

## Pollution of Llukac River from Sweage and Atmospheric Water and its Floss into the Ereniku River



### Environment and Ecology

**Keywords:** atmospheric, water, analyzes, quality, Llukac.

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### Abstract

The town of Gjakova is situated between the river Ereniku, Krena, and Llukac which is situated in west region of Kosovo, in the central part of Dukagjini valley in an attitude over 355 metres above the sea level. The pollution of the rivers by sweage and atmospheric waters as in the case in the Llukac and without proper maintenw brings to the thoughts about the future of the river, because the quality is very valuable and we have it in limited qualities. The evaluation of the quality, traditionally was based in the measurement of the concentration of organic and inorganic ingredients. The study of the project was done during 2011 and it was monitored its condition during 12 months. The outcome of the results conducted at physical-chemical labs as well as bacteriologic lab gives an general evaluation of the quality of the water at Llukac river which flows onto Ereniku river. Based on analyses results, shows that the quality of pollution of Llukac river as results of urban sweages and quantity of flowing pollutants.

### 1. Introduction

Waters in our country are threatened seriously and our world is hardly damaged. Sweage waters, atmospheric and other industrial discharges flow directly into collectors. These discharges are not measured, while these waters in surface or underground are not being monitored continuously. With the decreasing of industrial production in the last years, urban wastes are being even more a big source of problems for the quality of the waters. Within the concentrated discharges (urban or industrial), a big influence plays and the agricultural pollution and the erosion of the earth. For this is understandable that the flow of the water and the quality shows a clear face of the characteristics of the water keepers' basin. In places that are less populated the pollution decrease from the self-cleaning of the waters. Pollution of sweage waters of urban centers is a big problem for small rivers and its proportional with the amount and the intensity of anthropogenic activities in the region, with the advanced technologies used for their treatments and with their control. In small life terms of environmental problems, pollution from sweage waters it's considered the sanitary. This is just not visible but it is the most serious danger for human health. Patogens, which most of them lives only in waters, causes disease at humans, in which most of the cases comes from the human and animals sweages. Bacterias are mostly found in the waters, mostly like a proof for pollution caused by sweages. In water, most present is the group of bacteria "colliform", like this is called the group of bacteria founded mostly in human and animal sweages, a typical example is "Escherichia Coli" and the class is called "Enterobacteriacee" and the group "streptococcus with the specia of streptococcus faecalis dhe staphylococcus aureus which both of them found in humans. Domestic pollution in general consist in the bacterias of sweages, high values of organic contenents, mineral salts (especially nitrates, amioncales and phoshates) and the detergents.

On the other side, feeding elements and organic components (sweages, urban wastes, organic wastes, wastes from agriculture industry) passes through decomposition processes and produces chemical elements, in general is a feeding for fitoplancton. Aerobic processes of decomposition need  $O_2$ , so the amount of biodegradable material in the water can be measured by finding the velocity in which the  $O_2$  is used. Biochemical oxygen emande (biochemical oxygen demande-BOD) Can be determined like its consumed amount when the biodegradable substances are being oxidized in water. In waters with human wastes contentents, dissolved  $O_2$  in water is from 40 to  $150\text{mgL}^{-1}$ . In the consumed water this is less than  $0.5\text{ mgL}^{-1}$ . In qualitative waters for fishes life and other organisms is between 5 and  $7\text{ mgL}^{-1}$ . Polluted waters when in it is bigger than  $4\text{ mgL}^{-1}$  and less than  $2\text{ mgL}^{-1}$  fishes dies. Is valuated that Kosovo has limited water resurses, and for this reason their protection and maintence and raising of its quality need necessary adict from all the competent factors. In this study are given physo-chemical and bacterial parameters of water in the river Llukac in all the year 2011 and from the results we conclude that the river Llukac is one of the main pollutant of the river Ereniku. While in his way until its joins the river Ereniku, into it are flowed sweage waters, atmospheric waters and other pollutants. For this reason was monitored for one year this study. To decrease a little the human impact on natural waters, can be done by aplying all inclusive regimes of monitoration. Monitoration of water resources will determine the quantity and the quality of water, to identify their valuation, and to help the politic makers to take decisions for the using of the ground, not just to keep safe natural zones but and to increase the quality life.

## 2. Material and Methods

Llukac is the river that passes through the city of Gjakova and flows into the river Erenik, its flow is lower than the river Krena which the same flow into Ereniku river. In this oen year study is done the monitoration close to the bus station in Gjakova, in which are taken and the samples in three different points and them are: point 1 is taken 100 meters in the river Llukac before the flow of polluted waters, point 2 into the polluted waters (sweages waters), atmospheric etc, and the point 3 is taken 100 meters after the flows of the polluted waters in the river Llukac. Its clearly seen that the purpose of this study gives datas over the water quality of the river Llukac and the flow of the polluted waters in this river in all the four seasons if the year. While taking samples should be taken care that the sample to present actual components of the water. Another factor is the way of how we take and the transport the samples and this influence so much on the results of taken analysis. This recomandation comes from: World Health Organisation, OBSH (WHO 1993), USEPA 1983. The water samples are taken in 500ml polyethylen bottles which before were well cleaned and the taken samples we have put in 40c in a frigrator, same parameters are determined into the place of the taking samples and them are: water temperature, ph value etc and the other parameters need to be transported carefully in the laboratory. For the analyse of the water in the laboratory we have used standard methods like it is discribed by standard APHA. Through spectrometer UV Hach, Mercks Turbodimetrit Spectraquant 1500 T, we have used and titrometric methods, conductometric, ph-metric etc.

Are determined also and the bacteriologic parameters and them are:

1.Total number of Coliform bacterias

(Escheria-Coli bacteria)-incubated in 37c

Feeding place-Violet Red Bile-Agar

2.Coliform Bacteria from sweages material

Feeding place-Endo Agar-Less

3.Total number of aerobic mesophilic bacterias

Feeding place-Total plant count agar

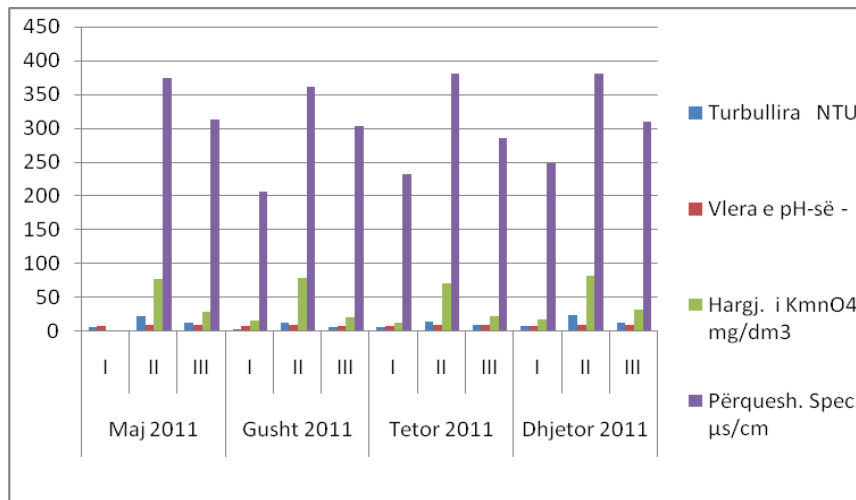
### 3. Results and Discussion

The research made in the laboratory of Regional Company for Water supply Radoniqi and some of them measured in the sampling site, during the study are monitored the parameters showed as below.

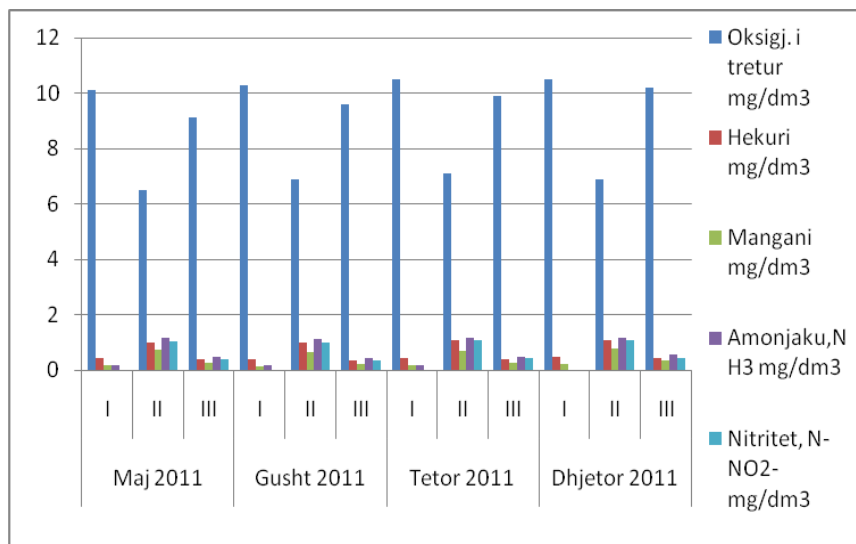
		River Llukac											
Parameters	Units	May 2011			Aug. 2011			Oct. 2011			dec 2011		
		I	II	III	I	II	III	I	II	III	I	II	III
Temp. air T°C	°C	18	18	18	34.3	34.3	34.4	16.7	16.8	16.8	11.6	11.7	11.10
Temp.water T°C	°C	9.3	9.5	9.5	20.2	20.2	20.3	15	15.2	15.3	7.8	7.6	7.4
Color	Sh.Co-Pt	6	17	11	5	15	9	8	19	15	21	39	29
Turbidity	NTU	6.2	22.3	13.7	3.9	13.1	7.2	6.1	14.8	9.9	7.5	24.1	12.3
pH value	-	8.29	9.75	8.88	8.06	9.59	8.51	8.17	9.82	8.94	8.21	9.82	8.91
KMnO <sub>4</sub> value	mg/dm <sup>3</sup>	16.11	77.42	29.07	16.1	79	21.2	12.3	71.1	22.2	17.38	82.16	31.6
Electr.conductivity	µs/cm	208	375	313	207	361	303	233	381	285	249	381	309
Total hardness	°dH	7.56	8.26	8.12	7.56	8.12	7.98	7.7	8.26	7.98	7.70	8.40	8.26
Dry residue	mg/dm <sup>3</sup>	124.8	225	187.8	124	217	182	140	229	171	149.4	228.6	185.4
CO <sub>2</sub>	mg/dm <sup>3</sup>	5.5	7.92	6.16	5.39	7.04	5.72	5.5	7.15	5.94	5.5	8.14	6.16
Chlorides	mg/dm <sup>3</sup>	7.79	19.85	10.28	7.44	20.6	12.1	8.15	20.6	11.6	8.86	20.56	10.63
Dissolved oxygen	mg/dm <sup>3</sup>	10.1	6.5	9.1	10.3	6.9	9.6	10.5	7.1	9.9	10.5	6.9	10.2
Iron(Fe)	mg/dm <sup>3</sup>	0.42	1.01	0.39	0.38	1.01	0.36	0.41	1.07	0.39	0.47	1.09	0.41
Manganese(Mn)	mg/dm <sup>3</sup>	0.16	0.71	0.26	0.14	0.66	0.23	0.16	0.69	0.26	0.20	0.78	0.33
NH <sub>4</sub> + ammonium	mg/dm <sup>3</sup>	0.18	1.14	0.47	0.16	1.12	0.44	0.18	1.14	0.47	0.24	1.18	0.55
Nitrites(NO <sub>2</sub> )	mg/dm <sup>3</sup>	0.014	1.05	0.39	0.01	1.01	0.37	0.02	1.07	0.44	0.017	1.09	0.45
Nitrates NO <sub>3</sub>	mg/dm <sup>3</sup>	0.22	8.2	3.8	0.21	7.6	3.7	0.28	7.8	4.2	0.43	9.1	3.8
Sulphate	mg/dm <sup>3</sup>	31	66	52	29	64	49	33	67	52	42	71	56

Complete results of physico-chemical analysis from the river Llukac - May 2011, August 2011, October and December 2011.

Diag 1. physico-chemical analysis



Diag 2 physico-chemical analysis



#### 4. DISCUSSION

During the seasons: spring, summer, autumn and winter of 2011, were made these physico-chemical analyses, in three sites of Llukac river in Gjakova. From the tested parameters are: temperature, turbidity, pH value, dissolved Oxygen,  $KMnO_4$  consumption, ammonium, nitrites, Iron, Manganese, etc.

From the analyzes results, temperature is as an important parameter which shows that there are changes from the third site with temperature  $7.4^{\circ}C$  in december up to higher temperature of  $20.3^{\circ}C$  which was shown in august month at the third site. These parameters depends from the time, season and the place where the samples were taken. Turbidity vary from 3.9 Ntu taken at the

first site in august up to maximum 24.1Ntu taken at the second site in december, which means that we are faced with an increase of turbidity. As the result of this increased values are the precipitation and many uncontrolled discharges made throughout Llukac river and the municipal discharges. pH value of 8.06 is marked in august 2011 in the first site of Llukac river. Higher pH values appeared in the second site 9.82 in december 2011. Taken as a whole level of pH is not very high, considering high discharges made into this river. The dissolved Oxygen in water which is very important for ecosystems and for all forms of water life including all the organisms. According to the results values, lowest value is measured in may (6.05 mg/l) in second site and the highest is in second site in october 2011 (10.5 mg/l).

Potassium permanganate consumption is considered as a measure of organic substances content in the water, lowest level of this parameter in the water is marked in summer in august 2011, (16.11 mg/l) in the first site of Llukac river. Highest potassium permanganate expenditure is in the second site of the Llukac river (82.16 mg/l) in december 2011. Based in these results there are big differences which comes as result of the over-contamination of this water from uncontrolled discharges and sewage waters. According to ammoniac the lowest level was marked in august at the first site (0.16 mg/l), and the highest level was in december at the second site (1.18 mg/l). Except the everyday discharges, in increasing of this parameter had influenced the high temperatures and the lack of the water in the flow of the river's bed itself. Lowest nitrites in the water were marked in august 2011 (0.01mg/l) in the first site of Llukac river, and the highest were marked in the second site (1.09 mg/l) in december 2011. The presence of Iron vary from 0.36 mg/l in the third site in august up to 1.09 mg/l in the site 2 and that during december. Level of Manganese in this water analysis is not that high, while we now that there are permanent discharges of contaminated water in this river, probably it's result of continual flow of this river and does not appear as rotter as Fe and Mn and that (0,14mg/l) in august and the highest (0,78mg/l) in site 2 in December.

Examina. bacteriological	Type water	Norm	Near city bus											
			08.0511	24.0811	18.1011	22.1211	08.0511	24.0811	18.1011	22.1211	08.0511	24.0811	18.1011	22.1211
			I				II				III			
Nr. total of coli bacteria 100 ml	cleaned	0												
	closed source	10 ose 5												
	Open source	100 ose 10	>150	>150	>200	>200	>1000	>1000	>1000	>1000	>500	>500	>500	>500
Faecal coliform bacteria in 100 ml	cleaned	0												
	closed source		E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli	E - coli
	Open source													
Nr. of total bact. mesophylic	cleaned	10												
	closed source	100												
	Open source	300	>250	>250	>250	>300	>1000	>1000	>1000	>1200	>600	>600	>500	>600

## Bacteriological Results

From the results given on the tables of bacteriological results we conclude: Total number on Coliform bacteria is very high especially at the point 2. Coliform bacteria which comes from sweages is very high in all the locations, especially at the place 2. Total number of aero mesophilic bacteria is high also in the location 2 its clearly seen that the number of bacteria is increased at the location number 2 because of the polluted waters flows in it.

## 5. Conclusions

From the experimentary results of water samples taken in the river Llukac during the year 2011 we conclude: Has been analysed the water samples of the river Llukac with the purpose to give datas over the quality and the flow of polluted waters that flows in it during four seasons of the year. Some parameters are measured in the place of taking the samples and the other are transported and measured in the laboratory for examination. Given results shows the quality of pollution caused by municipal discharges, atmospheric etc where this pollutants affect on the pollution of the river Erenik. Its recommended from high level government institutions to expand and to give straight instructions to other institutions for the maintenance of the water in the way to: Control over the water, to reduct the quantity of the pollutants in the water, degradation and other activities are a big danger for the water environment, to built and construct new plant for the treatment of sweage waters with the purpose to protect the environment, especially the rivers to respect and the water protection like Unites Unions standards.

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