Researched and analyzed variables for pollution waters around the "Kosova B" thermal power plant

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Summary
The energy corporation of Kosovo continuously monitors and analyzes the impact of its own activities on the environment. Regarding the environmental situation, energy corporation of Kosovo- ECK regularly informs and reports objectively to the competent state institutions, local municipal institutions and interested parties. ECK, through numerous contacts with the competent authorities, firstly with different ministers, harmonizes the positions regarding environmental issues in the direction of achieving certain environmental standards or legal requirements in order to gradually be in accordance with them, based on the real possibilities, especially the financial ones. From this point of view, the environmental issue is very sensitive, quite complex and represents one of the biggest challenges of society currently and in the future. The researched variables show a continuous increase in the need for electricity production in Kosovo and this increase in production conditions a wide range of environmental impacts both at the local, regional and global levels. The aim of the work is to reduce the emission of pollutants through the main variables without inhibiting the economic development of the country, i.e. to bring the pollution as a result of the activities of the ECK operation into compliance with the permitted environmental norms. As a result of ECK's operational activities, the following follows: Air pollution mainly as a result of emissions from TCs in the air, transport, etc. Water pollution - as a result of technological water discharges, Land degradation - as a result of surface mining activities of the entire mining area. The purpose of the paper is to research and analyze the main water variables in the area of the Kosova B power plant, which is to determine the degree of their pollution from the activities of the power plants, as well as to assess the real state of surface water quality and control the degree of pollution of these waters. Methodology of the work: The analyzes of the water samples were done in the company Institute "INKOS" JSC by simultaneous methods using different reagents.
Keywords:
Variables, Water, power plant B, pollution.

1. Introduction

Water is the environment in which life was born and without clean and healthy water there is no healthy life. Most of the rivers, especially in the developed countries of the world, have turned into sewage channels. Industrial and municipal sewage has exceeded the capacity of the waterways, so water is unable to break down these wastes. Large rivers in Europe carry tons of harmful substances (eg salts of heavy metals: mercury, lead, cadmium and cellulose pulp, oils, detergents, etc.), so they cannot be used for drinking and recreation. Awareness of water pollution, as well as the problem itself, has been around for a long time. Despite these early insights, pollution is the most important and current problem of today. The water is more polluted than before. Some large European rivers have become almost completely devoid of fish as a result of pollution, and the lack of fish is also an indicator of pollution.

Impurities in water are broken down by decomposers. However, if these processes are unnatural and the water is loaded with large amounts of harmful substances, the supply of dissolved oxygen is required due to the increase in oxidation processes. Because of this, the amount of oxygen needed by living beings (plants, fish, etc.) decreases. In the latter case, the lack of oxygen leads to the death of living things in the water and such water becomes dead. Only anaerobic bacteria can live in such water, which can live without oxygen. It is estimated that about 6 million tons of oil and its derivatives, 200,000 tons of lead compounds, 5,000 tons of mercury and large amounts of pesticides are released into the seas and oceans every year.

Pesticides, which produce about 25 thousand tons per year worldwide, and heavy metal salts have entered all food chains. It has been proven that the concentration of toxins increases through the links of food chains and since a person is at the bottom of these chains, he has most of these toxins. Today, the coastal seas in Europe (Mediterranean, Adriatic and Baltic), which constitute small closed ecosystems, are particularly polluted and endangered. The rivers that touch those seas bring tons of waste, pesticides, salts of heavy metals, detergents, etc.

Antibiotics are drugs used to control bacterial infections and are one of the most important groups of environmental pollutants. In Europe, the consumption of antibiotics of 10,200 tons per year has been recorded, mainly in veterinary medicine. It is increasingly being shown that currently available antibiotics are not sufficient to treat diseases caused by resistant bacteria and can

Manuscript received September 5, 2022
Manuscript revised September 20, 2022
https://doi.org/10.22937/IJCSNS.2022.22.9.17

potentially endanger an individual's health. Given the increasing extent of antibiotic contamination, there are currently various simple methods such as oxidation and somewhat more complex methods such as chlorination, ozonation, photolysis and photo catalysis that have proven successful in combating pollution. Due to the high cost, slowness and inefficiency, it is necessary to work on the development of new methods of antibiotic degradation. Antibiotic biodegradability tests show that most antibiotics are not degradable in the aquatic ecosystem. Recently, much attention has been paid to the identification and quantification of antibiotic resistance genes, which are proving to be important for the detection of antibiotic residues in the environment. Many studies have shown that antibiotic-resistant bacteria that threaten the aquatic life of rivers, such as the embryos of unicellular algae, shrimps, and multiply in an aquatic environment rich in antibiotics, disrupting the natural balance in the ecosystem.

The water we get from the water supply is treated with chlorine to kill germs, but when chlorine combines with organic substances that may be in the water, it creates a carcinogenic, health-threatening compound such as trihalomethane or chloroform. Water can be contaminated even after chlorine treatment. On the way from the central water supply to the tap of our home, the water can carry many other dangerous substances such as lead, manganese and even asbestos, which dissolved in the water can lead to severe poisoning. Elevated concentrations of various heavy metals, as well as organic solvents, such as trichloroethene and nitrite, were measured at many water pumping stations in Zagreb. What is even more worrying i`s the presence of pesticides.

Atrazine is a selective thiazine herbicide used to control broadleaf and narrow leaf weeds and is often the active ingredient in various herbicides. It enters the environment by spreading it on agricultural farms and unfortunately it is one of the most important pollutants of underground and surface water. In Croatia, atrazine has been used in agriculture as a poison approved by the Ministry of Health for decades, and some of this substance ends up in our waters. An example of the increase in the concentration of this herbicide appeared in the great affair of the polluted water in Vrban in Zagreb. Although the relevant authorities claimed that the effects of atrazine on humans have not been proven, some studies show that the substance can cause cancer in humans.

Regular consumption of water with high concentrations of arsenic is closely related to cardiovascular disease, high blood pressure and heart attacks, while higher concentrations (more than 50 micrograms per 1 liter of water) due to long-term use can lead to lung disease, skin, kidney and bladder cancer. Research shows that more than 120,000 people living in Slavonia are exposed to long-term consumption of arsenic in concentrations that in some areas are 10 times higher than allowed. These data are more than alarming.

There is almost no area where there is no pollution with heavy metals such as lead, mercury and cadmium, and these heavy metals have a very toxic effect and accumulate in the body. Some countries have practiced water fluoridation in water supply systems for many years in order to prevent tooth decay, especially in children. Although this procedure is supported by some scientists, opponents, including various civil associations, other scientists, as well as Nobel Prize winner for medicine Arvid Carlsson, warn of the harmful consequences of excessive use of fluoride. Consumption of fluoride-enriched water causes dental fluorosis, which leads to hypo mineralization and irregularity of the cells that make up tooth enamel, causing stains, discoloration, and weakening of children's teeth. The structure of the bones is also damaged, they become brittle and fragile, which eventually leads to osteoporosis. A recent study showed that bone cancer in children is closely related to fluoridated water, and hormonal disorders such as hypothyroidism are also possible. The countries that, despite the devastating statistics, have been fluoridating their water for years are: Australia, Canada, Brazil, South Africa, Singapore and Israel. [1], [2].

Water for PP-A and PP-B power plants

Power plant-PP "Kosova A" is supplied with raw water from the Llap River. while the PP "Kosova B" thermal power plant is supplied with raw water by the Hydro Economic Company "Ibër - Lepenc" JSC. Raw water is used as a raw material for steam recovery and as a cooling medium for equipment and thermal power plants. The amount of water used in thermal power plants for the benefit of technological steam and for cooling must first be subjected to the chemical process of processing, softening, respectively carbonization, flocculation, demineralization, degassing, and chemical conditioning. Only in this way, the prepared water can be used for the benefit of technological steam with allowable characteristics for turning the turbine. PP "Kosova A" is supplied with raw water from the Llap River, but also from the Hydro-Economic Enterprise "Ibër-Lepenc" JSC. in the period of the summer months (July, August, and September), a period of time when the flow of the Llap River decreases. During the year 2021 PP "Kosova A" spent: 7 598000 (m^3) of decarbonized water. PP "Kosova B", is supplied with raw water by the Hydro Economic Company "Ibër-Lepenc" JSC. During the year 2021, the PP "Kosova B" thermal power plant has spent about: 7522520 (m^3) of decarbonized water. In PP "Kosova A" and PP "Kosova B", the specific consumption of decarbonized water and demineralized water is lower, compared to last

year. There are exceedances of the specific consumption criteria for decarbonized water and demineralized water in PP-A and PP-B. In PP "Kosova A" the specific consumption of water is greater, compared to last year. While in PP "Kosova B" the specific consumption of water has recorded a small decrease, compared to last year.

Monitoring of water discharged from the "Kosova B" Thermal Power Plant

For all water flows coming out of ECK's industrial area, as well as at some points in the container, ECK has engaged the external contractor to do the monitoring. The contactor of KEK determines the quality of the discharged waters by analyzing the physic-chemical parameters and carrying out bacteriological analyzes (in accordance with Law No. 04/L-147 on Kosovo Waters, and according to UA No. 30/2014 - Discharges in surface water and discharges into the sewerage network). Also, ECK in some points also monitored the receivers (Sitnica and Drenica river), in order to verify their quality and assess the damage (eventual pollution) that can be caused by its own activities.

Water monitoring sites

The discharge waters from the area of TC "Kosova A" and TC "Kosova B" are analyzed in 11 sampling sites, while in the container the analyzes are done in three sampling sites. The discharge waters from TC "Kosova A" area are analyzed in 5 sampling sites, in the container the analyzes are done in two sampling sites, while the discharge waters from the TC "Kosova B" area are analyzed in 8 sampling sites, in the container the analyzes are done in two sampling sites, in all the waters discharged from TC "Kosova A" and TC "Kosova B" are subjected to weekly analyzes at 12 sampling sites, 14 parameters are determined, monthly analyzes at 12 sampling sites where 24 parameters are determined and periodic (seasonal) analyzes at 12 sampling sites and 35 parameters are determined. The Sitnica River is the main catchment for the discharge of surface water from thermal power plants.

2. Research variables and their results

Tab.1. The results of the analyzes of the first week of the January 2022 samples in the vicinity of the Kosova B Thermal Power Plant.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr	Variables (mg/l)	VMGJ 5 005/21	VMGJ 9 006/21	VMGJ10 007/21	VMGJ 12 008/21
1	Time	11.34	11.58	11.45	11.10
2	Wind	without	without	without	without
3	Color	poorly	without	poorly	without
4	Temperature (ºC)	8.0	9.9	7.9	6.5
5	Electrical conductors (µS/cm)	628	846	490	1841
6	The value of pH	7.58	7.68	7.65	8.21
7	Chlorides	65	226	46	50
8	Nitrites	5.8	7.9	5.9	6.3
9	Ammonium ion NH_4	2.36	1.31	1.90	0.97
10	O_2 dissolved	3.78	6.39	5.10	11.20
11	Sulphates	60	70	54	764
12	Suspended matter	178	24	69	42
13	Phenol	0.005	0.003	0.005	0.008
14	Total organic carbon	15.8	8.3	15.2	13.9

In this table, it can be seen that the amount of dissolved oxygen has increased from the allowed values in the sector of the catchment area near the ash deposit, because there the amount of dissolved oxygen is certainly reduced, that is, the value of the lack of oxygen increases as a result of the accumulation of many materials at this collection point, also according to research, it appears that the value of suspended materials has increased in the palaj (Sitnica river) from the allowed reference values.

Tab.2. The results of the analyzes of the second week of the samples in January 2022 in the vicinity of TC-B.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr	Variables (mg/l)	VMGJ 5 013/21	VMGJ 9 014/21	VMGJ10 015/21	VMGJ 12 016/21
1	Time	10.39	11.00	10.50	12.27
2	Wind	without	without	without	without
3	Color	poorly	without	poorly	without
4	Temperature (ºC)	3.5	4.3	4.2	6.1
5	Electrical conductors (µS/cm)	309	371	276	1895
6	The value of pH	8.21	8.12	8.20	8.74
7	Chlorides	39	40	38	60
8	Nitrites	1.2	0.7	0.9	1.4
9	Ammonium ion NH_4	0.52	0.40	0.48	0.72
10	O_2 dissolved	10.22	7.92	10.04	11.86
11	Sulphates	48	42	52	219
12	Suspended matter	121	57	134	45
13	Phenol	0.006	0.004	0.006	0.007
14	Total organic carbon	16.6	22.3	16.1	14.4

In this table, we see an increase in the amount of dissolved oxygen in the three locations in Palaj (Sitnica River), Plemetin, Sitnica River and the water catchment sector near the ash deposit near TC-B, while we notice an increase in suspended matter in the Plemetin location (in the river Sitnica) the other researched parameters are in the normal reference frames based on the administrative instruction 30/2014 on the discharge of polluted waters.

Tab.3. The results of the analyzes of the third week of the samples of the month of January 2022 in the vicinity of PPB.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr	Variables (mg/l)	VMGJ 5 024/21	VMGJ 9 025/21	VMGJ10 026/21	VMGJ 12 027/21
1	Time	13.38	14.24	14.36	14.25
2	Wind	without	without	without	without
3	Color	poorly	without	without	without
4	Temperature (ºC)	5.6	7.5	5.4	6.0
5	Electrical conductors (µS/cm)	708	809	642	2230
6	The value of pH	7.94	7.85	7.87	8.54
7	Chlorides	58	56	57	61
8	Nitrites	0.8	1.2	0.8	1.3
9	Ammonium ion NH_4	0.16	0.10	0,12	0.13
10	O_2 dissolved	9.23	6.71	9.91	12.30
11	Sulphates	71	68	79	378
12	Suspended matter	44	16	35	12
13	Phenol	0.011	0.007	0.012	0.013
14	Total organic carbon	9.8	16.1	9.7	11.6

Even in this table, we see an increase in the percentage of dissolved oxygen, as in the previous table, in the three polluted areas where the amount of dissolved oxygen has increased in Palaj, Plemet (in both places in the Sitnica River) and in the water catchment near the depot. thanks to PP-B.

Based on the monthly analysis, we come to the conclusion that we have an increase in the parameters of the electrical conductors from normal, also in the places of Mirash, the new ash depository and Mirash, the lagoon near the ash depository, and the pH value is also very high in Mirash, the new ash depository. cloud of grace The monthly analyzes show that in all the research sites we have increased amounts of the allowed values of dissolved oxygen, we also have an increase in the values of suspended matter from the allowed values also in the two researched sites of the technological waters of TC-B and in the final

output where we have a slight increase of these matters from normal values.

Tab. 4. The results of the analyzes of the first week of the samples of May 2022.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr	Variables (mg/l)	VMGJ 5 206/21	VMGJ 9 207/21	VMGJ10 208/21	VMGJ 12 209/21
1	Time	12.13	12.27	12.26	11.47
2	Wind	without	without	without	without
3	Color	without	poor	without	without
4	Temperature (ºC)	17,2	18.5	15.7	17.7
5	Electrical conductors (µS/cm)	685	509	627	2070
6	The value of pH	7.49	7.50	7.41	9.36
7	Chlorides	35	32	34	51
8	Nitrites	8.0	4.2	7.6	8.2
9	Ammonium ion NH_4	0.38	0.33	0.36	0,40
10	O_2 dissolved	2.14	4.70	2.08	8.12
11	Sulphates	60	41	61	506
12	Suspended matter	24	79	26	12
13	Phenol	0.009	0.011	0.010	0.012
14	Total organic carbon	12.8	8.9	12.2	10.4

Here it is seen that in the sector of the water collector near the ash deposit we have an increase in the value of electrical conductors, also in the same places we have a slight increase in pH, also in the final outlet we have a slight increase in the values of dissolved oxygen and also in the same place we have an increase in suspended matter.

Table 5. the results of the analyzes of the second week of the samples of the month of May 2022.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr	Time	VMGJ 5 214/21	VMGJ 9 215/21	VMGJ10 216/21	VMGJ 12 217/21
1	Wind	12.10	12.27	12.35	10.48
2	Color	without	without	without	without
3	Temperature (ºC)	without	Poor	without	without
4	Electrical conductors (µS/cm)	20.3	28.1	18.4	19.3
5	The value of pH	784	353	657	2070
6	Chlorides	8.34	8.04	8.27	9.34
7	Nitrites	48	38	41	52
8	Ammonium ion NH_4	8.8	3.4	6.7	8.7
9	O_2 dissolved	0.10	0.21	0.15	0.24
10	Sulphates	3.90	9.65	4.12	8.48
11	Suspended matter	74	36	68	510
12	Phenol	32	75	14	6
13	Total organic carbon	0.008	0.006	0.009	0.011
14	Karboni total organic	11.6	8.6	12.9	9.9

Here it is seen that in the sector of the water collector near the ash deposit we have an increase in the value of electrical conductors, also in the same places we have a slight increase in pH, we also have an increase in the values of dissolved oxygen also in the final output of TC-B, Plemetin (Sitnica River) and Sitnice water catchment near the ash depot. We also have an increase in suspended matter at the final outlet of the TCB.

Tab. 6. the results of the analyzes of the third week of the samples of May 2022.

Sampling places		*Palaj (Sitnica river)*	*PP B Output final*	*Plemetin (Sitnica river)*	*The water supply sector The crowd near the depot Please*
Nr		VMGJ 5 228/21	VMGJ 9 229/21	VMGJ10 230/21	VMGJ 12 231/21
1	Time	10.15	10.41	10.50	8.48
2	Color	Poor	without	poor	without
3	Temperature (ºC)	Poor	Poor	without	without
4	Electrical conductors (µS/cm)	15.4	18.8	15.9	16.4
5	The value of pH	697	510	665	2160
6	Chlorides	7.77	8.27	7.76	9.46
7	Nitrites	42	80	40	48
8	Ammonium ion NH_4	32.7	11.2	6.8	9.4
9	O_2 dissolved	0.64	0.32	0.28	0.32
10	Sulphates	1.01	6.08	1.97	7.31
11	Suspended matter	75	52	76	576
12	Phenol	211	57	85	9
13	Total organic carbon	0.011	0.018	0.012	0.014
14	Carbonic total organic	30.9	8.2	28.5	10.2

Here too, it can be seen that in the sector of the catchment area near the ash deposit we have an increase in the value of electrical conductors, also in the same places we have a slight increase in pH, and on both sides we have an increase in the parameters of suspended matter as well that in the village of Palaj (Sitnica river) and also an easy hike in Plemet (Sitnica river).

Here we have an increase in the values of suspended matter, also in TCB Mirash, the new ash warehouse, and in the lagoon near the ash warehouse, also in Mirash, the new ash warehouse, we have an increase in the Ph value. we also have an increase in dissolved oxygen values in the east warehouse as well as a slight increase in the final output. As for the suspended matter, we have an increase in the parameters in three locations from the reference values, including that in the technological waters, at the final exit and the new ash depot.

Tab.7.Limits allowed according to administrative instruction no. 30/2014 in the Republic of Kosovo for the discharge of polluted waters.

No. ordinal	*Variable*	*Units*	*Discharges into water's surface*	*Discharges to sewer network*
1	time (h)			
2	wind		Don't cause problems	Don't cause problems
3	Color		without	without
4	The temperature	ºC	-	-
5	Through. eLECTRIC	µSv/cm	-	-
6	pH value	-	6.5-9	5.5 -9
7	chlorides	mg/l	250	1000
8	nitrites	mg/l	20	50
9	nitrites	mg/l	0.6	1.0
10	Ammonium ion.NH_4	mg/l	10	30
11	Dissolved oxygen	mg/l		-
12	sulphates	mg/l	400	100
13	Matter. suspended	mg/l	35-60	300
14	Phenol	mg/l	0.01	1.0
15	Total org carbon.	mg/l	-	-
16	Phosphates	mg/l	-	-
17	$KmnO_4$	mg/l	-	-
18	Bicarbonates	mg/l	-	-

Conclusions

- The amount of dissolved oxygen has increased from the values allowed in the sector of the catchment area near the ash deposit from the reference values allowed during the first week of research in January
- according to research, it appears that the value of suspended matter has increased in the river (Sitnica river) from the reference values allowed during the first week of research in January.
- Based on the monthly analysis, we come to the conclusion that we have an increase in the parameters of the electrical conductors from the normal, also in the places of the new ash depot and the lagoon near the ash depot.
- in the sector of Sitnica, the water collector near the ash deposit, we have an increase in the value of electrical conductors, also in the same places we have a slight increase in pH, this is shown in the monthly table for the month of January.
- the pH value is very high in Mirash, the new ash deposit. The monthly analyzes show that in all the research sites we have increased amounts of allowed values of dissolved oxygen.

- the increase in the values of suspended matter from the allowed values also in the two researched places of the technological waters of TC-B and at the final outlet where we have a slight increase of these matters from the normal values.
- here we have an increase in the values of suspended matter also in TC-B Mirash, the new ash depot and Mirash in the lagoon near the ash depot.
- In Mirash, the new ash deposit, we have an increase in the Ph value. we also have an increase in dissolved oxygen values in the east warehouse as well as a slight increase in the final output.
- As for suspended matter, we have an increase in the parameters in three locations from the reference values, including that in the technological waters, in the final outlet and in the new ash depository.
- all these parameters changed from the normal values are as a result of the work of the Kosova B thermal power plant and the release of the materials that contribute to the changes of the researched reference parameters.

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