed the maximum allowability. Due to the above, water pollution in a number of cases leads to undesirable consequences (Mchedluri, T. 2018)

In order to avoid this problem, we considered it important to study the rivers of the Black Sea Basin (Georgian sector) – the Chorokhi and the Kubistskali.

The length of the river Kubistskali, which starts from Adjara-Guria mountainous system, is 5.4 km. Its minimum flow is 0.25 m³ / s and Max - 80-100 m³ / s. It joins the Black Sea with an artificial concrete canal located on the territory of the Batumi oil refinery.

The river Chorokhi starts in the Okus-Badadagi mountains. It flows through Turkey and Georgia. Its length is 438 km. 26 km of its lower course is on the territory of Georgia. The Chorokhi flows between the Chorokhi and Lazistan ridges, through a tectonic gorge and joins the Black Sea south of Batumi. It is characterized by spring and summer floods. It is used for irrigation (Mchedluri, T. Liparteliani M. 2021).

Research Findings: Fieldwork is one of the most important parts of environmental research. From a methodological point of view, conducting them correctly significantly contributes to the reliability of the final results. Therefore, their proper planning and implementation is crucial. Prior to fieldwork, all standard procedures were written according to management to ensure proper sampling, storage, and transportation of samples. Prior to the fieldwork, standard procedures for field analysis were written, and equipment and reagents were tested. Sampling and packaging were performed according to standard methods

Two rivers of western Georgia – the Chorokhi and the Kubistskali were selected as the object of research. We monitored the spring, summer, fall and winter of 2021 to assess the ecological condition of the rivers in relation to seasonality. We took water samples at our pre-selected points in the river Kubistskali - at the confluence of Batumi, the river Adjariatskali at the confluence of the Chorokhi. The results of the research are presented in Tables (1-6)

The main cause of anthropogenic pollution of surface waters is domestic-communal and industrial wastewater. Their impact is particularly pronounced on small rivers. Water pollution changes its physical properties (color, odor, turbidity), chemical composition (organic and biogenic substances, heavy metals, etc.). The results of hydrochemical analyzes of rivers are given in Table №1-2

Table №1. Basic hydro-chemical parameters of river

Ingredients	Kubistskali			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
temperature t ⁰ C	9.5	16.8	23.6	23.6
Smell, points	1.8	1.0	2.0	2.55
Turbidity NTU	2.83	1.88	3.98	2.99
pH	7.65	7.45	7.95	8.05
dissolved oxygen. mg / l	10.8	9.0	7.8	9.8
BOD ₅ , mg / l	4.48	5.18	7.02	5.86
Electrical conductivity µsms/cm	135.2	205.6	188.2	190.2
mineralization, mg/l	128.4	148.8	132.4	130.4

Table №2. Basic hydro-chemical parameters of river

Ingredients	Chorokhi			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
temperature t ⁰ C				
Smell, points	0	1.2	1.3	1.37
Turbidity NTU	7.4	6.4	7.2	5.5
pH	8.0	8.12	8.15	8.10
dissolved oxygen. mg / l	11.4	9.2	8.0	10.0
BOD ₅ , mg / l	5.18	4.16	5.16	5.16
Electrical conductivity μsms/cm	318.4	268.6	227.9	195.8
mineralization, mg/l	199.6	210.8	180.8	280.6

Against the background of low mineralization, the river Chorokhi water is characterized by a relatively high content of sulfate. In our opinion, it is related to the oxidation of sulfide minerals and leaching of sulfates of the iron ores.

Table №3. Content of basic ions in water

Ingredients	Kubistskali			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
Nitrite.	0.11	0.09	0.10	0.16
Nitrate	7.2	6.24	9.14	10.24
Ammonium	0.28	0.28	0.72	0.66
Phosphate	0.38	0.33	0.30	0.34
Sulfate	6.6	8.2	9.8	11.2
Chloride	8.8	5.7	7.7	8.6
Hydrocarbonate,	78.5	101.4	100.8	94.8
Potassium	24.1	15.5	19.5	16.5
Calcium	11.2	10.5	14.5	15.5
Magnesium	7.2	5.2	8.2	8.5

Table №4. Content of basic ions in water

Ingredients	Chorokhi			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
Nitrite	0.10	0.11	0.0081	0.066
Nitrate	5.72	5.22	7.22	8.28
Ammonium	0.56	0.40	0.68	0.54
Phosphate	0.33	0.35	0.55	0.45
Sulfate	22.4	21.8	24.7	18.6
Chloride	6.9	7.9	8.9	8.4
Hydrocarbonate	100.8	99.8	79.8	80.6

Potassium	22.4	20.3	17.3	18.2
Calcium	14.8	15.2	16.8	17.5
Magnesium	4.9	6.9	7.9	8.8

Important components are biogenic elements that reflect the degree of surface water pollution and are their indicators. Of particular interest is the control of the contents of their individual forms in the water, which are characterized to the intensification of processes such as fecal contamination, eutrophication, discharge of municipal and agricultural wastewater into the river, and others.

Table №5. Metal content in the river Kubistskali

Ingredients	Kubistskali			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
Iron, mg / l	0.0912	0.0677	0.0878	0.0774
Copper, mg / l	0.0073	0.0055	0.0065	0.0057
Zinc, mg / l	0.0112	0.0057	0.0067	0.0066
Bullet, mg / l	0.0082	0.0070	0.0088	0.0081

Table №6. Metal content in the river Chorokhi

Ingredients	Chorokhi			
	Time of taking samples 2021			
	Winter	Spring	Summer	Autumn
Iron, mg / l	0.1900	0.2201	0.2403	0.2288
Copper, mg / l	0.0038	0.0030	0.0031	0.0037
Zinc, mg / l	0.0114	0.0116	0.0214	0.0114
Bullet, mg / l	0.0032	0.0025	0.0015	0.0025

Heavy metals play an important role in the industrial pollution of reservoirs. However, the concentrations of heavy metals iron, copper, zinc and lead in these rivers do not exceed the maximum allowability. Which in our opinion is caused by the pH of the water.

Conclusion:

From the monitoring of the rivers Kubistskali and Chorokhi in spring, summer, autumn, winter 2021, it was found that their chemical pollution rates, heavy metals, biogenic elements do not undergo significant change and mostly fluctuate within the maximum allowable concentration. However, the results obtained indicate the influence of anthropogenic load on the river. Nevertheless, the ecological condition of the studied section of the river is satisfactory and it is epidemiologically safe.

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