ANTIROPOGENIC IMPACTS ON WATER QUALITY AT IBËR RIVERBED

DOBROSHI Florent[1], MALOKU Faton[2*], DOBROSHI Krenar[3], MALOLLARI Ilirjan[4]
[1]University "Isa Buletini", Mitrovica, Kosovo; [2]Institution of Higher Education, UBT- College, **Prshtina** Kosovo; [3]College of Medical Sciences "Rezonanca", Prishtinë, Kosovo; [4]Faculty of Natural Sciences University of Tirana, **Albania**

ABSTRACT

Pollution of pure natural waters represents any qualitative and quantitative deviation of the chemical, physical and biological composition and natural qualities that have adverse consequences on human health, the economy and the ecosystem in general. Today the rivers have become the collector of all influential urban and industrial waters. Kosovo in certain proportions is affected by all aspects of pollution, so it pushed me to take this paper and study the physical-chemical, microbiological aspects as well as the determination of heavy metals in the Ibar River. Water quality in the Iber River has been and is under the influence of various factors, where the main impact comes from anthropogenic activities, mainly from urban leaks, pollutants from sewage, agriculture and industrial discharges. Evaluation of anthropogenic impact in these rivers was done by performing monitoring, physical-chemical analysis, microbiology, and the determination of metals in trace. The environmental re-assessment is done by comparing the results achieved with international standards. The methodology during laboratory analysis is based on ISO standards. The results of the research showed a pollution in the river iber as a result of anthropogenic influence as some parameters had higher values than standard values. Construction of sewage treatment plants, the control of industrial releases and the awareness of the population on the value of water, which we are obliged to inherit to our descendants in the best possible way.

Keywords: Ibri, heavy metals, physicochemical and microbiological parameters.

PRESENTATION

Creation of nature is an undeniable phenomenon which has established all methods of preserving natural equilibrium but the participation of human activity in various natural processes has made it necessary to apply different methods for preserving and protecting many processes in nature [1-3]. The ancient rivers, which were rich in vibrant diversity of the animal world and green shores, have now been transformed into many parts of the world, as well as in us, into open waste canals and toxins or toxic substances [4,5].
The European Union and the European Parliament set goals in 1996, which are still preserved today that water should be "effective and efficient" spending that are:

- Sufficient supply with drinking water
- Good quality, sufficient quantity for economic and industrial needs
- To have quality and quantity of water resources and to protect the state of the environment
- Good management to reduce the negative impacts, the impact of drought and flooding

Anthropogenic chemical pollution is caused by urban activity involving waste generated from everyday living in dwellings, work, traffic and technological activity involving industrial production [6]. Mineral and chemical industries are the two most important sources of chemical

pollution, though not least have other industries such as pesticides, electrical, manufacturing and processing of leather, paper and urban wastes [7].

Anthropogenic sources of water pollution are classified into several categories:
- Industrial, municipal, agricultural, rainfall, solid deposits, pesticides and herbicides. Pollution of pure natural waters represents any qualitative and quantitative deviation of the chemical, physical and biological composition and natural qualities that have undesirable consequences for human health, the economy and the ecosystem in general [8]. Today the rivers have become the collector of all influential urban and industrial waters [9].

The Iber River has the following branches: Sitnica, Lushta, Trepça, Bistrica etc. The Iberian basin has a length of 42 km of surface of 1.155 km^2, flow of 32.00 Q [m^3/s]. The annual average amount of water in the Iberian river basin is 1.146.33 million m^3. The depth of water is different because Ibri has formed its bed in different geological layers. It is characterized by the maximum flow in March - April and the minimum in August and September. While the maximum flow rate is in relation to the melting of snow at the beginning of spring, the lower it appears as a consequence not only of lack of precipitation, but also intensive evaporation and absorption of limestone water.

The overall water status in Kosovo is partly satisfactory by comparing with EU standards and WHO standards. On the other hand, water resources in Kosovo are relatively insufficient (1600 liters per inhabitant of drinking water) and systematic degradation in the absence of an effective management and protection system [10,11].

MATERIALS AND METHODS

Water samples for analysis were obtained using standard tools and containers in three locations (Ibri on the outskirts, Iber in Mitrovica and Ibar joined Sitnica) as well as in 3 time periods: May, July and September 2018.

For sampling in the river, ISO 5667-6 standards are applied, where the samples do not approach near the coast where the speed of the water movement is smaller but in the middle of the river at a depth of 20-30 cm. At each location, measurements are made: water temperature, electric conductivity, pH, dissolved oxygen and blur.

The analysis of the water samples taken in the Ibar River was carried out in the laboratory of the Hydrometerological Institute of Kosovo, while the determination of water quality parameters was performed using these instruments and instruments:

- for temperature measurement is used Multi Thermometer 340i,
- turbidity is measured with AQUALITIC / PC COMPACT turbidimeter,
- Electrical conductivity with WTW 315i Condenser,
- Measurement of pH values are done with pH meter HI 98130,
- dissolved oxygen is defined by HI 9146,
- oxygen saturation is determined by HI 9146,
- SHBO5, GO, total suspended substances, nitrates, ion sulphate and detergents with SECOMAN UV Spectrophotometer,
- Total Soil and Ammonium ions with Visual Spectofotometers SECOMAN PRIM LIGHT - as well as the determination of the amount of heavy metal metals with the American Type PERKIN ELMER atomic absorption spectrophotometer of the Type 400 analyzer.

RESULTS AND DISCUSSIONS

Experimental research has been carried out for the characterization of Ibar River waters, mainly those 3 Monthly samples taken at three sites where the respective results of the analysis are presented in Tables 1 -3.

In order to simplify the presentation of the results and not the repetition of the values, we are referring to the time selected for the experiment. During the experiment it is worth noting that all experiments were carried out on field conditions.

Table 1. Presentation of results of 05.2018 of Iber river

Settings	Units	Standards	Results		
A		(maximum limit)	**R_1**	**R_2**	**R_3**
Time			**13:40**	**11:10**	**12:55**
Weather			**sum**	**sum**	**sum**
Water temperature	K/°C	281.16-285.16 (8-12)	**7.3**	**7.5**	**9.1**
Aroma		Pa	pa	pa	pa
Taste		Pa	Pa	Pa	Pa
Turbidity	NTU	1.2-2.4	11.7	12.3	**13.7**
Color	Shkolla Co-Pt	10.0-20.0	pa	pa	**pa**
pH value	pH	6.8-8.5 (6.5-9.5)	8.20	8.14	8.06
Harshness of $KMnO_4$	mg/l O_2	8*12**	2.96	2.98	3.01
Free Chlorine (DPD1/DPD4)	mg/l Cl_2	0.2-0.5	0.3	0.35	0.4
Chlorides	mg/l Cl	200	11	13	15
Ammonia (ammonia ion)	mg/l N	0.1	**0.0075**	**0.0075**	**0.0075**
Nitrogen is total inorganic	mg/l N	0.831	**0.067**	**0.064**	**0.070**
Nitrites	mg/l N	0.005	**0.090**	**0.080**	0.098
Nitrates	mg/l N	10	0.15	0.15	0.15
Phosphates	mg/l P	0.01-5.0	**0.0015**	**0.126**	**0.080**
Electricity quest	ms/cm	1500	**260**	270	380
Total dissolved material	mg/l	203	135	130	190
Dissolved Oxygen	mg/l O_2	11.760	**10.14**	**9.97**	9.84
Satisfaction with O_2	%	94.6	**101.6**	**96.7**	9.84
Chemical expenditure of O_2	mg/l O_2	30	**74.5**	**72.5**	54.0
Bioche. Oxygen expendit.	mg/l O_2	2	16.6	16.2	12.0
Suspended mat. total	mg/l	10	**60.5**	**58.5**	44.0
Sulfates	mg/ SO_4	200	5.8	8.739	4.970
Detergents (Anionic)	mg/l	0.1	0.15	0.15	0.15
Water hardness	dH	30	8.68	8.70	8.78
Total alkali	mmol/l HCl	4.280	**3.280**	3.285	**3.290**
Chromium Cr^{3+}	mg/L	0.05	0.029	0.031	0.036
Cadmium Cd^{2+}	mg/L	0.005	0.00022	0.00032	0.00043
Nickel Ni^{2+}	mg/L	0.02	0.0003	0.0004	0.0006
Zinc Zn^{2+}	mg/L	3.0	0.003	0.007	0.041
Leaden Pb^{2+}	mg/L	0.01	0.015	0.021	0.028
Iron Fe^{2+}	mg/L	0.2	0.02	0.148	0.067
Manganese Mn^{2+}	mg/L	0.05	0.062	0.052	0.22
Copper Cu^{2+}	mg/L	2.0	**0.0008**	0.0009	**0.0011**
Cobalt Co	mg/L	0.001	**0.00003**	0.00005	**0.00009**
Sodium Na	mg/L	200	**3.3286**	3.3290	**3.3310**
Potassium K	mg/L	12	**0.5111**	0.6123	**0.6246**
Microbiological parameters					
Nr. i ter. of bacteria	100 ml	10-100	24000		
Bak. Fecal coliforms	100 ml	0	E.coli		
Bak. Living us 37°C	100 ml	200	0		

Trace metals such as lead, manganese, magnesium, and calcium have higher amounts than standard values because the river Iber has urban emissions, which contributes to increased concentrations of heavy metals. Vedmostrimi Coordinate X Coordinate Y Height above sea level.

R1-Ibri Referent: Coord. X (42 ° 55'26.06) N, Coord. Y (20° 41'9.28") E, Altitude 508;
R2-Ibri in Mitrovica; Coord. X (42 ° 53'58.72 ") N, Coord. Y (20 ° 52'19.42") E, Altitude 501;
R3-Ibri joined Sitnica: Coord. X (42 ° 54'9.54 ") N, Coord. Y (20° 52'15.65") E, Altitude 500;

Table 2. Presentation of results of 07.2018 of Iber river

Settings	Units	Standards	Results		
A		(maximum limit)	**R_1**	**R_2**	**R_3**
Time			**10:40**	**12:00**	**11:35**
Weather			**sum**	**sum**	**sum**
Water temperature	K/°C	281.16-285.16 (8-12)	**11.1**	**16.9**	**20.1**
Aroma		Pa	pa	pa	pa
Taste		Pa	Pa	Pa	Pa
Turbidity	NTU	1.2-2.4	8.1	14	18.5
Color	Shkolla Co-Pt	10.0-20.0	pa	pa	pa
pH value	pH	6.8-8.5 (6.5-9.5)	8.6	8.1	8.17
Harshness of $KMnO_4$	mg/l O_2	8*12**	2.95	2.98	3.02
Free Chlorine (DPD1/DPD4)	mg/l Cl_2	0.2-0.5	0.3	0.35	0.4
Chlorides	mg/l Cl	200	11	14	15
Ammonia (ammonia ion)	mg/l N	0.1	**1.941**	**2.442**	**3.869**
Nitrogen is total inorganic	mg/l N	0.831	**1.584**	**2.217**	**3.711**
Nitrites	mg/l N	0.005	**0.103**	**0.162**	**0.563**
Nitrates	mg/l N	10	**0.15**	**1.3**	**2.4**
Phosphates	mg/l P	0.01-5.0	**0.0016**	**0.564**	**1.228**
Electricity quest	ms/cm	1500	320	350	**590**
Total dissolved material	mg/l	203	**150**	**160**	**290**
Dissolved Oxygen	mg/l O_2	11.760	**8.19**	**8.28**	**4.95**
Satisfaction with O_2	%	94.6	**88.3**	**91.7**	**64.2**
Chemical expenditure of O_2	mg/l O_2	30	**0.16**	**6.8**	**23.3**
Bioche. Oxygen expendit.	mg/l O_2	2	0.15	**5.0**	15.0
Suspended mat. total	mg/l	10	**0.15**	**1.6**	**7.7**
Sulfates	mg/ SO_4	200	7.5	10.06	38.10
Detergents (Anionic)	mg/l	0.1	0.15	0.1	0.2
Water hardness	dH	30	**9.14**	**9.15**	9.20
Total alkali	mmol/l HCl	4.280	**3.980**	**3.984**	3.986
Chromium Cr^{3+}	mg/L	0.05	0.028	0.032	0.046
Cadmium Cd^{2+}	mg/L	0.005	0.00022	0.00033	0.00044
Nickel Ni^{2+}	mg/L	0.02	0.0003	0.0004	0.0006
Zinc Zn^{2+}	mg/L	3.0	0.005	0.008	0.041
Leaden Pb^{2+}	mg/L	0.01	0.015	0.021	0.028
Iron Fe^{2+}	mg/L	0.2	0.04	0.148	0.067
Manganese Mn^{2+}	mg/L	0.05	0.062	0.052	0.22
Copper Cu^{2+}	mg/L	2.0	**0.0008**	0.0009	**0.0011**
Cobalt Co	mg/L	0.001	**0.0003**	0.0008	**0.0009**
Sodium Na	mg/L	200	**3.3286**	3.3290	**3.3310**
Potassium K	mg/L	12	**0.5113**	0.6123	**0.6246**
Microbiological parameters					
Nr. i ter. of bacteria	100 ml	10-100	24000		
Bak. Fecal coliforms	100 ml	0	E.coli		
Bak. Living us 37°C	100 ml	200	0		

Table 3. Presentation of results of the month 09.2018 of the Ibër River

Settings	Units	Standards	Results		
A		(maximum limit)	**R_1**	**R_2**	**R_3**
Time			**10:50**	**12:15**	**11:55**
Weather			**sum**	**sum**	**sum**
Water temperature	K/°C	281.16-285.16 (8-12)	**11.1**	**16.9**	**20.1**
Aroma		Pa	pa	pa	pa
Taste		Pa	Pa	Pa	Pa
Turbidity	NTU	1.2-2.4	8	14.1	19.5
Color	Shkolla Co-Pt	10.0-20.0	pa	pa	pa
pH value	pH	6.8-8.5 (6.5-9.5)	8.65	8.21	8.17
Harshness of $KMnO_4$	mg/l O_2	8*12**	2.85	2.89	2.94
Free Chlorine (DPD1/DPD4)	mg/l Cl_2	0.2-0.5	0.3	0.35	0.4
Chlorides	mg/l Cl	200	11	14	15
Ammonia (ammonia ion)	mg/l N	0.1	**1.951**	**2.441**	**3.879**
Nitrogen is total inorganic	mg/l N	0.831	**1.583**	**2.219**	**3.709**
Nitrites	mg/l N	0.005	**0.104**	**0.161**	**0.564**
Nitrates	mg/l N	10	**0.15**	**1.2**	**2.3**
Phosphates	mg/l P	0.01-5.0	**0.0015**	**0.563**	**1.218**
Electricity quest	ms/cm	1500	330	350	**580**
Total dissolved material	mg/l	203	**160**	**170**	**290**
Dissolved Oxygen	mg/l O_2	11.760	**8.19**	**8.29**	**4.96**
Satisfaction with O_2	%	94.6	**88.2**	**91.8**	**64.3**
Chemical expenditure of O_2	mg/l O_2	30	**0.15**	**6.7**	**23.2**
Bioche. Oxygen expendit.	mg/l O_2	2	0.15	**5.0**	15.0
Suspended mat. total	mg/l	10	**0.15**	**1.6**	**7.7**
Sulfates	mg/ SO_4	200	7.6	10.06	38.14
Detergents (Anionic)	mg/l	0.1	0.15	0.1	0.2
Water hardness	dH	30	**9.13**	**9.14**	10.4
Total alkali	mmol/l HCl	4.280	**3.990**	**4.120**	4.680
Chromium Cr^{3+}	mg/L	0.05	0.029	0.031	0.036
Cadmium Cd^{2+}	mg/L	0.005	0.00022	0.00032	0.00043
Nickel Ni^{2+}	mg/L	0.02	0.0003	0.0004	0.0006
Zinc Zn^{2+}	mg/L	3.0	0.005	0.007	0.041
Leaden Pb^{2+}	mg/L	0.01	0.015	0.024	0.028
Iron Fe^{2+}	mg/L	0.2	0.05	0.148	0.067
Manganese Mn^{2+}	mg/L	0.05	0.062	0.052	0.22
Copper Cu^{2+}	mg/L	2.0	**0.0008**	0.0009	**0.0011**
Cobalt Co	mg/L	0.001	**0.0003**	0.0005	**0.0009**
Sodium Na	mg/L	200	**3.3286**	3.3290	**3.3310**
Potassium K	mg/L	12	**0.5111**	0.6123	**0.6246**
Microbiological parameters					
Nr. i ter. of bacteria	100 ml	10-100	24000		
Bak. Fecal coliforms	100 ml	0	E.coli		
Bak. Living us 37°C	100 ml	200	0		

CONCLUSION AND RECOMMENDATION

From the results of the analysis for the Iber River we can conclude that the anthropogenic pollution has a great impact since at three water sites it is cleaner before the urban waste is discharged in the Ibar River. Concerned were the large industrial wastes found in the landfills near the factories of Mitrovica.

These wastes are constantly transferred to the river atmospheric rainfall, underground waters and airflow in the river. Therefore, preventive measures should be taken at source, while respecting environmental laws. To prevent pollution in the water basins of these rivers and to achieve a standard in the standard limits, propose:

- Preventing water pollution, respectively compliance with environmental laws

- Ensuring the conservation of quality and ecosystems of these waters, through appropriate and timely monitoring of time and space
- Rehabilitation and greening of degraded areas
- Construction of air, water and soil measuring stations and chemical and microbiological monitoring of the level of pollution in surface waters
- Awareness of the whole population in villages and urban areas, about the value of water as a national and private asset, through various forms of mass communication.

Water and the environment are very important for society, so we as a society should take good care of it, that water resources are as clear as possible from the negative influences of the human factor. Such a goal can only be achieved if science, laws, political actions are integrated, where good management would provide good results for water care and water resources.

REFERENCES

1. World Health Organization (WHO).(2001). International Standards for drinking water, 3rd edition., Geneva.
2. Voznaya NF. (1991). Chemistry of water and microbiology. Mir, Publishers, Moscow, 127.
3. Krasniqi S, Nushi – Latifi B. (2002). Scientific Conference on Technical end Technological Sustainable Development and Environment 203-207, Prishtina.
4. Oxfam Delagua, Portable Water Testing Kit, User's Manual Revised and updated 3rd edition, (1993).
5. Vitaku A, Baruti B, Malollari I, Shala F. (2013). Impact of Polluted Acidic Waters Discharged from Trepca Pb–Zn Mines, Kosovo, on the Pollution of Cross-border Rivers in the Region. The Journal of Environmental Protection and Ecology, 14, (1); 29-34.
6. Hernea C, Tenche-Constantinescu AM. (2013). Variability of Groundwater Quality Parameters from Periurban Area of Timisoara (Romania). The Journal of Environmental Protection and Ecology, 14 (1):63-70.
7. Standard Methods for the Examination of Water and Wastewater, 506-508 A, 16 Edition (1995).
8. Catrangiu A, Niculescu D, Lucaciu I, Chifiriuc C, Mihaescu G. (2015).Virulence Factors of Gram Negative Bacteria Isolated from Natural Aquatic Ecosystems, The Journal of Environmental Protection and Ecology, 16 (1) 33-39.
9. Thermal Conductivity of some common Materials. Engineeringtoolbox.com. Retrieved on (2011)-11-22.
10. Jump up to: Water in Linstrom, P.J.; Mallard, W.G. (eds.) NIST Chemistry WebBook, NIST Standard Reference Database Number 69. National Institute of Standards and Technology, Gaithersburg MD. http://webbook.nist.gov (retrieved 2014-06-01).
11. Water in Linstrom, P.J.; Mallard, W.G. (eds.) NIST Chemistry WebBook, NIST Standard Reference Database Number 69. National Institute of Standards and Technology, Gaithersburg MD. http://webbook.nist.gov (retrieved 2014-06-01).