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Report on Quality of Surface Water in the Four River Basins of Kosovo #2

Areas Signaled by the Community

Implemented by

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CLARIFICATION

This report was developed as part of the project "Promoting universal access to clean water", financed by the European Union Office in Kosovo and implemented by Rilindja Gjelbër (formerly Let's Do It Peja). The views, opinions and recommendations expressed in this publication are those of the author and do not necessarily represent the views of the European Union Office in Kosovo.

REPORT

"WATER QUALITY
Surface
IN THE FOUR RIVER BASINS
OF KOSOVO –
SIGNALED AREAS
FROM THE COMMUNITY" - II

November 2024

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GLOSSARY

MMPHI	Ministry of Environment, Spatial Planning and Infrastructure
KEPA	Environmental Protection Agency of Kosovo
RBDA	River Basin Region Authority
IHMK	Hydro-Meteorological Institute of Kosovo
IPH	National Institute for Public Health of Kosovo
KNU	Interministerial Council for Water
European Union	European Union
European Commission	European Commission
WFD	Water Framework Directive
Wow	Administrative Instruction

1. FoRewoRd

Water quality monitoring, in the framework of Kosovo's hydrography, is essential for the preservation and sustainable management of water resources in the country. Since Kosovo has a complex hydrographic network, with rivers crossing different territories and contributing to regionally connected ecosystems, continuous monitoring helps to identify environmental impacts and sources of pollution that endanger these water ecosystems.

The topographic catchment area of Kosovo is 11,645 km ^{2} , while only the existing accumulations are 569,690.00 m ^{2} .[1]

In terms of hydrography, Kosovo is divided into 4 river basins:

- Drini Bardhë,
- Ibri,
- Morava of Binca and
- Lepenci.

The nine rivers with the largest annual flows are located in the Drini Bardhë Basin in the Dukagjin Plain.

Kosovo's rivers flow into three marine catchments: the Black Sea, the Adriatic Sea and the Aegean Sea. The main rivers that belong to the catchment of:

- On the Black Sea are: Ibri, Sitnica with branches Llapi and Drenica, and Morava e Binça.
- Adriatic Sea: Drini i Bardhë with its tributaries: Lumëbardhi i Peja, Lumëbardhi i Deçan, Lumëbardhi i Prizren, Klina River, Ereniku, Mirusha, Toplluha and Plava.
- Aegean Sea: belongs to the river Lepenci with the main branch Nerodime.

Drini i Bardhë has the longest length in kilometers within the territory of Kosovo with 122 km, while Lumëbardhi i Prizren is the smallest with 31 km ^{2}.

Table 1. *Water basins in Kosovo*[3]

basin	Area km ^{2}
The Drin Bardhë basin	4622 km2
Ibrit Pond	4009 km2
Binca Morava Basin	1564 km2
The pond of Lepec	0.685 km2

Kosovo has established legal and institutional infrastructure for monitoring the quality of surface waters, which are further elaborated in this report. The main responsibility for monitoring river waters in the territory of the Republic of Kosovo is the Ministry of Environment, Spatial Planning and Infrastructure, more precisely the Hydro-Meteorological Institute of Kosovo. The quality of these rivers is determined on the basis of physical-chemical analyzes and heavy metals which are defined and determined on a legal basis.

This report was developed as part of the project "Promoting Universal Access to Clean Water", which is financed by the European Union Office in Kosovo and implemented by Rilindja Gjelbër (formerly Let's Do It Peja). The methodology of the report has also been approved by IHMK as conforming to Administrative Instruction UA 16/2017 [4].

Legal and Institutional Framework[5]

[1]https://siu.rks-gov.net/Hydrography/SurfaceWaters
[2]Brief summary of the water resources of the Republic of Kosovo - ARPL
[3]https://ammkrks.net/assets/cms/uploads/files/Dokumente%202022/Raporti%20per%20gjendjen%20e%20lumenjeve%202022%20(alb).pdf
[4]https://gzk.rks-gov.net/ActDetail.aspx?ActID=15797
[5]AMMK – WATER STATE IN KOSOVO 2020
https://www.ammk-rks.net/assets/cms/uploads/files/Dokumente/Shqip_WEB_uji.pdf

In the legal framework that directly regulates the quality of surface water and water services, as well as issues related to water resources and water services, the main documents are drawn up, which are also in compliance with the European Water Directives.

The State Water Strategy of Kosovo 2017-2036 is the main planning document in the field of water drawn up on the basis of the Law on Water for a period of 20 years. The purpose of this document is to provide sustainable and integrated development of the water sector by meeting the needs for: water supply, water for food production, irrigation and agriculture, industry, energy production, fishing, tourism, sports and recreation.[6]

Although the State Water Strategy has been drawn up for a time period of 20 years and will be valid for this approved time period, it is planned to be implemented in four time periods, the first period which included the years 2017-2021, the second period 2022-2026, the third period 2027-2031 and the last, fourth period 2032-2036.

Currently, this Strategy has entered the second implementation period 2023-2027, where the Review of the State Water Strategy 2023-2027 has also been approved, which is done according to the requirement of Article 31 of the Law on Water, which determines that the Ministry, in this case MMPHI drafts the State Water Strategy for a period of 20 years with the possibility of revision and completion every five (5) years.

There are the following laws that are directly related to the quality of surface waters:

- Law No. 04/L-147 on Water, approved in 2013, is the basic legal instrument that regulates water management and water rights. This law integrates most of the standards and principles from the DKU into the legal system of Kosovo, regulating the water policy.
- Law no. 06/L-035 on Hydrometeorological Activity - It is another important law in the field of water to determine the way of conducting hydrometeorological activities, the early warning system, expertise, products and services offered by these activities, in order to supported with information, central local institutions and the public as well as international and regional institutions.
- Law No. 02/L-78 for Public Health - This law, among other things, defines the Institutions responsible for the implementation of health policies, it also defines the tasks of the National Institute of Public Health of Kosovo, where, among other things, the tasks for monitoring the quality of drinking water are defined.
- Law No. 05/L-042 for the Regulation of Water Services - is an important law aimed at regulating the activities of water supply service providers, wastewater and wholesale water suppliers and the establishment of the Regulatory Authority for Water Services (ARRU) .
- Law No. 02/L-9 on Agricultural Land Irrigation - This Law regulates the organization and administration of agricultural land irrigation and drainage in Kosovo, the powers and division of responsibilities of irrigation and drainage entities, the formation and registration of irrigation companies, user associations of irrigation water, federations, their organization, irrigation water rates, association business and other issues related to irrigation and drainage.

In the framework of the obligations arising from the Law on Water and the Law on Public Health, the following administrative instructions have been drawn up and signed, which are classified as secondary legislation:

- MMPHI Administrative Instruction No. 02/2022 "Conditions, methods, parameters and limiting values of the discharge of polluted water into the public sewage network and into the water body";
- Administrative Instruction MESP No. 26/2013 on "Determining the method of identification and the form of legitimation of the water inspectorate";
- Administrative Instruction No. 12/2013 for "Water information system";
- QRK Administrative Instruction No. 10/2021 for "The quality of water used for human consumption";
- Administrative Instruction MESP No. 15/2017 for "On the criteria for determining sanitary protected areas of water sources";
- MESP Administrative Instruction No. 19/2015 on "Protection from harmful actions of waters";

[6] https://puacw.ldipeja.org/wp-content/uploads/2023/04/Permbledje-Monitorimi-Strategjise-Ujerave_FINAL_ALB.pdf

- QRK Administrative Instruction No. 02/2021 for the "Structure of water payments";
- MESP Administrative Instruction No. 16/2017 "Classification of surface water bodies";
- Administrative Instruction MESP No. 17/2017 "Calcification of underground water bodies";
- Administrative Instruction MESP No. 11/2016 "On the determination, method and procedures for the protection of erosive areas"
- MESP Administrative Instruction No. 04/2016 "On the criteria and procedures for the Protection of the Banks of Watercourses and Accumulations";
- MESP Regulation No. 02/2016 for "Method of determining acceptable ecological flow"
- Administrative Instruction MESP No. 05/2016 for "Regulation of the Status of Water Resources";
- Administrative Instruction MESP No. 09/2016 for "Organizational structure and additional tasks of the River Basin Region Authority";
- Administrative Instruction MESP No. 03/2018 for "Water Permit Procedures"
- MOH Administrative Instruction No. 05/2011 for "Prevention and Control of Hospital Infections"

In addition to the legal infrastructure, Kosovo has also developed the administrative infrastructure, which consists of government bodies, which are divided into three administrative levels, as shown in the following table:

Table 2. *Division of government bodies according to administrative levels*

central	regional	LOCAL
• Ministries • Agencies • National institutes	• Regional drinking water companies (state-owned) • Irrigation companies (state)	• municipalities • Local public water providers

Other government actors related to water management, including their quality, are:

- Interministerial Water Council (KNU),
- Ministry of Agriculture, Forestry and Rural Development (MAFDR),
- Ministry of Industry, Entrepreneurship and Trade (MINT),
- Ministry of Local Government Administration (MLAP),
- Ministry of Finance, Labor and Transfers (MFPT),
- Ministry of Foreign Affairs and Diaspora (MPJD),
- Ministry of Health/National Institute of Public Health in Kosovo (MSH/IKSHPC),
- Ministry of Internal Affairs (MIA),
- Ministry of Economy and Energy (MEE)
- Ministry of Education, Science, Technology and Innovation (MESTI),
- Regulatory Authority for Water Services (ARRU),
- Association of Water Supply and Sewerage Companies of Kosovo (SHUKOS), and
- Regional Water Companies (KRU).

Water quality - drinking water aspect

The monitoring of drinking water quality in Kosovo is carried out according to Administrative Instruction 10/2021 on "Quality of Water for Human Consumption".

Article 3 paragraph 2.6 of UA 10/2021 has defined that the health authority in the sense of this legislation refers to the Water Center within the National Institute for Public Health.

This AI determines that the health authority has an obligation to ensure that the water used for human consumption must be healthy and clean and meet the quality requirements according to this AI (Article 5 of AI 10/2021).

Water quality - Surface water

Based on the Law on Waters of Kosovo No. 04/L-147 - The Hydrometeorological Institute of Kosovo (IHMK) has the main responsibilities for monitoring the quantity and quality of surface, underground and accumulation waters.

IHMK is also responsible for the implementation of the Monitoring Program which is drawn up by the

Ministry and approved by the Government for a period of forty (40) years with the possibility of revision, completion and change, based on the monitoring data.

According to the annual report on the state of the environment in 2021 published by AMMK, **the quality of surface water in our country continues to be affected by pollution.**

Pollution comes from many different sources and factors, but mainly our rivers are polluted with pollution that comes as a result of urban and industrial water discharges, uncontrolled dumping of waste in rivers, use of pesticides and chemical fertilizers/fertilizers in agriculture , damage to riverbeds from the use of inerts as well as from illegal constructions.

According to the same report, during the year 2022, the monitoring of surface water quality was carried out in 54 monitoring points in the rivers where the presence of organic pollutants in the river waters was observed in all the monitored points but in different degrees.

Kosovo still does not have regular monitoring of the water quality of lakes and groundwater, but some steps have been taken within the framework of various projects to improve monitoring, the achievements will be published in follow-up reports.

Kosovo still does not have regular monitoring of the water quality of lakes and underground water, just as there is no biological monitoring of surface water. Likewise, in Kosovo, the wastewater treatment system is still not fully developed, even though there has been progress in this field during 2022. Wastewater treatment still remains at a low level with only 25% of the total amount of waste water. Donor support for the integrated management of water resources during 2022 has been one of the positive developments in this sector [7].

2. METHODOLOGY

In order to monitor and change the level of pollution from 2023 to this year 2024, the stations have remained the same as the ones we had in 2023. In addition, two monitoring stations have been added

[7]AMMK - Annual report on the state of the environment, 2022 https://www.ammkrks.net/assets/cms/uploads/files/Raporti%20i%20mjedisit%202022%20drafti%20final%20alb%20-%20Finale.pdf

during this year: one in the Graçanka River, the which is known as the most polluted river flow in the country, and an additional monitoring station on the Ibër River, in the northern part of Kosovo, near the city of Leposaviq. So. the monitoring of the water quality of the rivers Drini i Bardhë, Lumbardhi i Prizren, Ereniku, Ibri, Sitnica, Nerodime, Graqanka and Mirusha e Gjilan for the year 2024 was carried out through two phases divided into periods: the spring period at the end of April and autumn period in the month of September.

The monitoring sites have been determined by the implementation team of the "Promotion of Universal Access to Clean Water" project, from where it was decided that samples will be taken at 10 locations along the course of these rivers.

The methods used to determine locations are mainly free format methods of community invitations through direct communication and through Project and Organization communication channels such as Facebook and email.

Various communities active in environmental and water issues have been invited to signal locations with water pollution. After receiving the signaled cases, the addressed locations were analyzed and from 34 of them, 10 selected locations were selected that are not covered by monitoring at the state level. The selection of these locations was made in order to monitor and compare data and comprehensively cover the territory of Kosovo.

The realization of taking samples for field analysis was done during the month of April for the spring period as well as in September 2024 for the autumn period. The measurement of field parameters was carried out during sampling in the field, while the rest was carried out in the testing laboratory accredited by DAK for the analysis of running water.

The methodology of carrying out sampling and determining physico-chemical parameters has been approved by IHMK and is in accordance with UA 16/2017 MESP.

In this report, the condition of the waters is reflected through chemical parameters:

- dissolved oxygen (DO)
- Biochemical expenditure of oxygen ($SHBO_5$)
- Chemical Oxygen Expenditure (GO)
- Total organic carbon (C_{org})
- Total nitrogen ($_{total\ N}$)
- Total phosphorus (P_{tot})

The physical - field parameters defined in the sampling site are:

- Air temperature (T_A)
- Water temperature (T_U)
- pH value
- Saturation of water with Oxygen
- Electrical conductivity (EC)
- Total Dissolved Matter in Water (TDS)

All the determined parameters were analyzed according to the relevant standard methods with which the contracted laboratory works for the realization of this activity and which also coincide with the instructions in UA 16/2017 of MMPHI. The table below shows all the defined parameters and the respective standard method applied.

Table 3. *The parameters analyzed in the field and in the laboratory and the standard methods according to which those parameters were determined*

No.	settings	SYMBOL	Unit	STANDARD METHODS
Physical parameters				
1	Sampling	--	--	I *SO 5667-3 and 6*

2	Air temperature	T_A	^0C	*Weather app.*
3	Water temperature	T_U	^0C	*DIN 38404-C4*
4	turbidity	Tour	NTU	*ISO 7027:1999*
5	Electrical Conductivity	EC	μScm^{-1}	*ISO 7888:1985*
6	Water soluble substances	TDS	mg/L	*ISO 7888:1985*
7	Hydrogen ion concentration	pH	0-14	*ISO 10523:2008*
8	Dissolved oxygen	Oh_2	mg/L	*ISO 5814:2012*
9	$O_{2\ saturation}$	from O_2	%	*ISO 5814:2012*
10	Total Suspended Matter	TSS	mg/l	*EN 872*
Chemical parameters				
11	Chemical Oxygen Expenditure-UV	Go	mg/L	*ISO 5815-ISO 6060:1989*
12	Biochemical expenditure of oxygen-UV	$SHBO_5$	mg/L	*EN 1899*
13	Total Organic Carbon	these	mg/L	*APHA 5310*
14	Phosphate ion	YES_4^{3-}	mg/L	*ISO 6878*
15	Phosphorus Phosphate ions	$P\text{-}YES_4$	mg/L	*ISO 6878*
16	Total phosphorus	P_{tot}	mg/L	*ISO 6878*
17	Ammonium ion	NH_4^+	mg/L	*ISO 7150-1*
18	Nitrate ion	NO_3^-	mg/L	*DIN 38405 D9*
19	Nitrite ion	NO_2^-	mg/L	*DIN EN 26 777*
20	Sulfate ion	SO_4^{2-}	mg/L	*APHA 4500-SO42-E*
21	Total Nitrogen	In_{total}	mg/L	*ISO 11905-1*

This monitoring serves to reflect the quality of surface water from rural and urban areas of some settlements in Kosovo.

3. Description of monitoring sites and selection methodology

The selection of the locations was carried out based on the signals delegated by the community which have been affected by river pollution in different forms. The different communities were invited to signal locations with water pollution, the locations were analyzed and from the 34 signaled cases, 10 locations were selected which are not covered by monitoring at the state level, in order to have monitoring and comparison of data. and inclusiveness of the territory of Kosovo.

The primary criterion for the selection of locations was that the monitoring sites should be located in the 4 main river basins in the country. While the second criterion was to select monitoring sites that are not included in the water quality monitoring network, the verification of which locations was carried out in consultation with the official website of IHMK, in which the monitoring network is published of surface water quality .

1. **River Drini i Bardhë:** it was monitored in the village of Zllakoqan, which represents a rural area influenced by the urban area of the city of Peja. Currently, most of the city's urban water passes through the urban wastewater treatment plant. Up to this monitoring site, there is also an industry of concrete, alcoholic and non-alcoholic beverages, as well as it is affected by the discharged waters of Istog in the Istog river, which joins the Drini i Bardh river only 0.5 km before this location, where it has been selected to be monitoring its quality from this project. Pollution is also evident from many agricultural activities.
2. **The Erenik River:** it is monitored in the village of Brekoc in Gjakova, which represents the waters of the municipality and Junik as well as some villages in the municipality of Gjakova. Agricultural areas and potential industries, such as the Dava mine, slaughterhouses, concrete plants, gravel washes and restaurants, affect water quality.
3. **Lumbardhi of Prizren:** sampling was carried out at the bridge at the exit of the city, which represents a part of the city's own urban waters, especially the left part of the river, as well as the discharged waters of all settlements and other activities such as gastronomy and agronomy starting from Prevalla to the monitoring site at the exit of Prizren. Industries that discharge wastewater include Styrofoam, soft drink, and concrete plants.
4. **River Ibër:** in the city of Mitrovica, it is located half a kilometer before it joins the river Sitnica. The discharges from the city of Mitrovica occur only a few tens of meters before the sampling site. The pollution of this river is greatly affected by the discharges of the gastronomy businesses, which are located on both sides of the Ibër river.
5. **Ibër River:** in Leposaviq is a location found in the northern part of Kosovo, 34 km away from where it joins the Sitnica River. This location includes all waters of the Sitnica River, as well as all discharges along those 34 km of the stream. Also, the pollution is affected by the agricultural surfaces that are used for irrigation and washing during the rains.
6. **Sitnica River:** near the village of Lumadh, it is located after the village of Lumadh, 150 meters after the confluence of the Sitnica River with the Llap River. The pollution is caused by the entire region through which the Llap River flows, as well as the pollution coming from the Drenica River, the Graqanka River, the Prishtevka River, as far as the industries, worth mentioning are: Kosovo Energy Corporation (KEK), producer of energy products milk and meat, colors, etc.
7. **Sitnica River:** in the village of Hallaq near the city of Lipjan, which contains all the discharges of the residents of the city of Lipjan as well as the city of Shtime and other villages along the entire course of the Sitnica River up to the location where the sample was taken. In addition to urban discharges, there are also significant agricultural areas, meat and dairy industries, gastronomic establishments and recreation centers.
8. **Graçanka river:** in the village of Laplje Selo, municipality of Graçanica, it is a river with small amounts of water, which is affected by the pumping waters of the Kizhnica mine, urban discharges from Graçanica, the village of Ajvali and Laplje Selo. In its course there are agricultural areas, gastronomic places and car washes.
9. **Nerodime River:** in the village of Kaçanik i Vjetër, this location is located between the towns of Ferizaj and Kaçanik. In this monitoring site, there are discharges of urban and rural water and from the washing of agricultural land surfaces.
10. **Mirusha River:** in the city of Gjilan it is a river with a very small amount of water that flows

naturally, but the amount of water is multiplied by the amount of water discharged from the urban area of a large part of the city of Gjilan, the amount of flow total water increases several times.

Table 4. *Data of geographic positions and altitude above sea level monitoring site*

Monitoring site	river	N latitude	Longitude E	Altitude (m)
Zllakuqan (cline)	Drini the White	42°39'45.62”	20°32'8.43”	394
Brekoc (Gjakova)	Erenik	42°22'25.83”	20°24'23.00”	347
Prizren (City)	Lumbardhi of Prizren	42°12'26.34”	20°43'26.54”	391
MITROvICa (City)	Ibri	42°53'40.71”	20°52'18.93”	501
Leposavic	Ibri	43°08’40.69”	20°80’76.29”	
Lumadh (oblique)	Sitnica	42°42'26.02”	21° 2'16.69”	528
Hallaq (Lipjan)	Sitnica	42°31'33.77”	21° 5'41.41”	545
Graqanka (Laplje Selo-Graqanica)	Ibri	42°35'39"	21° 8'22"	550
Old Kacanik (Kacanik)	Nerds	42°17'15.06”	21°14'10.66”	520
Gjilan (City)	Mirusha	42°27'13.56”	21°29'16.23”	498

Geographical position on the map of sampling locations

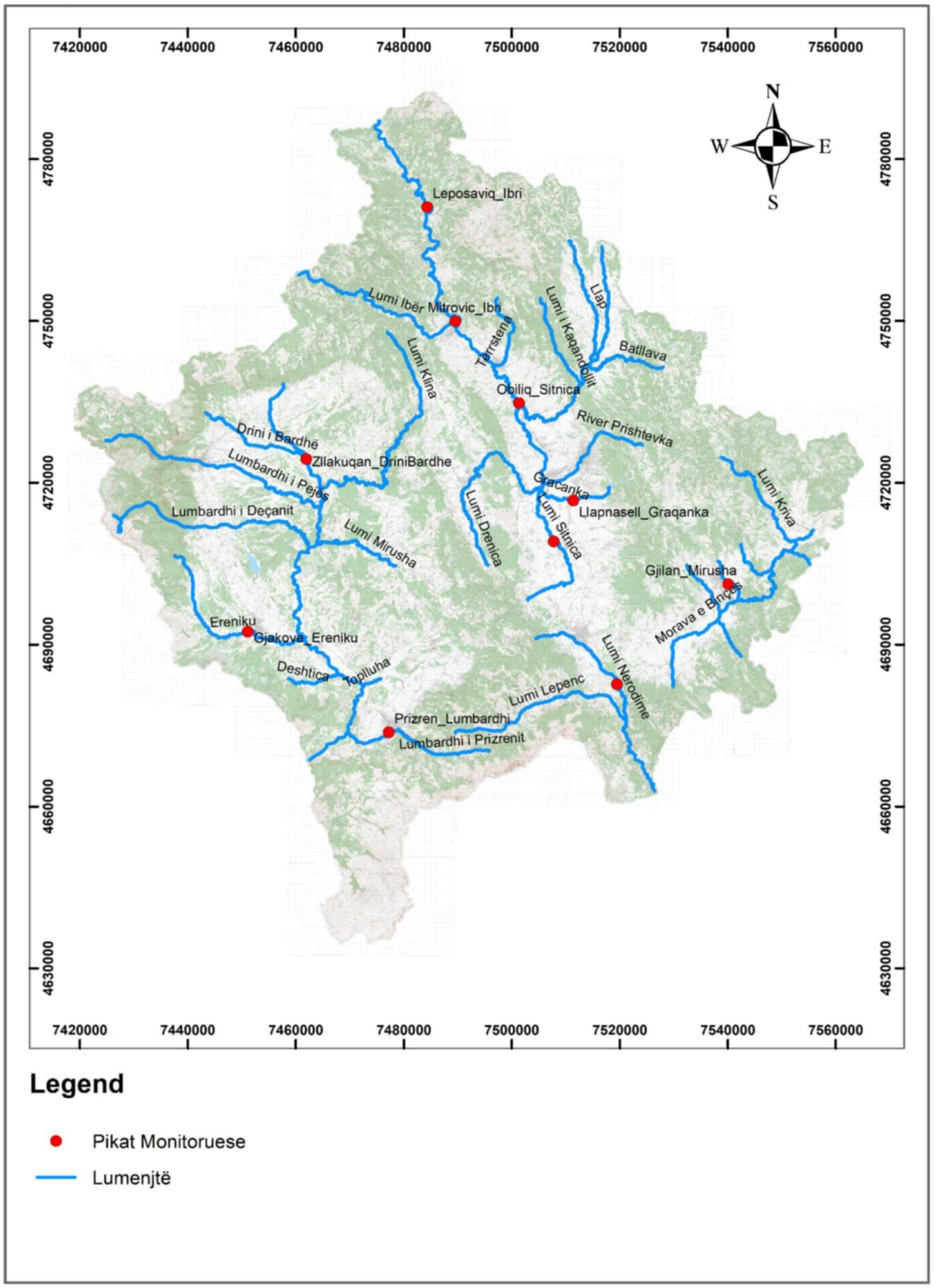

Figure 1. *Sampling locations are shown on the map of Kosovo*

Geographical map of Kosovo with the locations of quality monitoring by IHMK

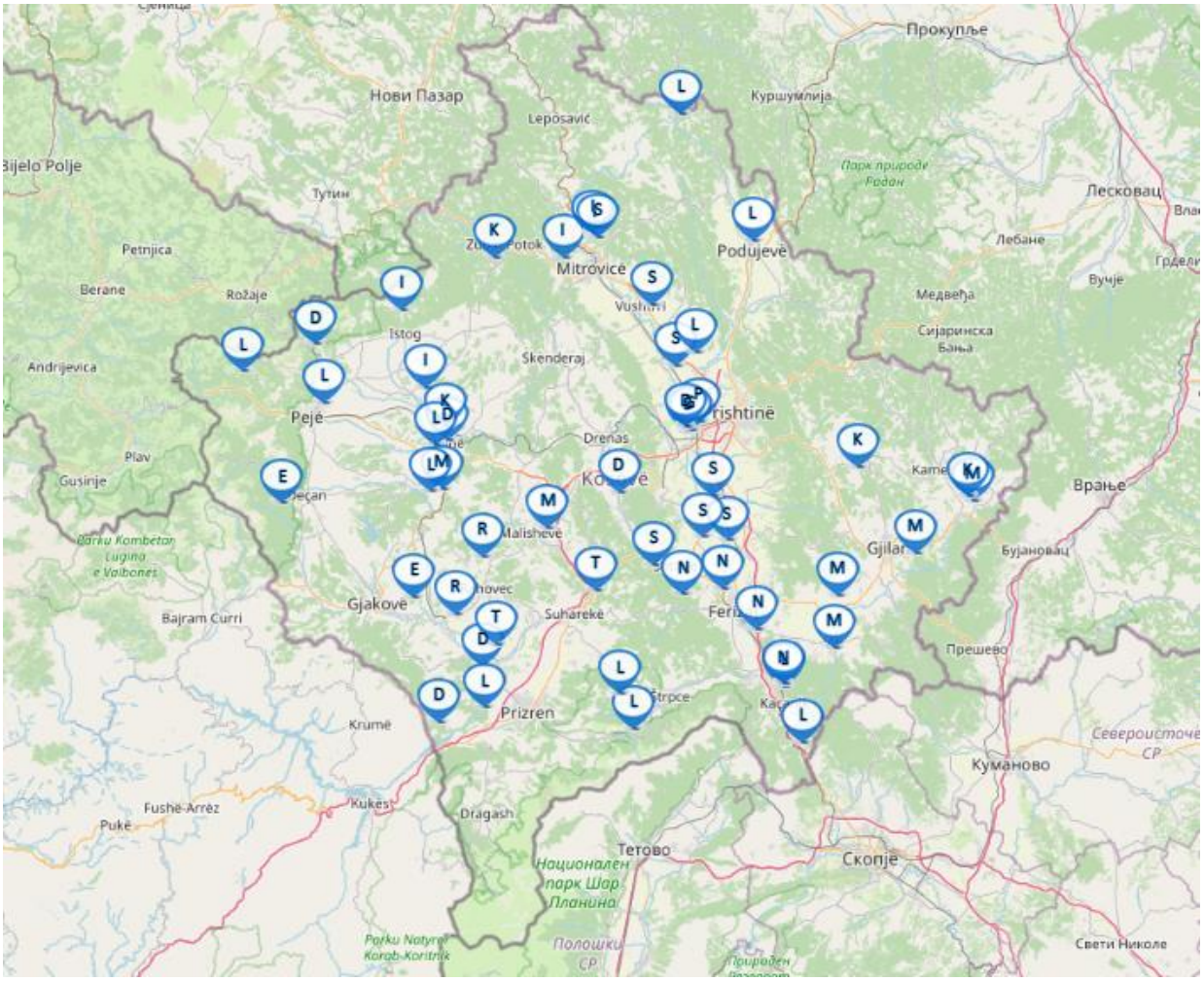

Figure 2. *IHMK surface water quality monitoring network - map with monitoring locations*[8]

[8] https://ihmk-rks.net/?page=1,22

4. Results from measurements

4.1. Field activities

For the measurement of field parameters, mobile devices such as:
- *Hach Lange sensION 156 Multiparameter Device of the HACH firm* with which these parameters are defined: WT - percentage of oxygen, EC - Electrical conductivity, TDS - Total Soluble Matters. The device was pre-calibrated with a standard resolution of 1413 µS/cm according to the manufacturer's instructions.
- To determine the pH value, the mobile device *METER - portable - pH & mV & temperature measurement was used of the manufacturer ISOLAB* calibrated with buffer with values of 10.01 and 7.00 according to the manufacturer's instructions.
- While the amount of dissolved oxygen and the saturation of water with oxygen is determined with the device *Portable Dissolved Oxygen Meter with Extended Range in Water-Resistant Casing HI9143 of the manufacturer HANNA Instruments* , calibrated according to the manufacturer's instructions.
Through the Weather Forecast application, the air temperature at the time of sampling was recorded.

Figure 3. *View from measurements of parameters in the field*

The measurements were made with these devices and three probes through which these parameters were measured:

- Air Temperature (T_A)
- Water temperature (T_U)
- The pH value
- Amount of dissolved oxygen (DO)
- Saturation of water with Oxygen
- Electrical conductivity (EC)
- Total Water Soluble Matter (TDS)

The measured values are recorded in the field protocol.

In the following, the values determined during field measurements on site-monitoring, divided according to river basins, initially with geographic data, time, and physical parameters, are placed in the table.

Table 5. *Data of the parameters determined in the field during the measurements in the third phase: Spring*

Parametrat	Njesia	Pellgu i Drinit të Bardhë			Pellgu i Ibrit					Pellgu i Moravës	Pellgu i Lepencit
		Ereniku Gjakove (Brekoc)	Drini i Bardhë Klinë (Zllakuqan)	Lumbardhi i Prizerenit Prizeren (Qytet)	Ibri Mitrovicë (Qytet)	Ibri Leposavic	Sitnica Obiliq (Lum Madh)	Sitnica Lipjan (Hallaq)	Graqanka Graqanice (Laplje Selo)	Mirusha Gjilan (Qytet)	Nerodime Kaçanik (Kaçanik i Vjetër)
Data	d.m.v	27.04.24	27.04.24	27.04.24	29.04.24	29.04.24	28.04.24	28.04.24	28.04.24	28.04.24	28.04.24
Ora	hh:mm	13:20	10:45	14:40	08:15	09:20	10:05	11:32	11:11	14:55	13:39
Temp. e Ajrit	^{0}C	18	17	21	10	11	16.0	17.0	17.0	23.0	21.0
Temp e Ujit	^{0}C	11.1	9.5	13.0	9.3	13.0	13.4	16.2	13.9	17.4	14.9
Përçueshmëria Elektrike	µS/cm	234	368	220	305	440	603	628	2070	1132	468
Materiet Totale te Tretshme	mg/L	118	184	110	152	220	302	314	1035	566	234
Vlera e pH	0-14	7.60	7.46	7.31	7.73	7.65	7.02	7.0	6.9	6.80	6.78
Oksigjeni i Tretur	mg/L	5.42	5.04	4.58	6.40	6.30	3.07	2.87	2.34	0.04	1.71
Ngopshmeria me Oksigjen	%	64.4	57.0	54.8	71.0	73.1	37.5	36.7	20.0	0.5	12.6
Turbullira	NTU	5.9	6.3	10.2	1.95	5.58	13.5	15.8	7.3	22.8	19.6

Table 6. *Data of the parameters determined in the field during the measurements in the second phase: Autumn*

Parametrat	Njesia	Pellgu i Drinit te Bardh			Pellgu i Ibrit					Pellgu i Morave s	Pellgu Lepenc
		Ereniku Gjakove (Brek oc)	Drini i Bardhë Klinë (Zllak uqan)	Lumbardhi i Prizerenit Prizeren (Qytet)	Ibri Mitrovicë (Qytet)	Ibri Lepos avic	Sitnica Obiliq (Lum Madh)	Sitnica Lipjan (Hallaq)	Graqanka Graqanice (Laplje Selo)	Mirusha Gjilan (Qytet)	Nerodim Kaçanik (Kaçani k i Vjetër)
Data	d.m.v	28/09	28/09	28/09	29/09	29/09	29/09	29/09	29/09	29/09	29/09
Ora	hh:mm	*10:44*	*13:29*	*14:35*	*8:40*	*9:20*	*9:54*	*15:15*	*10:31*	*11:46*	*14:29*
Temp. e Ajrit	^{0}C	10.8	11.5	14.5	11	12.5	13.4	10.8	11.5	14.5	11
Temp e Ujit	^{0}C	15.7	18.1	17.4	16.1	18	17.4	15.7	18.1	17.4	16.1
Përçueshmëria Elektrike	µS/cm	404	332	411	340	500	784	808	921	799	472
Materiet Totale te Tretshme	mg/L	201	172.2	202	170	250	382	334	450	390	236
Vlera e pH	0-14	7.9	8.5	7.65	7.7	7.5	7.7	7.48	7	7.82	7.25
Oksigjeni i Tretur	mg/L	5.21	6.54	4.45	7.82	4.55	0.89	1.95	0.23	5.38	1.3
Ngopsh mëria me Oksigjen	%	66.9	89,8	35.9	91.5	59.6	12.5	26.6	2.8	70.8	16.9
Turbullira	NTU	1.8	3.5	32.4	4.7	6.8	18.1	24.9	13.5	33.6	21.7

4.2. Chemical parameters determined in laboratories

After the completion of river water sampling at the site-monitoring, chemical parameters were analyzed in the laboratory according to the procedures of the standard methods described above in Table 2.

Figure 4. *Photos from work in the laboratory during the analysis of samples*

Table 7. *Data of the parameters determined in the laboratory during the measurements in the first phase: Spring*

Parametrat	Njesia	Pellgu i Drinit te Bardhë			Pellgu i Ibrit					Pellgu i Morave s	Pellgu i Lepencit
		Ereniku Gjakovë (Brekoc)	Drini i Bardhë Klinë (Zllakoqan)	Lumbardhi i Prizrenit Prizren (Qytet)	Ibri Mitrovicë (Qytet)	Ibri Leposavic	Sitnica Obiliq (Lum Madh)	Sitnica Lipjan (Hallaq)	Graqabka Graqanicë (Laplje Selo)	Mirusha Gjilan (Qytet)	Nerodime Kaçanik (Kaçanik i Vjetër)
Materiet Totale te Suspenduara	mg/L	12.8	10.6	16.4	15.8	65	68.5	89.0	60.0	77.2	66.8
Shpenzimi Kimik i O_2	mg/L	18.8	16.2	87.0	26.2	60.4	85.0	109	1060	111	82.2
Shpenzimi Biokimik i O_2	mg/L	9.8	8.3	47.4	12.6	27.2	46.2	54.2	775	53.2	48.2
Karboni Total Organik	mg/L	4.8	4.3	24.7	7.3	16.5	25.8	37.4	415	35.7	33.0
Jonet Amonium	mg/L	0.016	0.013	0.346	0.22	0.106	1.025	0.682	0.402	2.651	0.704
Azoti i joneve te Amoniumit	mg/L	0.012	0.010	0.269	0.171	0.082	0.797	0.531	0.313	2.062	0.548
Jonet Nitrate	mg/L	2.6	1.4	2.0	1.5	6.7	14.5	15.0	50	10.4	16.0
Jonet Nitrite	mg/L	0.061	0.013	0.114	0.118	0.274	0.312	0.327	0.59	1.85	0.650
Azoti Inorganik	mg/L	0.619	0.330	0.756	0.546	1.680	4.169	4.020	11.792	4.975	4.361
Azoti Organik	mg/L	0.62	0.53	2.87	0.86	1.99	2.80	3.59	34.98	3.66	2.71
Azoti Total	mg/L	1.24	0.87	3.63	1.41	3.67	6.97	7.62	46.77	8.64	7.07
Jonet Fosfate	mg/L	0.070	0.315	0.375	0.093	0.277	1.352	0.380	0.644	3.62	2.032
Fosfori i Joneve Fosfate	mg/L	0.023	0.103	0.122	0.030	0.090	0.441	0.124	0.210	1.180	0.662
Fosfori Total	mg/L	0.55	0.56	2.56	0.76	1.78	2.82	3.18	29.89	4.29	2.96
Jonet Klorure	mg/L	1.8	2.7	6.2	10.4	18.6	25.6	29.1	60.4	61.4	18.6

Table 8. *Data of the parameters determined in the laboratory during the measurements in the second phase: Autumn*

Parametrat	Njesia	Pellgu i Drinit te Bardhë			Pellgu i Ibrit					Pellgu i Moravës	Pellgu i Lepencit
		Ereniku Gjakovë (Brekoc)	Drini i Bardhë Klinë (Zllakoqan)	Lumbardhi i Prizrenit Prizren (Qytet)	Ibri Mitrovicë (Qytet)	Ibri Leposavic	Sitnica Obiliq (Lum Madh)	Sitnica Lipjan (Hallaq)	Graqabka Graqanicë (Laplje Selo)	Mirusha Gjilan (Qytet)	Nerodime Kaçanik (Kaçanik i Vjetër)
Materiet Totale te Suspenduara	mg/L	15.2	20.8	51.5	3.7	10	41	66.5	78.5	82	98
Shpenzimi Kimik i O_2	mg/L	18.8	25.8	92	20	33	75	119	142	190	152
Shpenzimi Biokimik i O_2	mg/L	8.1	15.7	46.8	12.2	18.6	32	67	58.5	88	71
Karboni Total Organik	mg/L	5.9	7.2	24.7	8	13	21.5	31	40.2	55.5	43.8
Jonet Amonium	mg/L	0.44	0.22	3.86	1.12	0.31	5.7	6.15	3.75	2.96	4.25
Azoti i joneve te Amoniumit	mg/L	0.342	0.171	3.003	0.871	0.241	4.435	4.785	2.918	2.303	3.307
Jonet Nitrate	mg/L	7.3	3	1.6	1.700	14	2.2	1.1	2.6	5.5	3.6
Jonet Nitrite	mg/L	0.082	0.073	0.084	0.550	0.69	0.35	0.33	0.79	2.79	0.58
Azoti Inorganik	mg/L	2.017	0.871	3.390	1.423	3.615	5.038	5.134	3.745	4.394	4.296
Azoti Organik	mg/L	0.620	0.851	3.036	0.403	1.089	2.475	3.927	4.686	6.270	5.016
Azoti Total	mg/L	2.6	1.7	6.4	1.8	4.7	7.5	9.1	8.4	10.6	9.312
Jonet Fosfate	mg/L	0.215	0.078	0.805	0.402	0.800	2.114	3.217	0.825	2.509	0.527
Fosfori i Joneve Fosfate	mg/L	0.070	0.025	0.262	0.131	0.261	0.689	1.049	0.269	0.818	0.172
Fosfori Total	mg/L	0.29	0.47	1.57	0.36	0.78	1.59	2.93	1.91	3.28	2.16

5. Discussion of results

5.1. Field measurements

5.1.1. Water temperature (T U)

From the graph below, we see that the water temperature (T U) depending on the sampling period and the sampling time, in the first phase in the month of April, ranged from 9.3°C to 17.4°C, while in the second phase, in the month of September, they were higher, from 15.7°C to 18.1°C. In both cases, the Mirusha River in Gjilan and the Graqanka River in Graçanica had the highest temperature.

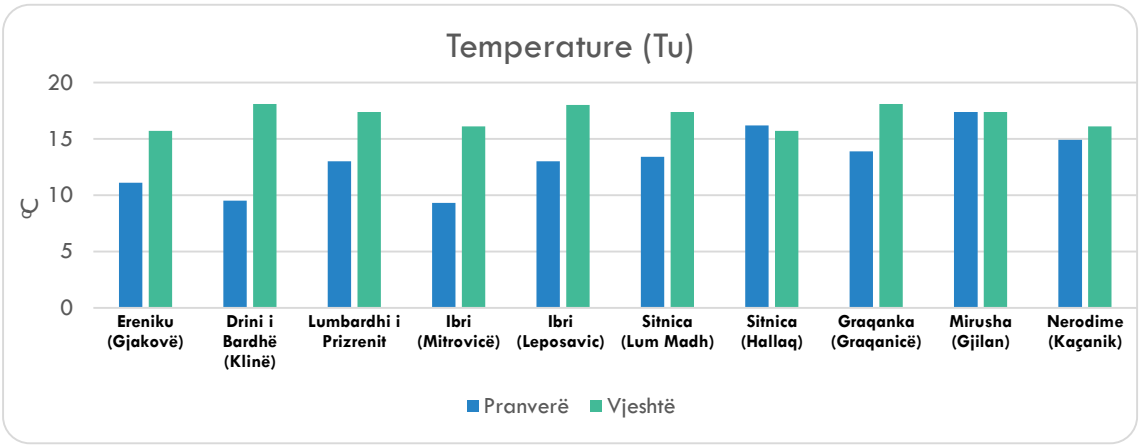

Figure 5. *Diagram with water temperature data (T U)*

5.1.2. pH value

The graph below shows the measured pH values, they were between 6.78 and 7.73 in spring, while in autumn they were between 7 and 8.5. According to UA 16/2017 MESP, the maximum pH value for surface waters is required to be ***between 7.0 and 9.0*** . A value lower than 7 was found in the river Mirusha in Gjilan (6.8), Graqanka in Graçanicë (6.9) and Nerodime in Kaçanik (6.78), which indicates a slightly acidic to almost neutral water environment.

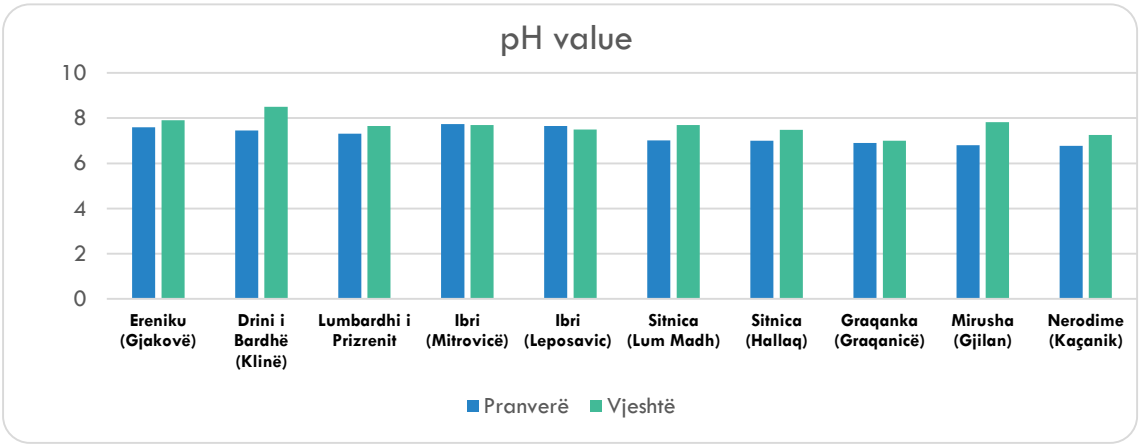

Figure 6. *Diagram with pH value data*

5.1.3. Dissolved Oxygen (DO)

The level of dissolved oxygen (DO) in the monitored rivers shows different values between seasons, where during spring the values vary from 0.04 to 6.4, while in autumn from 0.23 to 7.82. These changes show that rivers are sensitive to seasonal factors and specific pollutants, which affect the oxygen content of the water. In rivers such as Graçanka in Graqanicë and Mirusha in Gjilan, they recorded low values

of OT, which indicates a high level of pollution that has affected the expenditure of dissolved oxygen. On the other hand, the Ibër River in Mitrovica records higher OT values during autumn (7.82). Rivers such as Ereniku, Drini i Bardhë, Lumbardhi i Prizren, Ibri in Leposavic, Sitnica and Nerodime also have OT levels lower than the required threshold of 7.0 mg/L according to UA 16/2017 of the MESP, thus showing the high level of pollution that rivers are exposed to.

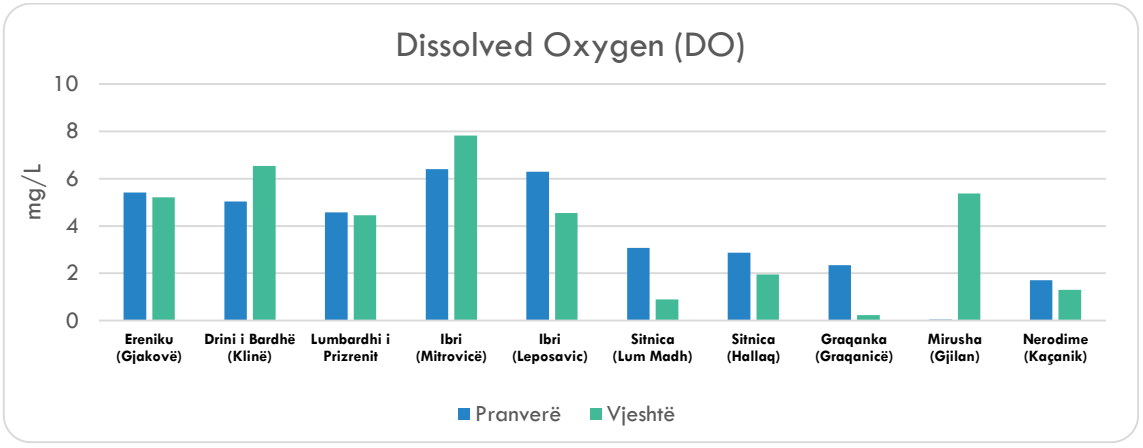

Figure 7. *Diagram with Dissolved Oxygen (DO) value data*

5.1.4. Turbidity (NTU)

During the spring phase, the turbidity values ranged from 1.95 to 22.8 NTU, while in the autumn period, these values increased from 1.8 to 33.6 NTU. The rivers Mirusha, Sitnica (Hallaq) and Nerodime have shown the highest turbidity values during the monitoring period for both phases, while Lumbardhi i Prizren during the autumn phase, showing high pollution and significant presence of suspended particles in the water , where urban runoff and sewage are among the main factors.

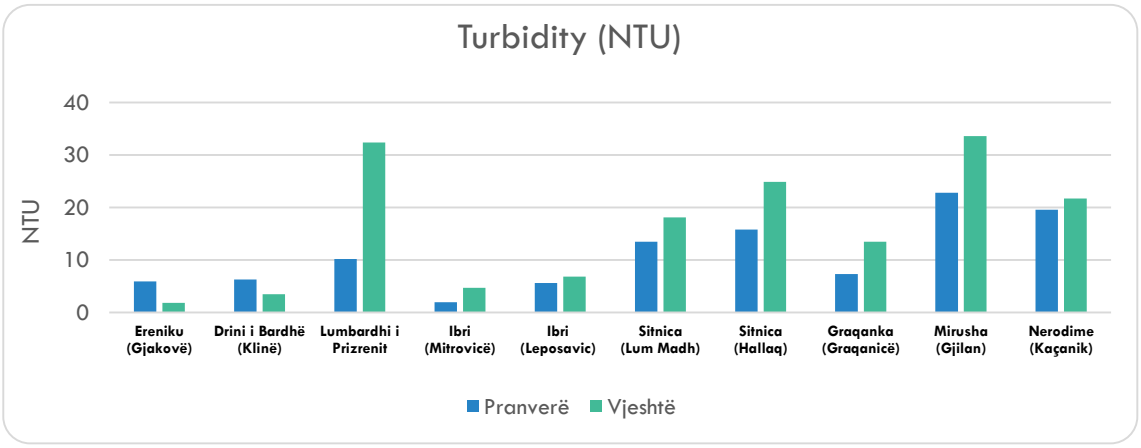

Figure 8. *Turbidity Value (NTU) Data Chart*

5.1.5. Electrical conductivity - EC

Electrical conductivity (PE) is an important indicator of water quality, as it reflects the amount of dissolved materials. During spring, PE was lower compared to autumn, indicating seasonal changes in water quality. The Graçanka River in Graçanica has recorded high PE values compared to other rivers as the graph below shows, as a result of various discharges, including Kizhnica mine waters (industrial pollution), urban waters from Graçanica, Ajvalia and Laplje Selo, as and impacts from agricultural land .

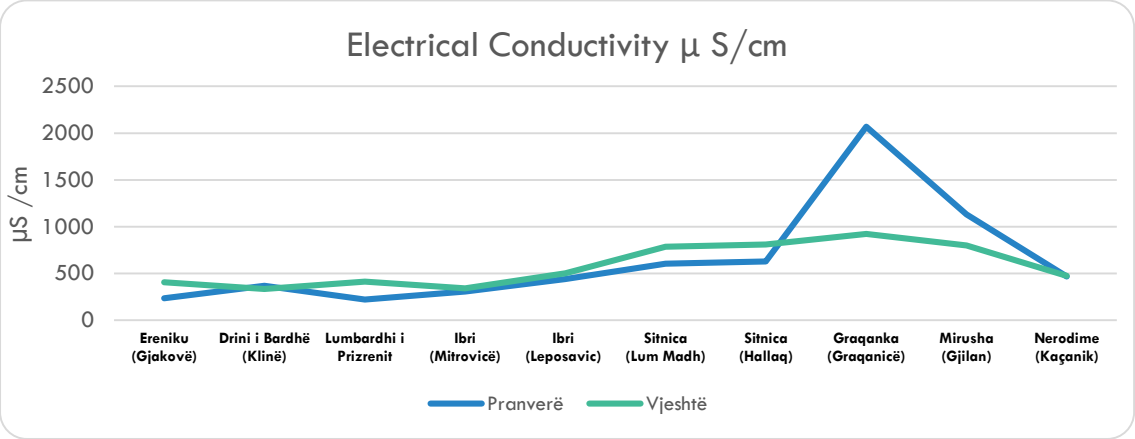

Figure 9. *Diagram with data of Electrical Conductivity (EC) value*

5.2. Parameters analyzed in the laboratory

5.2.1. Total Suspended Matter – TSS

TSS indicates the concentration of solid particles that are suspended in water, but not dissolved. According to the graph below, Sitnica River (Hallaq) recorded the highest TSS values during spring, while Nerodime River had the highest values during autumn. During the spring period, TSS values ranged from 10.6 to 89 mg/L, while in autumn from 3.7 to 98 mg/L.

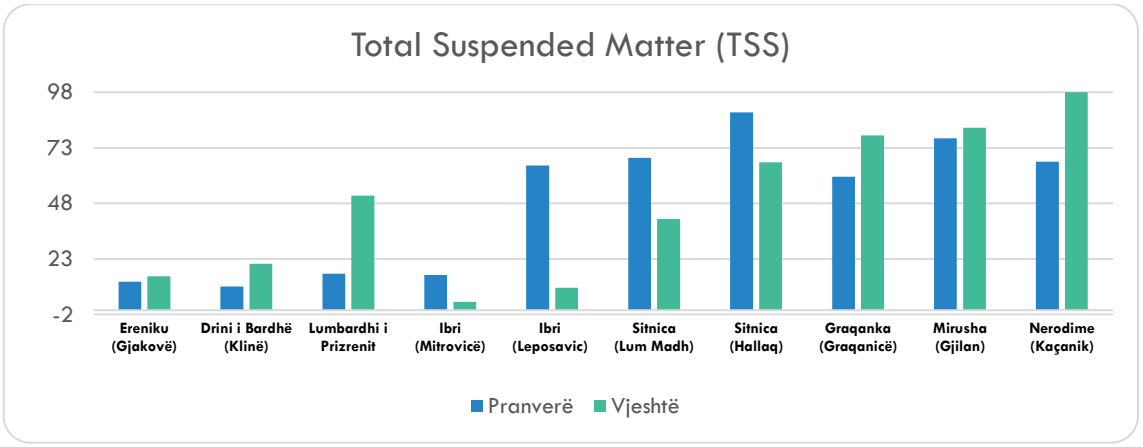

Figure 10. *Diagram with Total Suspended Matter (TSS) data*

5.2.2. Chemical Oxygen Expenditure – GO

Chemical Oxygen Expenditure (COD) represents the amount of oxygen needed to oxidize organic materials in water, which is particularly high in polluted waters. High values of SHBO come mainly from household and sanitary water discharges, as well as from industry that uses organic products, including manufacturers of food, beverages, agricultural fertilizers and detergents. *With UA 16/2017 MESP, the maximum allowed value for SHKO is* ***12 mg/L*** , and in the two phases of monitoring, this value is exceeded in all rivers, except for the Graqanka River, where the value recorded for the spring period is **1060** ***mg/L,*** which means the high level of pollution in this river.

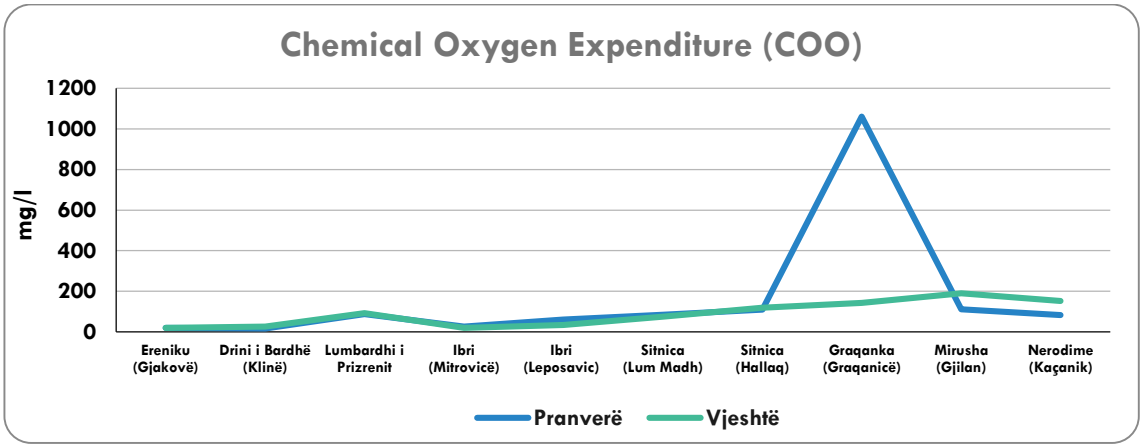

Figure 11. *Diagram with Chemical Oxygen Expenditure (COO) data*

5.2.3. Biochemical Expenditure of Oxygen - SHBO $_5$

Biochemical Oxygen Expenditure (BOD) is an important part of BOD, but it differs from it, as it relates only to the amount of organic materials that are biologically degradable. BOD is measured at a certain time interval. The more degradable organic materials there are in the water, the higher the microbiological pollution. As can be seen in the graph below, the highest values for SHBO $_5$ were recorded in the Graqanka river in Graçanica, with 775 mg/L in the spring and 58.5 mg/L in the autumn phase. Then we have the Mirusha river in Gjilan with SHBO $_5$ at values of 53.2 mg/L in the spring and 88 mg/L in the autumn season. *In UA 16/2017 MESP, the maximum value allowed for SHBO $_5$ is* ***8.0 mg/L*** .

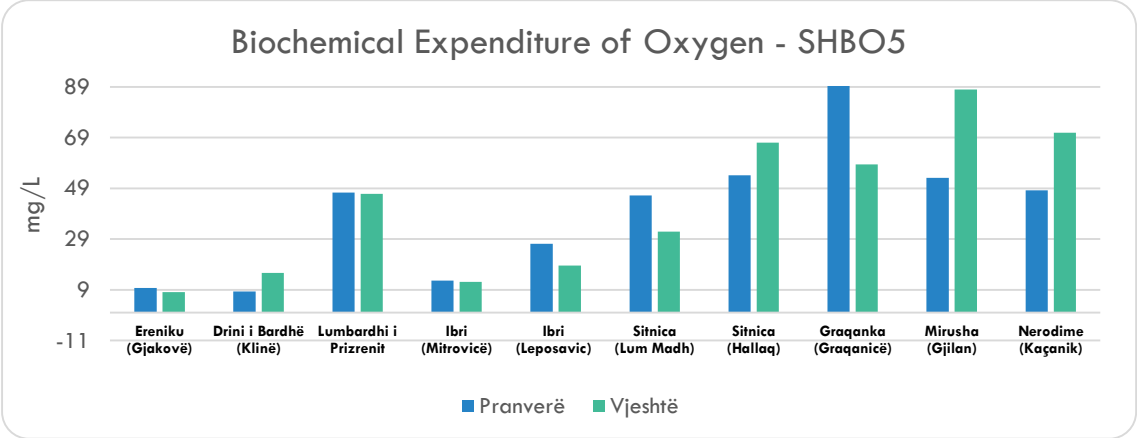

Figure 12. *Diagram with the data of Biochemical Expenditure of Oxygen (SHBO $_5$)*

5.2.4. Total Organic Carbon – KTO

KTO is also an integral part of organic matter and this parameter measures the concentration of organic carbon compounds in a water sample. KTO as both preliminary parameters is present in significant amounts in most of the samples taken in the rivers monitored as part of this project. During the spring phase, the amount of KTO varied from 4.3 to 41.5, while in the autumn phase from 5.9 to 55.5. The amount of KTO was higher in Graqanka River, Mirusha, Sitnica (Hallaq) and Nerodime.

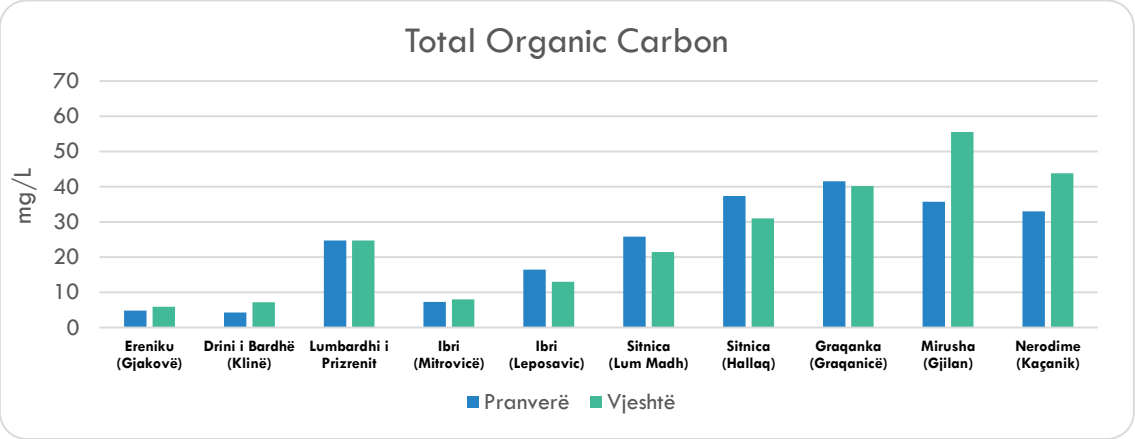

Figure 13. *Diagram with Total Organic Carbon (TOC) data*

5.2.5. Ammonium Ions Nitrogen - N-NH_4^+

Wastewater discharges to surface water bodies have increased the presence of ammonium ions, mainly coming from sewage and agricultural fertilizers containing ammonium. *According to UA 16/2017 MESP, the maximum allowed value for N-NH_4^+ is* ***0.7 mg/L*** , while much higher values were often recorded in this monitoring. The highest values during spring were recorded in the Mirusha River, while in autumn, the highest values were recorded in two sampling sites of the Sitnica River. During the autumn, high levels were also noted in Lumbardhi of Prizren, Graçanka River, Mirusha River and Nerodime.

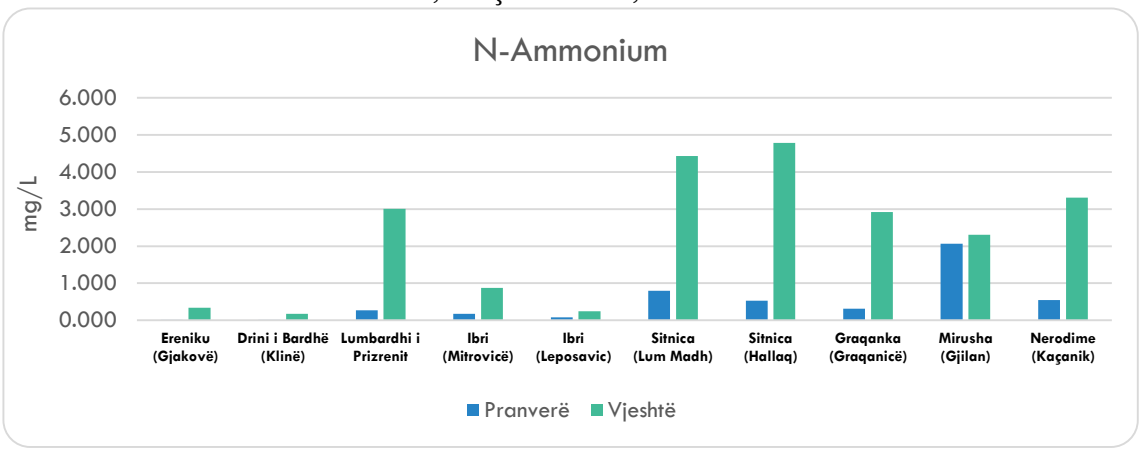

Figure 14. *Diagram with data of Nitrogen of Ammonium ions (N-NH_4^+)*

5.2.6. Nitrates - NO_3^-

Nitrate ions are undesirable in surface waters, and laboratory analyzes have shown that they are present in significant amounts. Their presence mainly comes from discharged fecal waters and agricultural fertilizers with nitrogen content. *In UA 16/2017 MESP, the maximum value is* ***5.0 mg/L*** ***NO_3^-***. The highest values were recorded during the autumn phase, where the Graçanka River had a very high presence of these ions, with a value of 50 mg/L.

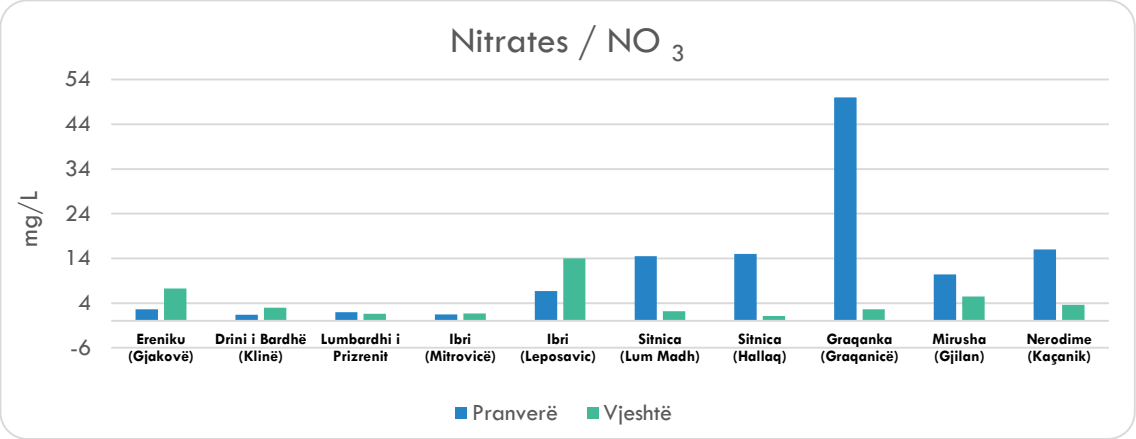

Figure 15. *Diagram with data of Nitrate ions (NO_3^-)*

5.2.7. Nitrite - NO_2^-

Like nitrate ions, nitrite ions are undesirable in surface waters, and laboratory analyzes have shown that they are present in significant amounts. The highest values were recorded in the Mirusha River, where in the spring phase the value was 1.85, while in the autumn phase it was 2.79.

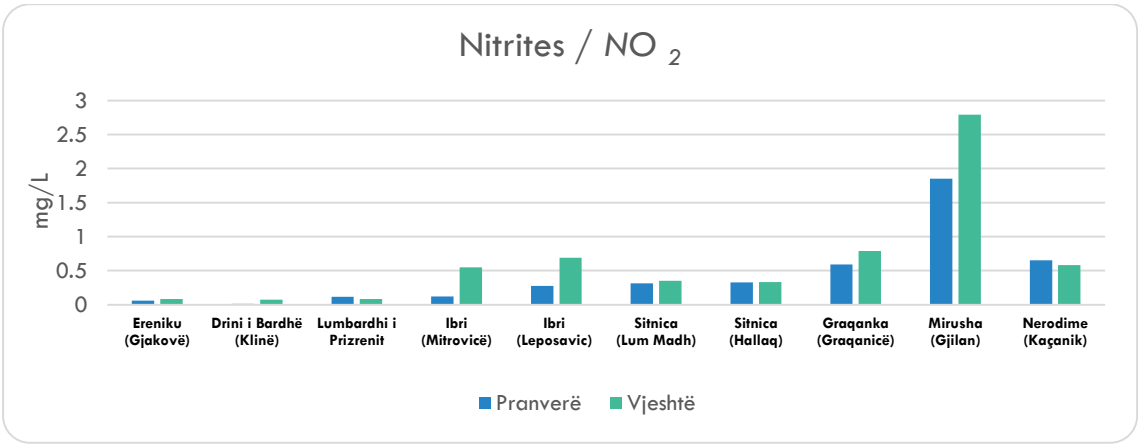

Figure 16. *Diagram with data of Nitrite ions (NO_2^-)*

5.2.8. Phosphorus Orthophosphates - $P\text{-}PO_4^{3-}$

Phosphate ions in surface waters usually come from sanitary water discharges, which contain soaps, shampoos and detergents, as well as from fertilizers containing phosphorus, widely used in agriculture. During the spring phase, the highest phosphate values were recorded in the Mirusha River, with a value of 1.18 mg/L, while during the autumn, the highest values were recorded in the Sitnica (Hallaq) River with 1.04 mg/L and in the Mirusha with 0.81 mg/L. *In UA 16/2017 MESP, the maximum allowed value is* ***0.2 mg/L*** *$P\text{-}PO_4^{3-}$.*

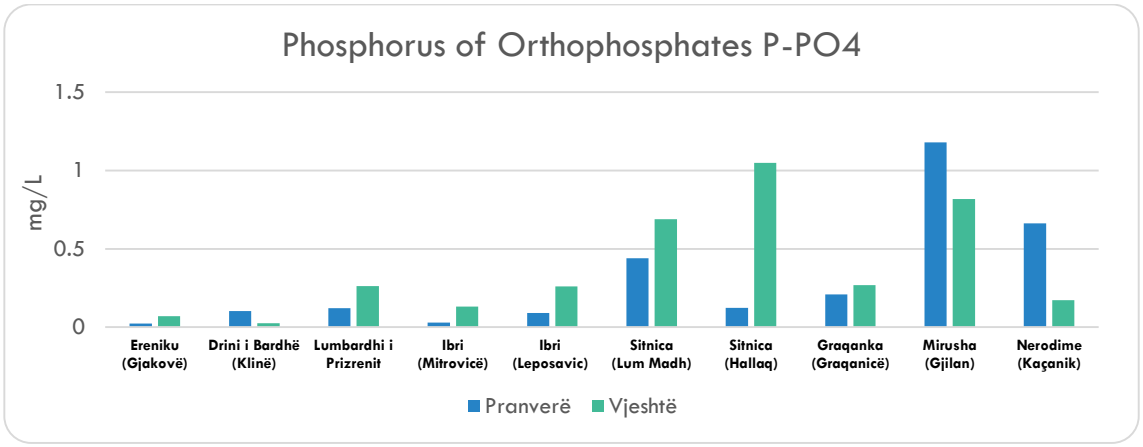

Figure 17. *Diagram with the data of Phosphorus in Orthophosphates (P-PO $_4^{3-}$)*

5.2.9. Total Nitrogen – N $_{tot}$

All parameters containing nitrogen, which were monitored during this study, together with the amount of SHKO, indicate an increase in Total Nitrogen in the monitored rivers. The presence of nitrogen in surface water directly affects the uncontrolled growth of aquatic flora. *According to UA 16/2017 MESP, the maximum value for Total Nitrogen is* ***10 mg/L*** , and several cases of exceeding this rate were recorded during monitoring. During the spring phase, very high values were recorded in the Graçanka River, with a level of 46.77 mg/L.

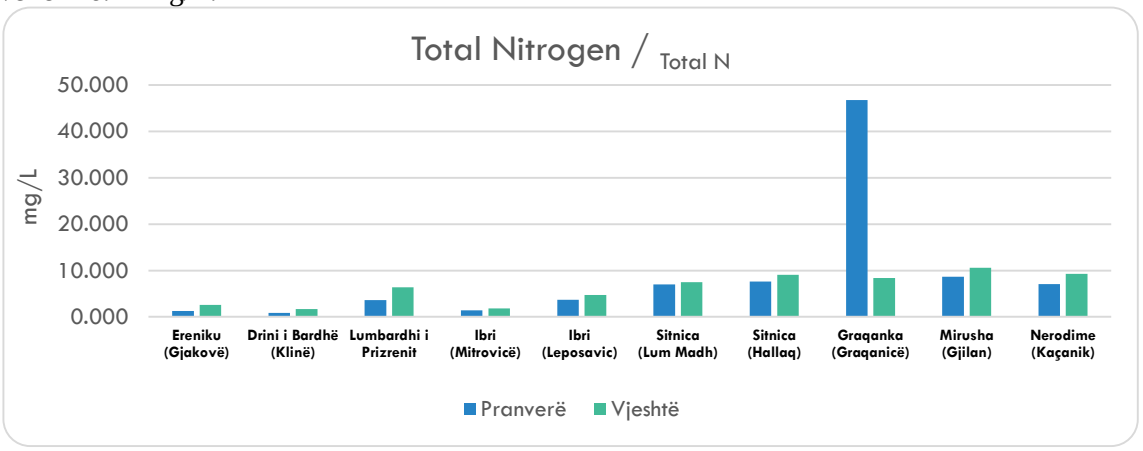

Figure 18. *Diagram with the data of Total Nitrogen (N $_{tot}$)*

5.2.10. Total Phosphorus - P $_{tot}$

The value of Total Phosphorus is derived from the presence of phosphates and the amount of SHKO, since a part of the organic materials also contains phosphorus. This element affects the uncontrolled growth of vegetation in the waters, causing eutrophication [9], which shows how harmful the presence of phosphorus in rivers is. The presence of total phosphorus has been highlighted during monitoring, often exceeding the maximum allowed value of 0.4 mg/L Ptot, according to UA 16/2017 of MESP. The highest phosphorus value was recorded during the spring in the Graçanka River, with a level of 29.89 mg/L.

[9]Eutrophication is a process of enriching waters with nutrients, mainly phosphorus and nitrogen, which leads to rapid and uncontrolled growth of aquatic vegetation, especially algae.

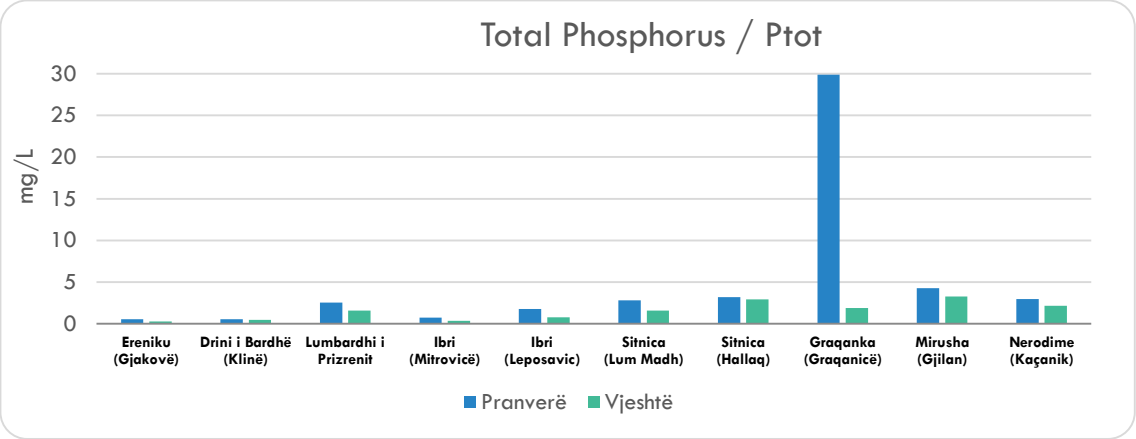

Figure 19. *Diagram with the data of Total Phosphorus (P_{tot})*

5.2.11. Chlorides - Cl^-

The presence of chlorides is common and is a less dangerous pollutant of river waters.
During the spring phase, higher amounts were recorded than in the autumn season. The highest values were recorded in the Graqanka River (60.4 mg/L) and in the Mirusha River (61.4 mg/L).

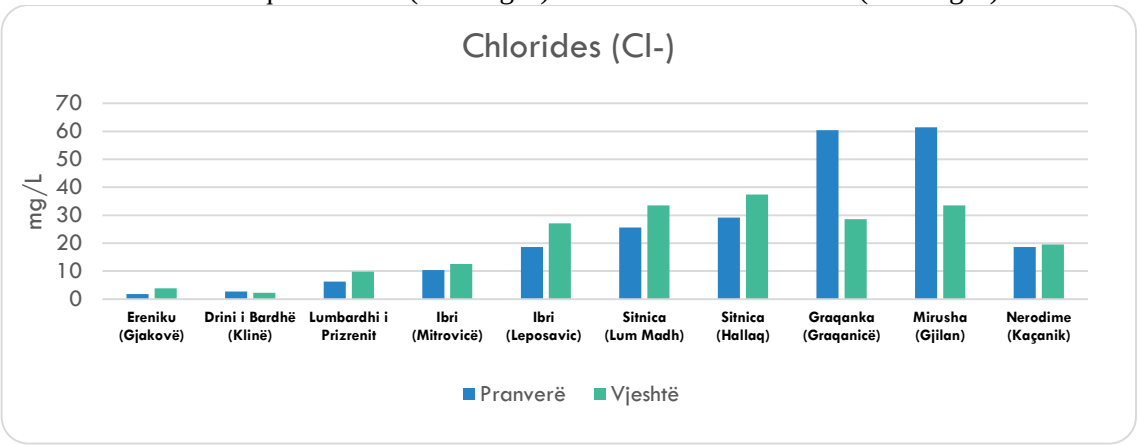

Figure 20. *Diagram with Chloride data (Cl^-)*

5.2.12. Sulfates - SO_4^{2-}

The presence of sulfates in rivers usually indicates pollution from industrial, agricultural, or sewage sources. The highest amount of sulfates was recorded in the autumn phase, in the Graqanka river in Graçanica with a value of 310 mg/L. This high amount of sulfates in the Graqanka River is influenced by the pumping waters of the Kizhnica mine.

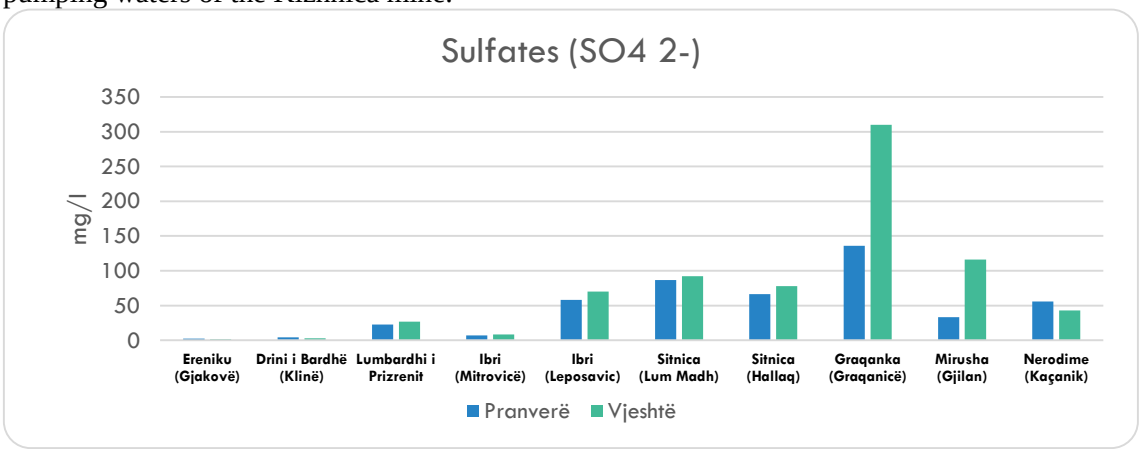

Figure 21. *Diagram with Sulfate data (SO_4^{2-})*

7. CLASSIFICATION OF SURFACE WATER BODIES

The classification of surface water bodies is based on the local legislation that is in force. This is done by comparing the results measured in the field and the laboratory with the maximum allowed values determined by Administrative Instruction UA 16/2017 MESP [10]. In our case, the comparison should be made with ***the type T2 of waters,*** which include ***small, medium and large lowland rivers*** , and which match the type of rivers that have been monitored within this project.

Table 9. *Values according to Administrative Instruction NO. 16/2017 MESP1 for the classification of surface water bodies*

No.	TYPE*	T 2 - Lowland river small, medium and large		
	StatUS	**L**	**M**	**Md**
1	***pH***	7.0-8.6	<7.0 >9.0	<7.0 >9.0
2	***Dissolved oxygen***	>7.0	7.0 – 6.0	6.0 – 5.0
3	***BOD5***	<4.0	4.0 – 6.0	6.0 – 8.0
4	***Go***	<4.0	4.0 – 7.0	7.0 – 12.0
5	***Nitrogen of Ammonia NH_4-N ions***	<0.10	0.10 – 0.25	0.25 – 0.70
6	***nitrites***	<1.00	1.00 - 2.00	2.00 - 5.00
7	***Total Nitrogen - N_{tot}***	<1.5	1.5 – 3.0	3.0 – 10.0
8	***Phosphorus of Orthophosphates PO_4-P***	<0.05	0.05 – 0.10	0.10 – 0.20
9	***Total Phosphorus – P_{tot}***	<0.10	0.10 – 0.20	0.20 - 0.40

The classification of river waters based on the results of the samples of the first phase - spring and the second phase - autumn, according to UA 16/2017, turns out **to be of moderate status** and in some cases it turns out to be outside this status due to parameter values that exceed the reference values according to UA 16/2017.

[10] https://gzk.rks-gov.net/ActDetail.aspx?ActID=15797

8. conclusion

For easier reading, the tables with spring and autumn measurements for the two years of monitoring and evaluated according to the values determined in UA 16/2017 are presented:

high (L)	good (M)	moderate (Md)	weak

Table 10. *Evaluation of the chemical parameters analyzed according to the maximum values allowed with UA 16/2017: Spring 2023-2024*

Periudha	Pranverë 2023									Pranverë 2024								
Lumi	pH	O2	SHKO	SHBO5	NH4-N	NO3-	NT	P-PO4	P	pH	O2	SHKO	SHBO5	NH4-N	NO3-	NT	P-PO4	P
	0-14	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	0-14	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Vlerat Referente: L M Md	7.0-8.6 <7.0>9.0 <7.0>9.0	>7.0 7.0-6.0 6.0-5.0	<4.0 4.0-7.0 7.0-12.0	<4.0 4.0-6.0 6.0-8.0	<0.10 0.10-0.25 0.25-0.70	<1.00 1.00-2.00 2.00-5.00	<1.5 1.5-3.0 3.0-10.0	<0.05 0.05-0.10 0.10-0.20	<0.10 0.10-0.20 0.20-0.40	7.0-8.6 <7.0>9.0 <7.0>9.0	>7.0 7.0-6.0 6.0-5.0	<4.0 4.0-7.0 7.0-12.0	<4.0 4.0-6.0 6.0-8.0	<0.10 0.10-0.25 0.25-0.70	<1.00 1.00-2.00 2.00-5.00	<1.5 1.5-3.0 3.0-10.0	<0.05 0.05-0.10 0.10-0.20	<0.10 0.10-0.20 0.20-0.40
Ereniku Gjakovë (Brekoc)	7.9	6.3	6.8	4	0.005	1.5	0.5	0	0.1	7.6	4.42	18.8	9.8	0.01	2.6	1.2	0.02	0.55
Drini i Bardhë Klinë (Zllakuqan)	7.6	7.6	20.8	12.3	0.012	3.5	1.2	0.1	0.4	7.46	5.04	16.2	8.3	0.01	1.4	0.8	0.1	0.55
Lumbardhi i Prizrenit Prizren (Qytet)	7.7	5.44	102	62.6	0.244	1.2	2.6	0.1	1.9	7.31	4.58	87	47.4	0.26	2	3.6	0.12	2.56
Ibri Mitrovicë (Qytet)	8.92	10.6	40	28	0.521	1.6	2.8	0.2	1.3	7.31	6.4	26.2	12.6	0.17	1.5	1.4	0.03	0.76
Ibri Leposavic										7.31	6.3	60.4	27.2	0.08	6.7	3.7	0.09	1.78
Sitnica Obiliq (Lumadh)	7.72	2.52	65.5	38.3	0.445	7	3.5	0.3	1.4	7.02	3.07	85	46.2	0.79	14.5	6.9	0.44	2.82
Sitnica Lipjan (Hallaq)	7.34	1.68	39.4	20.7	0.424	5.3	2.5	0.2	0.7	7	2.87	109	54.2	0.53	15	7.6	0.12	3.18
Graqanka Graçanicë										6.9	2.34	1060	775	0.31	50	47	0.21	29.9
Mirusha Gjilan (Qytet)	7.8	1.08	87.6	53.6	0.926	5.7	4.4	1.4	2.9	6.8	0.04	111	53.2	2.06	10.4	8.6	1.18	4.29
Nerodime Kaçanik (Kaçanik i Vjetër)	7.3	4.17	43.5	28.5	0.428	5.8	2.8	0.9	1.7	6.78	1.71	82.2	48.2	0.54	16	7	0.66	2.96

Table 11. *Evaluation of the chemical parameters analyzed according to the maximum values allowed with UA 16/2017: Autumn 2023-2024*

Periudha	Vjeshtë 2023									Vjeshtë 2024								
Lumi	pH	O2	SHKO	SHBO5	NH4-N	NO3-	NT	P-PO4	P	pH	O2	SHKO	SHBO5	NH4-N	NO3-	NT	P-PO4	P
	0-14	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	0-14	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Vlerat Referente: L M Md	7.0-8.6 <7.0>9.0 <7.0>9.0	>7.0 7.0-6.0 6.0-5.0	<4.0 4.0-7.0 7.0-12.0	<4.0 4.0-6.0 6.0-8.0	<0.10 0.10-0.25 0.25-0.70	<1.00 1.00-2.00 2.00-5.00	<1.5 1.5-3.0 3.0-10.0	<0.05 0.05-0.10 0.10-0.20	<0.10 0.10-0.20 0.20-0.40	7.0-8.6 <7.0>9.0 <7.0>9.0	>7.0 7.0-6.0 6.0-5.0	<4.0 4.0-7.0 7.0-12.0	<4.0 4.0-6.0 6.0-8.0	<0.10 0.10-0.25 0.25-0.70	<1.00 1.00-2.00 2.00-5.00	<1.5 1.5-3.0 3.0-10.0	<0.05 0.05-0.10 0.10-0.20	<0.10 0.10-0.20 0.20-0.40
Ereniku Gjakovë (Brekoc)	8.32	8.4	8.9	4.9	0.031	1.7	0.83	0.027	0.28	7.9	5.21	18.8	8.1	0.34	7.3	2.6	0.07	0.29
Drini i Bardhë Klinë (Zllakuqan)	7.95	7.14	14.2	6.6	0.021	6.8	2.06	0.035	0.43	8.5	6.54	25.8	15.7	0.17	3	1.7	0.02	0.47
Lumbardhi i Prizrenit Prizren (Qytet)	7.63	4.15	236	102.5	0.985	1.2	9.2	0.2	6.77	7.65	4.45	92	46.8	3	1.6	6.4	0.26	1.57
Ibri Mitrovicë (Qytet)	7.42	7.2	26	16.8	0.996	2.2	2.4	0.2	0.89	7.7	7.82	20	12.2	0.87	1.7	1.8	0.13	0.36
Ibri Leposavic										7.5	4.55	33	18.6	0.24	14	4.7	0.26	0.78
Sitnica Obiliq (Lumadh)	7.45	2.18	46	22.4	0.782	4.8	3.5	0.6	1.86	7.7	0.89	75	32	4.43	2.2	7.5	0.68	1.59
Sitnica Lipjan (Hallaq)	7.5	0.88	176	69.9	1.038	1	7.3	1.4	6.35	7.48	1.95	119	67	4.78	1.1	9.1	1.04	2.93
Graqanka Graçanicë										7	0.23	142	58.5	2.91	2.6	8.4	0.26	1.91
Mirusha Gjilan (Qytet)	7.62	0.3	192	115	0.531	0.1	6.9	0.5	5.88	7.82	5.38	190	88	2.3	5.5	11	0.81	3.28
Nerodime Kaçanik (Kaçanik i Vjetër)	7.19	0.56	102	43	0.62	0.1	4.12	0.94	3.79	7.25	1.3	152	71	.3.3	3.6	9.3	0.17	2.16

The monitoring results for the years 2023 and 2024 show a general state of river pollution, where most parameters show classification of moderate status or exceeding this level, according to UA 16/2017.

- Based on the Dissolved Oxygen values, many rivers have exceeded the moderate status, indicating a high degree of pollution, especially in the rivers of Sitnica, Lumbardhi of Prizren, Mirusha and Nerodime.

- Also, in both years, the Chemical and Biochemical Oxygen Expenditure has been above the moderate status for most of the samples, with some rivers showing particularly high values, such as the Graçanica River in 2024.

- The Phosphorus parameter, whether in the form of orthophosphate ions or total phosphorus, has shown exceeding the moderate status in some rivers, which reinforces the water pollution with nutrients that contribute to eutrophication.

- Regarding Total Nitrogen, the rivers are mostly in moderate status, confirming a high presence of nitrogen-containing pollutants.

- Nitrates, another indicator of pollution from agricultural and industrial sources, show moderate status exceedances in some rivers such as Erenik, Ibri, and Sitnica in both seasons.

- Ammonium ion nitrogen also shows high levels of pollution, where some rivers in spring and especially in autumn show poor status due to polluted discharges.

- In general, these data reflect a continuous and widespread pollution of Kosovo's rivers, where the impact of polluted urban, industrial and agricultural waters continues to be evident in their quality.

These results highlight the need for urgent interventions in water management and pollution control, to preserve aquatic ecosystems and ensure a healthy environment for communities that depend on Kosovo's rivers.

9. RECOMMENDATIONS

Based on the findings of the report, the following recommendations were issued:

- **Investments in new wastewater treatment plants** and improving the capacities of existing plants would significantly reduce river pollution.
- **Higher inspection by the inspectorate** at municipal and central level is needed, increasing the number of water inspectors across municipalities and ministries and thus increasing regular joint inspections to prevent pollution and ensure that operators operate in accordance with environmental standards.
- **Enforcing stronger regulations and policies for industrial polluters** that limit raw industrial discharges and fining polluters will help prevent pollution.
- **Providing opportunities for consultation and technical advice** to assist farms and operating businesses in implementing sustainable practices in waste treatment and water management.
- **Raising awareness and engaging the community** through training and informational meetings about their impact on water quality and how they can help reduce pollution through simple actions.
- **To create comprehensive real-time or real-time monitoring** for all rivers, where all citizens have the opportunity to be informed about the quality of surface water extending throughout the country. This monitoring should include testing for chemical and biological contamination parameters.
- **Improving information** on water quality monitoring data - Data should be accessible to the public through dedicated websites and periodic reports.
- **Improving policies** at the local level to improve water quality control policies and regulations.
- **Awareness activities** , especially in schools, including environmental topics and sustainable practices in school curricula to educate new generations on the importance of water quality and environmental protection.

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