DETERMINATION OF PHYSICO-CHEMICAL PARAMETERS OF WATER IN BIOLOGICAL MINIMUM IN THE LAKE ”RADONIQ”

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Abstract

Artificial lake of Radoniqi is raised in dam of river Përrua in north of the town of Gjakova , in village Radoniq , main source of supply with water is “Lumbardhi i Deçanit” it secure with water near 90%.Goal of this study was to analyzed concentration of physical parameters, chemical and metals in the water of Lake Radoniq and their impact on water quality. Rating of physical parameters, chemical and metal is important to determining the environmental condition of waters. The general content of metals, organic substances in water provides valuable information not only for the general level of pollution in the water, but also helps in determining the pollutant source.In this study that has been done over the years 2011,2012, has been presented results of physical-chemical parameters and metals like: Fe,Pb,Zn,Al in the water of Lake Radoniqi that after treatment this water is used for human consume.

The results that has been obtained show that the water of the lake "Radoniq" is water with good quality , but the presence of some metals such as Cd, Pb, Zn, etc. in the lake water makes us think about their sources and to search for a better solution. Therefore required continuous monitoring and deeper analyze for quality of water. Certainly water needs to be treated in technological process so it can be used for human consume.

Biological minimum is designed under the lake, where water discharges collected from all seen that certain parameters of water quality by biological minimum is almost the same features as the lake naturally seen a lower presence of dissolved oxygen , what is more than normal because of the depth of approximately - 68 m. Therefore, it requires continuous monitoring and deeper analysis of water quality.

Keywords: Metals,water, method, analyzis, lake, parameters.

Introduction

Water is a natural resource with limited and uneven distribution in time and space. All forms of life and all human activities are dependent on water. Water resources are of great importance to human life and economy and are the main source of meeting the demand for drinking water, for irrigation of lands and industries. Lack of water is considered as a limiting factor of socio-economic development of a country.

Modern industrial development and urbanization have resulted in the formation of large urban areas, industrial zones and the development of intensive agriculture. This has increased the need for water, but also the growth of urban and industrial discharges into rivers

without any prior treatment, thereby reducing the possibility of self-purification (auto purification) of water.

The need for clean water, today is considered as one of the biggest problems the global environment. Currently, more than 1.2 billion people worldwide have no access to drinking water while some 3 billion people (half the world's population) do not have adequate sanitation services. More than 200 diseases are originating from contaminated water and about 6,000 people a day lose their lives just by diarrheic diseases.

According to the World Health Organization, an estimated 5 million people die each year from the consumption of contaminated water. Considering the current trend of urbanization in the world by 2025, nearly 3 billion people will need water supply and more than 4 billion for access to sanitation. In Kosovo, as in many countries, human health and meeting their needs is increasingly threatened by the poor quality or lack of clean water.

Material and methods

In order to determine the physico- chemical analysis and heavy metals in biological minimum lake " Radoniq ".Samples for water analysis has been tested in water are inorganic analytical laboratory RWC " Radoniq ." For this purpose the method is implemented : by atomic absorption spectrophotometers SAA , Perkin ELMMER , NOVA60 photometer Merck , titrimetrike method , gravimetric etc . Samples of water are taken in bottle of 1000 ml, bottle was from polyethylene well cleaned,transport and storage of samples are done with little refrigerator for saving temperature between 4-7°C.

Samples of water are brought immediately in laboratory to analyze. The physical parameters that has been analyzed are: Temperature, Turbulence, Value of pH, Electrical conductivity these parameters has been rated in the place where samples has been taken through mobile device.

Water samples were taken in the lake at the bottom of the lake or biological minimum depth of - 68 m .

Water samples were taken in 1000 ml bottle cleaned well initially , and immediate, are brought into the lab to analyze these parameters analizired : Spending KMnO4 , Nitrites , Nitrates , Sulphates , phosphates , metals such as Fe,Mn,Pb , Cd , Zn , Cu , , etc. . Where were analyzed by atomic absorption spectrophotometry with SAA who previously do by elements required calibration and wavelengths of each element , in terms of other parameters such as temperature , turbidity , pH value , conductivity , dissolved oxygen , scaled in sampling site with portable devices .

Table 1. Results of physico-chemical analysis of water-in Biological Minimum Analyzed in 2011.

Parameters	**Units**	**Results**	**Standards**
Temperature	^{0}C	**5.9**	
Turbidity	- NTU	**2,03**	ISO 7027:1999

Vlera-pH	-	**8,19**	ISO 10523:2008
Calcium	mg/l	**40,6**	ISO 6059:1984
Magnesium	mg/l	**5.8**	ISO6059:1984
Iron	mg/l	**0.04**	ISO 6333:1986
Manganese	mg/l	**0.064**	ISO6333:1986
Nitrogen Amonia	mg/l	**0.86**	ISO 6333:1986
Chlorides	mval/l	**1.5**	ISO 9297:1989
Nitrates	ºdH	**0.9**	ISO 7890-2:1988
Sulphates	ºdH	**7.9**	ISO 9280:2000
Phosphates	ºdH	**0.04**	ISO 6878:2004
Dissolved Oxygen	mg/l	**6.2**	ISO 5814:1990
ExpenseKMnO4	mg/l	**4.16**	ISO 8467:1993
Lead	mg/l	**0.001**	APHA 3111B
Cadmium	mg/l	**<0.005**	APHA 3111 B
Chromium	mg/l	**0.001**	APHA 3111 B
Cuprum	mg/l	**<0.1**	APHA 3111 B
Nickel	mg/l	**0.001**	APHA 3111B
Zinc	mg/l	**0.02**	APHA 3111 B

	2011
Temperature	5.9
Turbidity	2.03
pH value	8.19

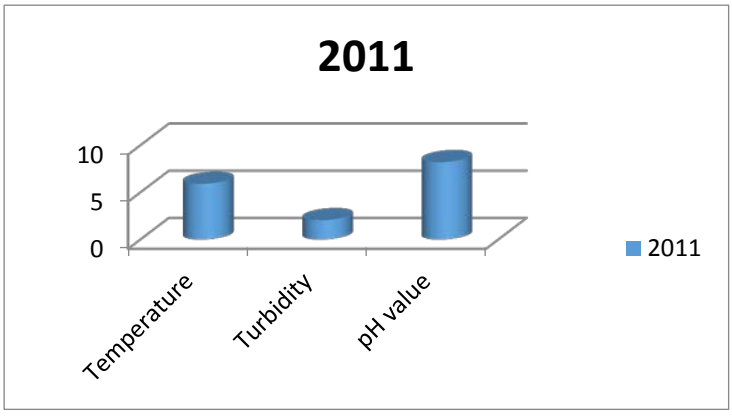

Figura 1. values of physical parameters of water

Expense KMnO4	4.16
Dissolved oksygen	6.2
Fe	0.04

Mn	0.064

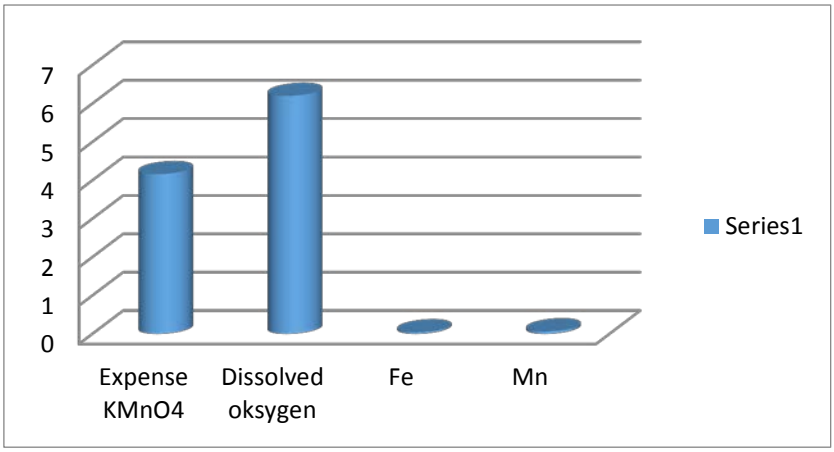

Figure 2. values of chemical parameters of water

Table 2. Results of physico-chemical analysis of water-
In Biological minimum,analyzed in 2012

Parameters	Units	Results
Temperature	^0C	**5.7**
Odor	-	**Pa**
Taste	-	**pa**
Color	Co-Pt scale	**Pa**
Turbidity	NTU	**2.83**
Ph value	-	**7.86**
Expense $KmnO_4$	mg/dm^3O_2	**3.68**
Conductivity	$\mu s/cm^2$	**172**
M-alkality	mval/l	**22.5**
Total Hardness	^{o}dH	**6.58**
Ca	^{o}dH	**5.88**
Magnesium	^{o}dH	**0.7**
Dry residue.	mg/dm^3	**123.2**
CO_2	mg/dm^3	**4.95**
Chlorides	mg/dm^3 Cl	**4.89**
Dissolved Oksigen	mg/dm^3 O_2	**6.4**
Iron	mg/dm^3 Fe	**0.08**
Manganese	mg/dm^3Mn	**0.06**
Nitrogen Amonia	mg/dm^3 NH_3-N	**0.09**
Nitrites N-NO_2^-	mg/dm^3 NO_2-N	**0.0045**
Nitrates N-NO_3^-	mg/dm^3 NO_3-N	**<0.6**
Sulphates SO_4^{2-}	mg/dm^3 SO_4	**16.5**
Phosphates PO_4	mg/dm^3 PO_4	**<0.05**

Year	2012
Temperature	5.7
Turbidity	2.83
pH value	7.86

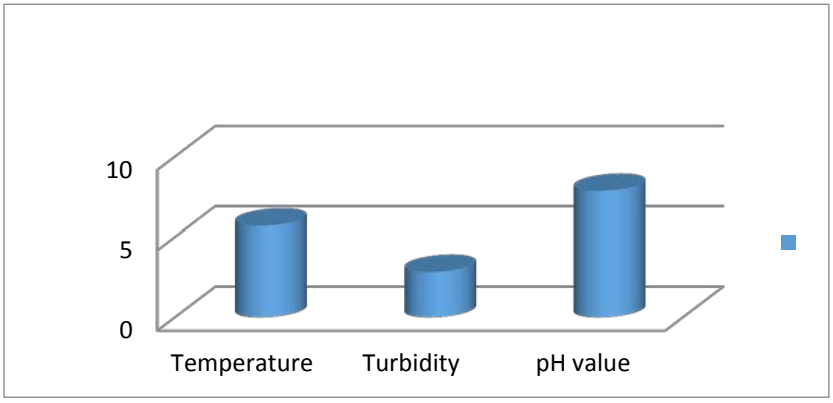

Figure 4. values of physical parameters of water

Expense $KMnO_4$	3.68
Dissolved Okxigen	6.4
Fe	0.08
Mn	0.06

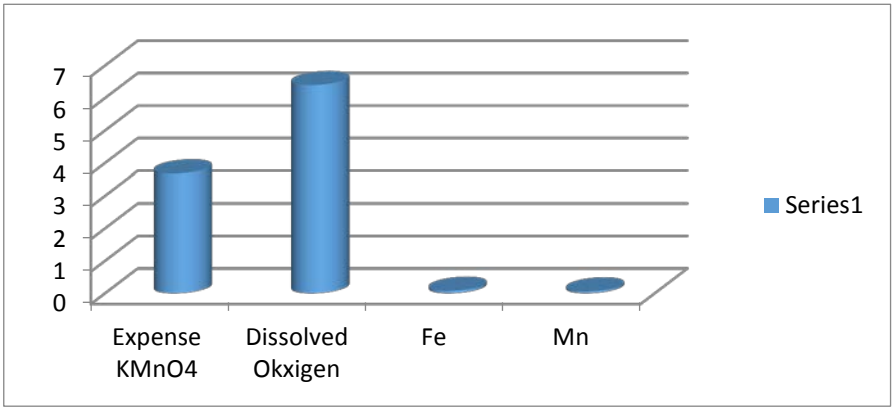

Figure 5. values of chemical parameters of water

Table 3. Results of physico-chemical analysis of water-
In Biological minimum,analyzed in 2013

Parameters	Units	Results
Temperature	^{o} C	7.5
Turbidity	NTu	0.67
Taste		pa
Ph value		7.70
Expense $KmnO_4$	mg/dm^3	5.37
Conductivity	µS/cm	207.0

M-alkality	mval/dm^3	22.5
Total Hardness	^{o} dH	7.28
Ca	^{o} dH	5.46
Magnezium	^{o} dH	1.82
Dry residue.	mg/dm^3	124.2
Chlorides	mg/dm^3	4.25
Dissolved Oksigen	mg/dm^3	7.8
Iron	mg/dm^3	0.02
Manganese	mg/dm^3	0.022
Nitrogen Amonia	mg/dm^3	0.05
Nitrites $N\text{-}NO_2^-$	mg/dm^3	0.003
Nitrates $N\text{-}NO_3^-$	mg/dm^3	0.6
Sulphates SO_4^{2-}	mg/dm^3	15
Phosphates PO_4	mg/dm^3	0.6

Parameters	Results
Temperature	7.5
Turbidity	0.67
pH value	7.7

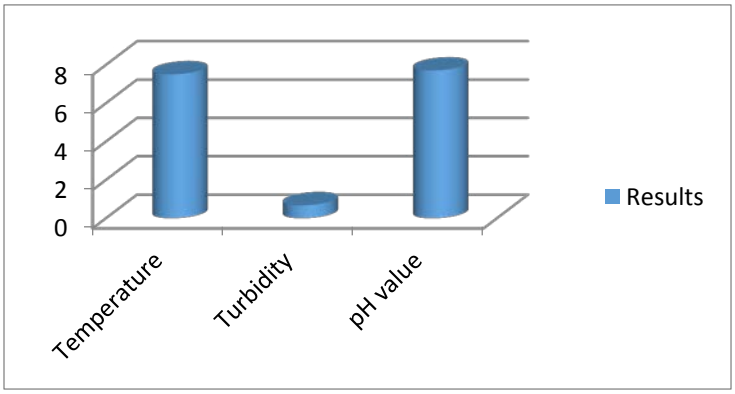

Figure 5. values of physical parameters of water

Parameters	Results
Expense KMnO4	5.37
Dissolved oksigen	7.8
Fe	0.022
Amonium N-NH3	0.05

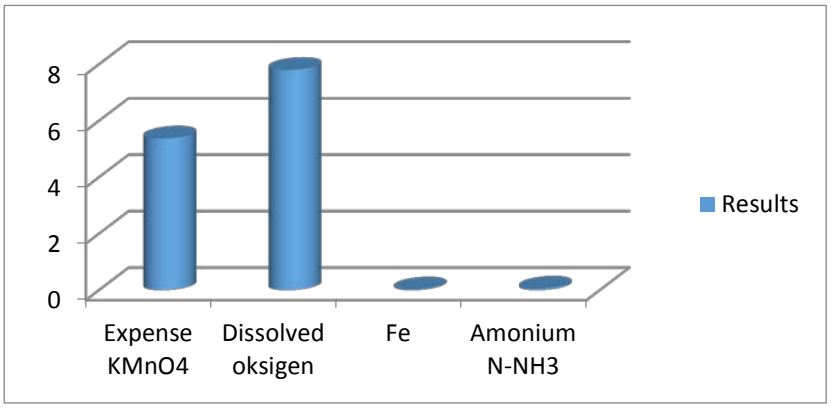

Figure 6. values of chemical parameters of water

Conclusion

The results of water analysis conducted during 2011,2012 and 2013 in the waters of Lake " Radoniq" show fluctuations of physical and chemical parameters, starting with the temperature, which during the month of February 2011 we have a reduction in temperature of up to 5,7 ºC, while during July and August there's an increase up to 7.5 ºC, which is normal and it varies by seasons of the year .

Turbidity: the water in Lake shows growth during months of April, May, June, because of the water flow when the turbidity is around 2.03 NTU, and in May and Jun it goes up to 3.67 NTU. This change is a result of high water flow to bring Lumbardhi of Decan terms of turbidity of water in biological minimum it shows an increase especially when large flow of water from melting snow and rainfall from turbidity have and change which is also observed in biological minimum or end of the lake a depth of -68 mPH value: It is the most important parameter because this parameter regulates the balance of CO_2 and water carbonates, and this parameter shows how the water will be treated. PH value parameter in our case is 7.86 to 7.70, and is within standard for drinking water .

Nitrites and phosphates show a gradual increase especially during the months of April, May and June as a result of uncontrolled discharges made by population along the canal for water supply to the lake.

The presence of organic matter such as potassium permanganate spending, it's within the normal limits.

Also, the metals Fe, Mn, Zn, Al, Pb,Cd,Cu are within the permissible limits for drinking water, which means that what we are dealing with a good quality water, but such waters need further treatment in the technological process and special attention be paid to process of Floculation, coagulation,decantation, filtration and chlorination of water to eliminate the bacteria that are present in the lake water Radoniq. These processes are implemented promptly and with great success in water treatment Plant in RWC "Radoniq " in order to offer consumers the best quality water.

References:

Bozho Dalmacija Kontrolla kvaliteta voda, Novi Sad 2000.
Savezni zavod za zdravstvenu zashtitu-Voda za pice, Beograd 1990.
D.T.E. Hunt. A.L. Wilson-The chemical Analysis of water 1995.
Voda za pice,standardne metode za ispitivanje higijenske ispravnosti,Beograd,1990
Standards methods for the Examination of Water and Wastewater, P 506-508 A, 20 th Edition1998.

J.W.Moore,S, ramamoorty, heavy metals in natural waters, Moskva,1987
Cullaj,A,Metodat instrumentale të analizës kimike.Shtëpi botuese e librit universitar, Tirane.(232-237).(2004).
WHO, 1984. Guidelines for Drinking Water Quality
Health Criteria and other Supporting Information. Vol. 2.
Quevauviller et al;1992
Korca B. Analizat kimike e ujit ,Prishtinë, (185-192), 2001.