



EVALUATION OF SOME LAKES IN DUMRE-DARSIA PLATEAU FROM THE COLIFORM POLLUTION POINT OF VIEW

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SYNOPSIS

Key words:

ecosystem,
Dumre-Darsia
plateau,
coliform bacteria,
wastewater,
coliform pollution.

The aim of this paper is to present the evaluation of some lakes in Dumre-Darsia plateau based on some bacteriological and physic-chemical data. These data, registered during the summers of the years 2007, 2008 and 2009 clearly show a very high coliform pollution level in Belshi Lake and a tendency on the increase of this level in both, Belshi and Merhoja lake.

INTRODUCTION

Belshi and Merhoja Lake are two of 80 natural lakes situated in Dumre-Darsia plateau in the district of Elbasan. They are typical carstic lake. Belshi Lake is in the height of 160 m above the sea level and has a surface about 29,6 ha and a deepness of 7 meters. whereas Merhoja Lake is in the height 118 m above the sea level and has a surface of 65.5 ha and a deepness of 61 m. (Pano et al., 1985). Both these two lakes are used by the habitants around them and tourists for fishing, swimming and irrigation. Belshi town is situated around the Belshi Lake and has a population around 4 thousand habitants. The big demographic changes are happening these two last decades around Belshi area which are following by a number increase of private and public buildings. But unfortunately this process is carried out without any criteria, followed by major damage of the vegetation around the lakeshore, continuous discharge of the wastewater and other remains into the lake in the conditions of a total absence of a managing system of treatment. During the year 2009 some good actions are carried out on the management on some parts of the area around the Belshi Lake which were absent during 2008 and 2007. A totally different situation exists around the Merhoja Lake. Some new private houses are built around 200 m far from the lakeshore.

The studies started with the purpose to compare some data regarding to the coliform pollution level in both two lakes during the summers of years 2007, 2008 and 2009. These data show clearly the tendency on the increase of the coliform pollution level in both two lakes and also some of them are some times higher compared with international standards.

MATERIALS AND METHODS

This study was carried out during the summers of 2007, 2008 and 2009 in the laboratory of microbiology in the University of Elbasan. The sample stations are determined with the help of the G.P.S ALAN MAP 500 device.

Table 1: Co-ordinates of the sample stations.

Stations	Height	N (North)	E (East)
1 Merhoja Lake	118 m	40° 56' 00.87"	19° 52' 03.75"
2 Merhoja Lake	118 m	40° 56' 07.05"	19° 52' 01.51"
1 Belshi Lake	160 m	40° 58' 34.10"	19° 53' 23.51"
2 Belshi Lake	160 m	40° 58' 48.91"	19° 53' 25.63"

This study is focused on the measure of the coliform level pollution on the littoral surface waters of Belshi and Merhoja Lake. The oxygen level, pH and temperature has been determined with the W.T.W, pH/cont 340 I device. Collecting the water samples is carried out with sterile bottles with a volume around 300 ml. The samples were transported by portable fridges which provided temperatures lower than 5 ° C. The work method was based on the standard methods for the examination of the surface and polluted waters, APHA (1988). The method of the technique with a filter membrane in the Standard TTC-NutriDisk (10434164) with Tripheniltetrazoliumchloride link by Whatman Scheilder and Schuell is used for the determining of heterotrophic bacteria. The determining of the total coliforms was carried out with the same technique of the filter membrane respectively in the EndoNutriDisk (10434162)(Oehme & Schuler, 1983).

Table 2: Microbiological standards of bathing water quality (Directive 2006/7/EC).

Inland waters	Nr	Microbiological Parameters	Guideline	Alert level
	1	Total coliforms /100ml	500	10 000
	2	Escherichia coli (cfu/100ml)	100	2 000
	3	Feacal streptococci/100 ml	100	-

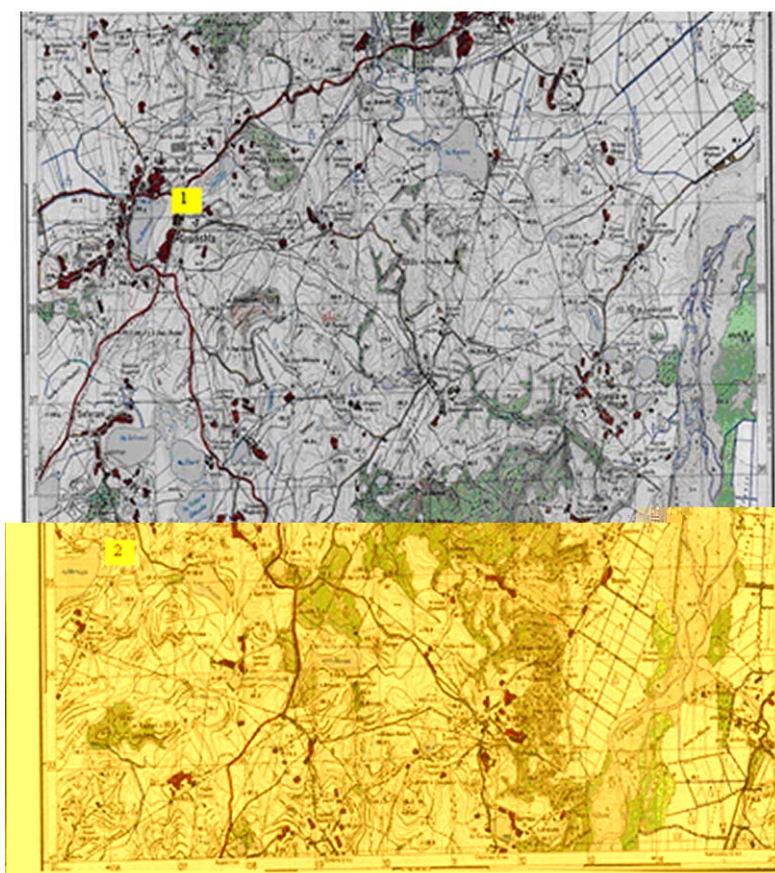


Figure 1: Dumre - Darsia Plateau Topographic Map (1 : 25000)
1. Belshi Lake., 2. Merhoja Lake.

RESULTS AND DISCUSSIONS

The data show clearly the tendency on the increase of the coliform pollution level during three years. The higher values are registered on august 2009 in both two stations. (Tab. 3, 4, 5 and Fig. 2 and 3). They are several times higher compared with those taken in august 2007 and 2008, MALI (2008).

Based on the number of hererotrofs the Merhoja Lake is oligotrophic. The comparison of the data registered in Merhaja Lake during two periods of study with the international standards show that this Lake has water with high quality from the coliform pollution point of view except during the August 2009 in both two sampling stations. The main sources of this kind of pollution are varies, for example farm animals, pets, wild animals etc., OSAWA et al. (1981). The discharging of wastewater does not exist in Merhoja Lake. Comparing the water of this lake with the microbiological standards of bathing water quality (EEC, 1996) in some sides it has a high quality.

Table 3: Physico - chemical and bacteriological data of Merhoja Lake.

Date	Stations	T(°C)	pH	O ₂ mg/l	Heterotrophs /100ml water	Coliforms total/100ml water
20.07.07	1	30	8.33	9.3	2600	120
18.08.07	1	29.5	8.56	9.1	2400	200
23.09.07	1	25.2	8.34	9.7	2500	180
27.07.08	1	29.2	8.32	9.6	2800	220
26.08.08	1	29.6	8.64	8.8	3200	280
18.09.08	1	24.5	8.20	9.8	4600	260
29.07.09	1	28.5	8.45	9.2	4000	720
27.08.09	1	29.3	8.52	8.5	9000	1460
26.09.09	1	24.1	8.02	10.8	22000	900
20.07.07	2	29.8	8.23	8.36	4300	210
18.08.07	2	29.5	8.20	8.85	5600	250
23.09.07	2	26.2	8.54	9.5	5800	230
27.07.08	2	30.0	8.30	8.12	5400	360
26.08.08	2	31.0	8.30	8.15	6800	300
18.09.08	2	25.2	8.35	9.7	9400	320
29.07.09	2	28.3	8.57	9.4	10000	500
27.08.09	2	29.3	8.52	8.6	17000	1300
26.09.09	2	24.3	8.02	10.9	36000	700

Table 4: Coliform data of Merhoja Lake (station 1).

Date of sampling	20.07. 2007	18.08. 2007	23.09. 2007	27.07. 2008	26.08. 2008	18.09. 2008	29.07. 2009	27.08. 2009	26.09. 2009
Coliform total bact/ 100 ml water	120	200	180	220	280	260	720	1460	900

Table 5: Coliform data of Merhoja Lake (station 2).

Date of sampling	20.07. 2007	18.08. 2007	23.09. 2007	27.07. 2008	26.08. 2008	18.09. 2008	29.07. 2009	27.08. 2009	26.09. 2009
Coliform total bact/ 100 ml water	210	250	230	360	300	320	500	1300	700

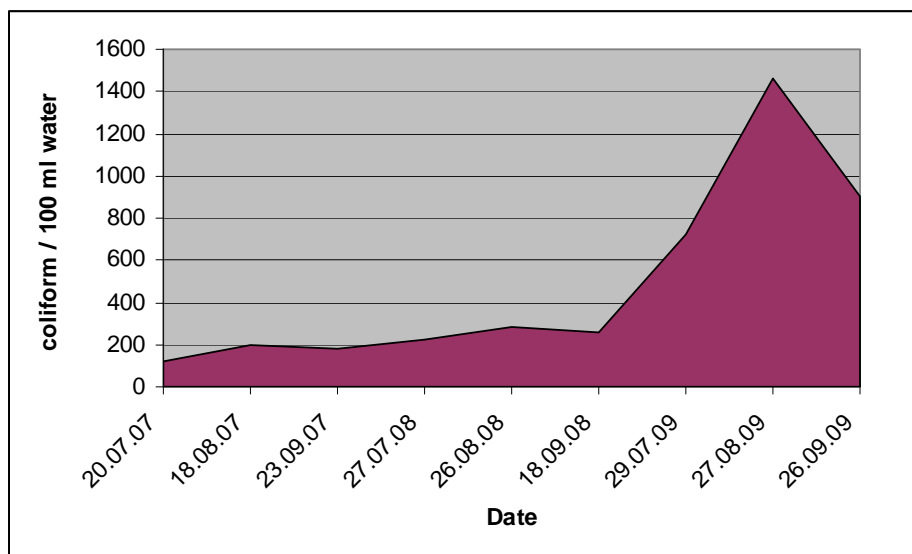


Figure 2: Coliform data of Merhoja Lake (station 1).

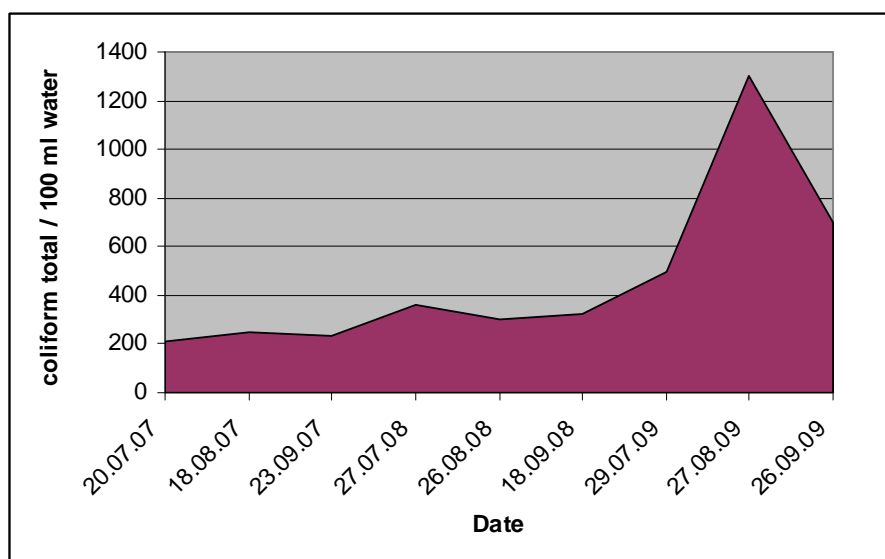


Figure 3: Coliform data of Merhoja Lake (station 2).

Table 6: Physico - chemical and bacteriological data of Belshi Lake.

Date	Stations	T(°C)	pH	O ₂ mg/l	Heterotrophs /100ml water	Coliforms total/100ml water
20.07.07	1	28.0	8.20	8.73	134000	13200
18.08.07	1	28.5	8.30	8.24	250000	24000
23.09.07	1	24.5	8.50	8.85	180000	16000
27.07.08	1	29.0	7.50	8.55	124500	18300

26.08.08	1	26.0	8.40	8.40	84000	16200
18.09.08	1	24.0	8.35	8.70	76000	14400
29.07.09	1	28.8	8.92	9.40	25000	10200
27.08.09	1	30.1.	8.61	8.60	43000	13000
26.09.09	1	23.7	8.15	10.70	64000	10200
20.07.07	2	28.0	8.20	8.32	330000	43000
18.08.07	2	26.0	8.24	8.30	234000	36000
23.09.07	2	24.5	8.36	8.60	210000	23000
27.07.08	2	30.0	7.90	8.15	440000	64300
26.08.08	2	26.5	8.20	8.35	189300	32400
18.09.08	2	25.6	8.30	8.55	226000	23600
29.07.09	2	29.5	8.74	8.7	220000	31000
27.08.09	2	31.3	8.36	8.4	54000	46400
26.09.09	2	22.6	8.13	9.4	117000	35700

Table 7: Coliform data of Belshi Lake (station 1).

Date of sampling	20.07.2007	18.08.2007	23.09.2007	27.07.2008	26.08.2008	18.09.2008	29.07.2009	27.08.2009	26.09.2009
Coliform total bact/ 100 ml water	13200	24000	16000	18300	16200	14400	10200	13000	10200

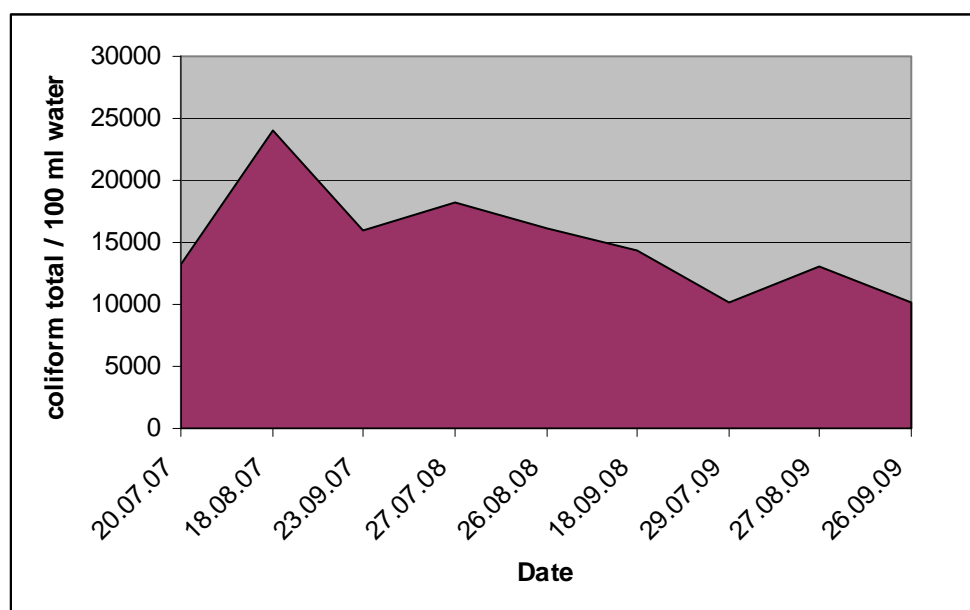


Figure 4: Coliform data of Belshi Lake (station 1).

Table 8: Coliform data of Belshi Lake (station 2).

Date of sampling	20.07.2007	18.08.2007	23.09.2007	27.07.2008	26.08.2008	18.09.2008	29.07.2009	27.08.2009	26.09.2009
Coliform total bact/ 100 ml water	43000	36000	23000	64300	32400	23600	31000	46400	35700

According to the coliform pollution level in station 1 the higher value is registered during august 2007. The comparison of these data taken on august 2007 with data registered on august 2008 and 2009 show clearly the decrease of the level coliform pollution (Tab. 7 and Fig. 4). The reason of this decrease is a good management of the area around the station 1, even though they are some times higher the international standards.

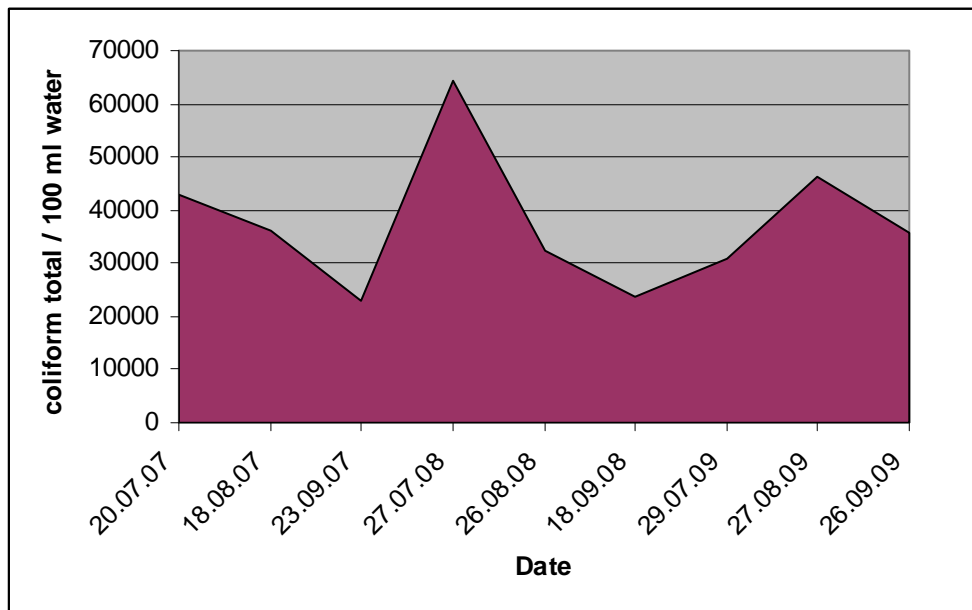


Figure 5: Coliform data of Belshi Lake (station 2).

High temperature is a factor which makes possible to coliforms bacteria to live some weeks in the water, McCoy (1971). The higher results of coliforms bacteria registered in the different sources of wastewater in USA are 150000 / 100 ml water, BOUND & STRAUB (1980). The data presented in table 8 and figures 5 belong to station 2 of Belshi Lake. Based on the pollution level caused by coliforms comparing with international standards Belshi Lake is very polluted, especially in station 2. EEC (1996). These data show that from the presence of heterotrophs point of view, this lake is mesotrophic, between classes. The data given by the other authors clearly

proves that some of those are approximate with them but the mostly are lower. For example these values are approximate with values registered in the Kariba Lake in the Zimbabwe, 40400 coliforms bacteria /100 ml water, MAGADZA & DHLOMO (1996) and with those registered in the Albanian littoral of Ohrid lake in 1998, 46000 coliforms bacteria / 100 ml water), MALI (2009). Comparing of these results they are higher than the data registered in summer 1997 in the Macedonian littoral of Ohrid Lake 2400 / 100ml, NOVEVSKA (1998).

CONCLUSIONS

Comparing with international standards in some parts of Merhoja Lake there is a high water quality from the coliform pollution point of view, but in some other parts there is a tendency on the increase of the coliform pollution level.

The main cause of the increase of the coliform pollution level is the absence of the garbage management and other remains on the area around it.

According to the international standards the coliform pollution level of Belshi Lake is very high during the period of study 2007, 2008 to 2009.

The main source of the coliform pollution on Belshi Lake is the discharge of the wastewater and different kinds of garbage into the lake. In this condition it's water can not be used for different public and private aims. Analyzing the causes of the coliform pollution in both lakes points out the immediately complex intervention in order to protect these aquatic ecosystems.

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