



THE IMPACT OF THE RIVERS DRENICA, PRISHTEVKË, GRAQANKË ON POLLUTION OF THE RIVER SITNICA WITH HEAVY METALS

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ABSTRACT

One of the three largest rivers in Kosovo is known Sitnica River. This river formed near village Rubovc by the flow called Matica, Sazllinë stream and from the river flow of Shtime. At the start, the river is characterized by small water capacity, but during his path across the plains of Kosovo, in the geographic extension south-north, with a length of 90 km, him join the other rivers and springs, who with water flow not only that increase the amount of water of the river, but at the same time, some of these streams, pollute it with black waters, with industrial discharge and preparations of various chemicals used in agricultural activities. The amount of water discharged into the river Sitnica varies from season to season. Water flows more prevalent occur during the late autumn, in the winter and in spring. During this time, as a result of rainfalls and snow melt, increase the amount of water and there are cases when they arise and numerous flood agricultural land, despite the fact that along the flow of the river, in the 70^s/80^s years in both sides of it were raised levees to discipline these waters. The object of our study is the identification and evaluation of pollution with heavy metals of waters of river Sitnica, throughout flow since its Village Vragoli, located near Fushë Kosovë to discharge his bottom in the River Ibri, in Mitrovica city, including six site-sampling.

Keywords: Sitnica River, pollution, heavy metals, industrial discharge, site-sampling.

INTRODUCTION

While river Sitnicë passes a very long route inside territory of Kosovo, during this path takes with him from two sides of his bed, pouring water of springs and rivers, which carry with them different pollutants and heavy metals. Therefore, for drafting this paper, aimed for correct assessment and identification of heavy metal presence, was seen reasonable to select six monitoring points in river water flows Sitnicë, Graqankë, Drenicë and Prishtevkë.

Sampling site one (1) includes waters of river Sitnicë in village Vragoli in Fushë Kosovë
Sampling site two (2) includes lower pouring of river Graqankë in village Vragoli, before pouring of this river in Sitnicë.

Sampling site three (3) includes river Drenicë, in his lower pouring, near village Vragoli, which also pours in Sitnicë.

Sampling site four (4) includes lower pouring of river Prishtevkë, in village Bresje in Fushë Kosovë, which pours in Sitnicë.

Sampling site five (5) includes waters of river Sitnicë, in village Plemetinë, after industrial pouring done by Energetic Corporate of Kosovo (KEK) and sampling site six (6) includes lower pouring of waters of river Sitnicë, exit of Mitrovica Industrial Park (PIM) landfill, near river Ibër.

MATERIAL AND METHODS

During the research, we have seen fit to process monitoring of waters that flow into the river and the water itself Sitnica, done in April and August 2016. Such action we made to the fact that in April, the amount of water flows is much higher than in August, when it is known that this month is the peak of dry season. In order to detail as exact monitoring points, they are presented in the table mode and each monitoring point have associated with their coordinates (Table-1).

Table-1. Site-sampling points and their coordinates.

Rivers	Sampling point	Geographical width	Longitude	Altitude (m)
1. Sitnicë	Sitnicë In Vragoli	42°36'33.29"	21° 3'41.79"	535
2. Graqankë	Graqankë In Vragoli	42°36'40.37"	21° 4'2.35"	538
3. Drenicë	Drenicë In Vragoli	42°36'52.46"	21° 3'37.40"	537
4. Prishtevkë	Prishtevka In Bresje	42°37'26.03"	21° 4'17.23"	535
5. Sitnicë	Sitnicë In Plemetin	42°42'27.26"	21° 2'14.33"	529
6. Sitnicë	Sitnicë In Mitrovicë	42°53'21.72"	20°52'36.65"	504



In all site-sampling, the samples of water that we have taken in correlation and accordance with paragraph 5.4 of the norms EN ISO / CEI 17025

Samples of water taken from all sampling points that, we transferred to special containers observing and timely manner. Conservation of samples is done in accordance with the procedure of conservation American Public Health Association 2005. (APHA, 2005) Also, for measuring the concentration of heavy metals, the mineralization of samples it is done in accordance with the methods EPA- 3015 (HM1994), while reading their method made in accordance with EPA- 6010C. Also samples taken were determined the degree of concentration of the metals Cr, Cd, Ni, Zn, Mn, Cu, Fe and Pb.

The degree of concentration of these metals in the water is monitored in laboratory of HMIK made by applying the technique SAA-F.

RESULTS AND DISCUSSIONS

With the aim of evaluating the real degree of concentration of heavy metals Cr, Cd, Ni, Zn, Mn, Cu, Fe and Pb in rivers Graçankë, Drenica, Prishtevkë and water Sitnica, we are based on a reference value in EU Directive 75/440 / EEC and in Kosovo AI Administrative Instruction 13/2008 / to discharge effluents into water bodies and sewerage network (Table-2.)

Except pollution with wastewater and run off agricultural lands, more potential generators for contamination with heavy metals of waters of the river Sitnica are industry of KEK, Ferronickel, Mines Kishnica and other waste industrial Combine "Trepça", because these industrial flowing released a large set of complex organic compounds and heavy metals.

Chehregani and Malayer (2007) reported that high concentrations of heavy metals have strong toxic effects and are considered potential environmental pollutants.

One of the most pressing problems, which in recent years has presented and preoccupies mankind in general in the world, has to do with pollution with heavy metals water environments, because these metals fail to disintegrate and that most of them have toxic effects on living organisms. (MacFarlane G. B. *et al.*, 2000)

Heavy metals can pass into springs of drinking water, food products and due to the high toxicity that can

cause serious consequences for human health, so for this reason it is essential that their presence be maintained, always under control. (Alqi Çullaj, 2005).

Table-2. The maximum permissible value (mg/dm³) for effluent by U.A. Kosovo and EU.

Heavy metal	Kosovo under legislation standards	EU Directive
Chromium Cr	0,5	0,05
Cadmium Cd	0,01	0,005
Nickel Ni	-	0,1
Zinc Zn	1	0,5
Manganese Mn	1,5	0,05
Cuprum Cu	0,1	0,02
Iron Fe	1	0,1
Lead Pb	0,2	0,05

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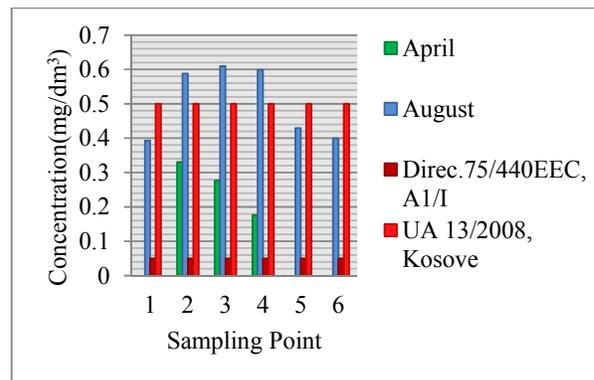
**Table-3.** Concentration of heavy metals in water rivers monitoring in April

Sampling point		Sitnicë In Vragoli	Graqankë In Vragoli	Drenicë In Vragoli	Prishtevkë In Bresje	Sitnicë In Plemetin	Sitnicë In Mitrovicë
Date: 11.04.2016	Unit	1	2	3	4	5	6
Heavy metals							
Chromium Cr	mg/dm ³	bld	0,3306	0,2768	0,1763	bld	bld
Cadmium Cd	mg/dm ³	0,0305	0,0645	0,0343	0,0361	0,0237	0,0215
Nickel Ni	mg/dm ³	0,0637	0,3518	0,0443	0,0365	0,0649	0,0894
Zinc Zn	mg/dm ³	bld	1,0611	0,0078	0,0196	bld	0,2456
Manganese Mn	mg/dm ³	0,0715	3,1581	0,1202	0,2857	0,1082	0,3303
Cuprum Cu	mg/dm ³	bld	bld	bld	bld	bld	bld
Iron Fe	mg/dm ³	0,1823	1,8698	0,4255	0,3535	0,3002	0,4950
Lead Pb	mg/dm ³	bld	bld	bld	bld	bld	0,0621

Table-4. Concentration of heavy metals in water rivers monitoring in August.

Sapling point		Sitnicë In Vragoli	Graqankë In Vragoli	Drenicë In Vragoli	Prishtevkë In Bresje	Sitnicë In Plemetin	Sitnicë In Mitrovicë
Date: 11.08.2016	Unit	1	2	3	4	5	6
Heavy metals							
Chromium Cr	mg/dm ³	0,393	0,5877	0,6097	0,5987	0,4293	0,3999
Cadmium Cd	mg/dm ³	0,0330	0,0697	0,0370	0,0393	0,0248	0,0225
Nickel Ni	mg/dm ³	0,0412	0,3800	0,0739	0,0486	0,0320	0,1063
Zinc Zn	mg/dm ³	0,0177	1,6880	0,0225	0,0291	0,0229	0,2626
Manganese Mn	mg/dm ³	1,1878	3,6490	0,3172	0,5571	1,1311	1,1373
Cuprum Cu	mg/dm ³	bld	bld	bld	bld	bld	0,0031
Iron Fe	mg/dm ³	0,2060	2,1129	0,4808	0,3909	0,3720	0,6134
Lead Pb	mg/dm ³	bld	bld	bld	bld	bld	0,0865

Based on the results obtained and presented in Tables 3 and 4, the state of heavy metals in all sampling points that appear as follows:

**Figure-1.** Concentration of Cr (mg/dm³) by site-sampling in April and August.



According to the EU directive, exceeded the reference to Cr we found in all sampling points that, while based on U.A. Kosovo exceeded the reference value, this metal, we found the place sampling 2, 3 and 4, are only in August, will they said; when the water level is lower

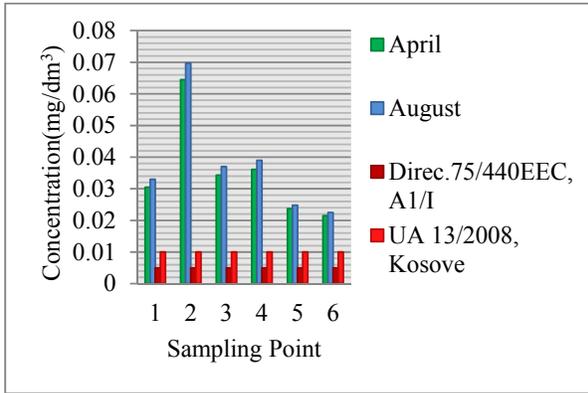


Figure-2. The concentration of Cd (mg/dm³) by sampling place in April and August.

With Cd, exceeding the reference values, according to EU Directive and under the administrative instruction of Kosovo have found in all sampling points that and in two periods, from April to August.

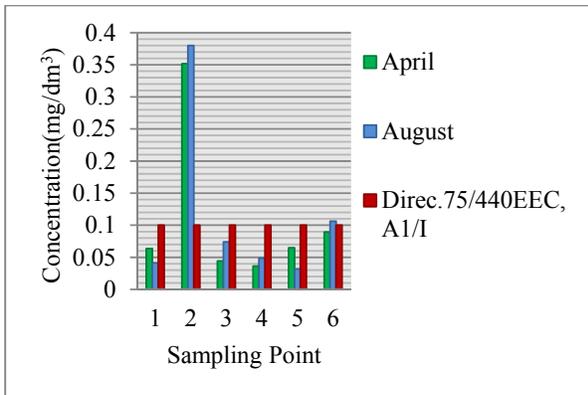


Figure-3. Concentration of Ni (mg/dm³) by sampling place in April and August.

Figure-3 shows the reference values exceeded with Ni the sampling 2, in April and August, while in the sampling point with this metal exceeded 6 encounters only in August.

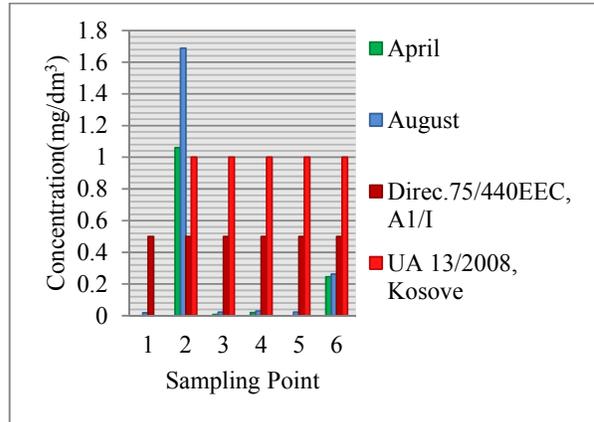


Figure-4. Concentration of Zn (mg/dm³) by sampling place in April and August.

Reference values in excess of Zn sampling found only in 2, while in all other sampling points that the situation is within the standard values.

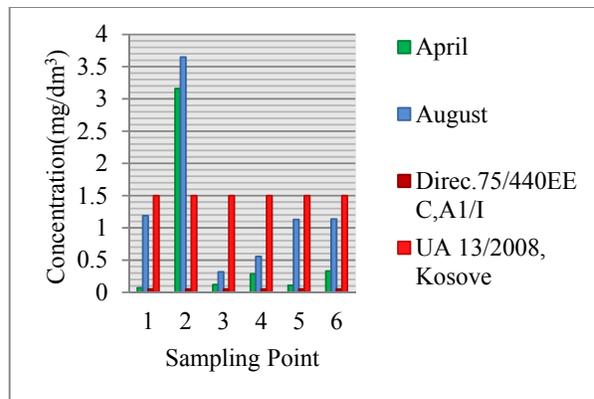


Figure-5. The concentration of Mn (mg/dm³) by sampling place in April and August.

According to EU Directive, the concentration of Mn above reference values meet in all sampling points that, during the months of April and August, while according U.A. Kosovo, exceeding the reference value of this metal, we found the river in Vragoli Graçanë.

Cu situation is different with the fact that the presence of this metal is not observed in any of the site-sampling, since his presence is below the limits of detection (bld), sampling location except 6, where the metal is presented in lower values than the standard values.

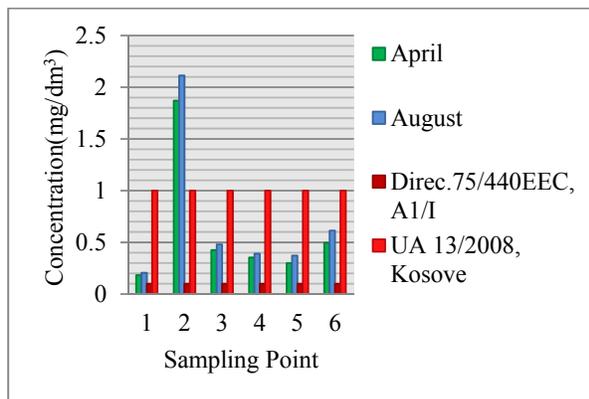


Figure-6. The concentration of Fe (mg/dm^3) by sampling place in April and August.

Fe results in excess of the reference values, according to EU Directive, in all sampling points that, while under U.A. Kosovo excess of normal values have found only 2 sampling.

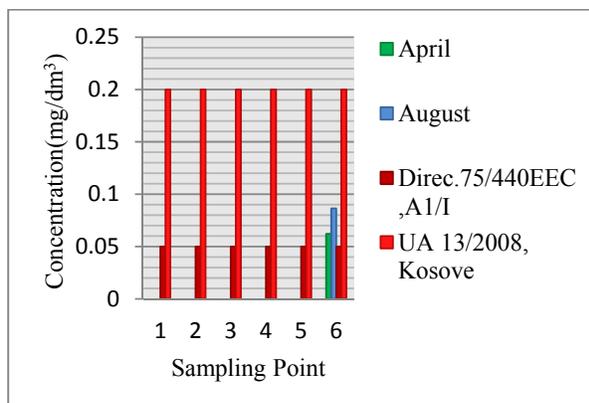


Figure-7. The concentration of Pb (mg/dm^3) by sampling place in April and August.

As with Cu Pb well, with the exception of sampling site 6 (Sitnica to PIM), where standard values, according to EU Directive have shown exceeded in any of the other site-sampling is not observed at the presence of this metal, since such a presence is below the limits of detection (bld).

CONCLUSIONS

During our work, we have managed to conclude that the concentration of heavy metals above reference value in the river Sitnica, occurred as a result of wastewater discharges polluting of industrial Mine Kishnica through river Graqankë, then industrial waters of Ferronikel through river Drenica; Prishtevka polluting waters, Kosovo Corporation Energy (KEK) Industrial Park in Mitrovica (PIM) and mine "Trepça".

Tabular results also show that pollution of the river Sitnica vary from one site-sampling to one another, from one season to another. This happens because the pollution resources of water Sitnica influenced by

industrial sources that are considered as potential water pollutants in largely subsistence, and in this case the water of river Sitnica.

Therefore, competent institutions of state it falls to take emergency action for placement of plants, mainly of rivers with them carry heavy metals and other pollutants, that river Graqankë Drenica, Prishtevkë, Sitnica from polluting rivers to turn in clean rivers.

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