RESEARCHES ON THE ALGOFLORA OF LAKE OSTROVENI (VÂLCEA COUNTY)

CERCETĂRI PRIVIND ALGOFLORA LACULUI OSTROVENI (JUDEŢUL VÂLCEA)

DOBRESCU Codruţa-Mihaela, SOARE Liliana-Cristina
University of Piteşti, Faculty of Sciences, Romania

Abstract. *Lake Ostroveni was formed in 1977. After the building of the Râmnicu Vâlcea dam, Goranu, a former arm of the Olt river started to silt up upstream, while, downstream, the dam of the hydropower lake at Râureni closed it completely, and for nearly three years the lake served as a basin collecting the waste waters of the city of Râmnicu Vâlcea. Lake Ostroveni is not even today recorded by the database of the Vâlcea County Agency for the Protection of the Environment, so the results we have obtained in consequence of the present study can be used as a starting point for subsequent ecological researches. Water samples were taken from representative areas. The phytoplankton community was studied. Following the processing of the samples, 32 species were identified, grouped in 25 planktonic genera; the data obtained are essential for evaluating the trophic state of Lake Ostroveni.*

Key words: Vâlcea County, Ostroveni Lake, phytoplankton, diversity

Rezumat. *Lacul Ostroveni s-a format în anul 1977. După îndiguirea de la Rm. Vâlcea, Goranu, un fost braţ al râului Olt, a început să se colmateze spre amonte, iar în aval digul lacului de acumulare de la Râureni l-a închis complet. Timp de aproape trei ani lacul a servit drept bazin de colectare a apelor uzate ale municipiului Rm. Vâlcea. Nici în prezent lacul Ostroveni nu este în evidenţa Agenţiei Judeţene Pentru Protecţia Mediului Vâlcea, iar rezultatele obţinute de noi în urma acestui studiu pot constitui o bază de plecare pentru cercetări ecologice ulterioare. S-au prelevat probe de apă din secţiuni reprezentative. S-a studiat comunitatea fitoplanctonică. În urma prelucrării probelor, s-au identificat 32 de specii grupate în 25 de genuri planctonice datele fiind esenţiale pentru evaluarea stadiului trofic al lacului Ostroveni.*

Cuvinte cheie: Judeţul Vâlcea, Lacul Ostroveni, fitoplancton, diversitate

INTRODUCTION

Olt River has the largest hydrographic basin from our country with a length of 615 km and a reception area of the basin of 24050 Km and is the main shaft of the Vâlcea County which goes from north to south for a length of 135 Km with a slope median between 1-1,5% (Cârstea, Constantinescu, 1980). Fitting Olt river flow due to fluctuations and due to the development of human communities on its banks involved construction of 26 lakes of accumulation with multiple uses such as water intakes for the population and industrial, agricultural irrigation, creating a path to prevent floods but also in helping to hydroelectric plants.

Lake Ostroveni was formed in 1977. After the building of the Râmnicu Vâlcea dam, Goranu, a former arm of the Olt River started to silt up upstream, while,

downstream, the dam of the hydropower lake at Râureni closed it completely, and for nearly three years the lake served as a basin collecting the waste waters of the city of Râmnicu Vâlcea. After 1979 the city declined to further dump used water in the lake, through the inauguration of the purification station which went directly into Olt and thus the lake belonged to the custody of the municipality yielded to a cleaning program intense and for modernization.

At the beginning of the year 1981, they began work on systematization of the lake, cutting the actual form, building the river banks, cementing the north zone, then the east, actually where there was the clogging very evident and for allowing to directly connect with the ”fresh” streams of the Olt river penetrated the right side of the Râureni dam with the help of some metallic tubes Ø 1500 mm. Due to the permanent connections with the waters from Olt river, a phenomenon was produced to auto cleanse the Ostoveni Lake, this made possible to enter in the sight of the municipalities which on the February 18th 1982, decided to transform the Ostroveni perimeter into a recreational park, which besides the lake and campsite having the same name also has a belt of newly planted forest.

It is noteworthy that due to the fact that because of alluvial brought on by the torrents, from the Ocnele and Capela hills the cap of Ostroveni Lake is clogged. This thing is observed especially in the central zone of the water glistening downstream. A strangeness of the lake is the fact that in the clogged zone the maximum depth does not go beyond 1,5m, the greatest depths being found in the flow zone, practically near the banks, but also in the piercing zone towards Olt river in the draught season and when the lake level of Râureni accumulation decreases, through the center of Ostroveni Lake appeared an arrow on the sand which becomes a place to look for food to the storks and seagulls in the one. Lake Ostroveni is not even today recorded by the database of the Vâlcea County Agency for the Protection of the Environment.

MATERIAL AND METHOD

The biological determinations were realized through the testing of the water samples taken every two months, respective November 2008 and February and April 2009, using customary methods, in glass vases with 0,25 - 0,3 l volume. Sampling was done in representative sections (right bank – left bank) and on the depth levels (water surface – 1,5m). The phytoplankton was characterized from the qualitative point of view. The microscopic analysis of the fresh samples was made using OPTIKA B-253 microscope, with 10, 20, 40 lenses and 10 and 15 oculars, and the photographs were made with the CANON A 630 camera. To determine the species, we used the Romanian tools (Francisc, Barna, 1998; Ionescu, Péterfi, 1981, 1979) and European tools (Hindák *et al*, 1975; Hortobagyi, 1973) representative for the study field, from which we noted and saprobity index (Mălăcea, 1969, Vlăduţu, 2005).

RESULTS AND DISCUSSIONS

After processing the samples, were identified 32 species in 25 genera grouped planktonic belonging *Chlorophyta* (12), *Bacillariophyta* (5), *Euglenophyta* (3), *Cyanophyta (Cyanobacteria)* (3), *Pyrrophyta* (1) and *Crysophyta* (1).

Table 1

Taxonomic composition and diversity of phytoplankton in Lake Ostroveni

Nr. crt.	Taxa list	November	February	April
	Cyanophyta (Cyanobacteria)			
1	*Oscillatoria sp.* Vaucher ex Gomont	-	-	+
2	*Anabaena sp.* Bory ex Bornet & Flahault	-	-	+
3	*Cylindrospermum sp. K*ützing ex É. Bornet & C. Flahault	-	-	+
	Euglenophyta			
4	*Trachelomonas caudata* Ehrenberg	-	-	+
5	*Euglena spirogyra* Ehrenberg	-	-	+
6	*Euglena caudata* Huber	-	-	++
7	*Euglena intermedia* (Klebs) Schmitz	-	-	+
8	*Phacus sp.* Dujardin	-	-	+
	Pyrrophyta			
9	*Peridinium spp.* Ehrenberg	-	-	++
	Chrysophyta			
10	*Synura uvella* Ehrenberg	-	-	++
	Bacillariophyta			
11	*Synedra ulna* (Nitzsch) Lang.-Bert.	-	-	+
12	*Diatoma vulgare* Bory	-	-	+
13	*Navicula radiosa* Kützing	-	-	+
14	*Pinnularia sp.* C.G. Ehrenberg	-	-	+
15	*Pinnularia viridis* (Nitzsch) Her.	+	+	+
16	*Hantzschia amphioxys* (Ehrenberg) Grunow	-	-	+
	Chlorophyta			
17	*Chlorella vulgaris* Beijerinck	-	-	++
18	*Ankistrodesmus falcatus* (Corda) Ralfs	-	-	++
19	*Selenastrum gracile* Reinsch	-	-	+
20	*Scenedesmus acutus* Meyen ex Ralfs	-	-	++
21	*Scenedesmus acuminatus* (Lagerheim) R. Chodat	+	++	++
22	*Scenedesmus linearis* Komárek	+	++	++
23	*Scenedesmus quadricauda* (Turpin) Brébisson & Godey	+	-	++
24	*Scenedesmus dimorphus* (Turpin) Kützing	-	++	++
25	*Pediastrum sp.* Meyen	-	-	+
26	*Chlamydomonas sp.* Ehrenberg	-	-	++
27	*Pandorina morum* (Müller) Bory	-	-	+
28	*Volvox sp.* Linnaeus	-	-	+
29	*Cosmarium subcostatum* Nordstedt	-	-	+
30	*Closterium attenuatum* J. Ralfs	-	-	+
31	*Spirogyra sp.* Link	+	+	+
32	*Mougeotia sp.* C.A. Agardh	-	-	+

Legend: + (rare individuals present in the lake), + + (numerous individuals present in the lake) - (species absent)

In the months of November and February phytoplankton from Ostroveni lake was very poor and a little diversified showing just algae from Bacillariophyta types (genus *Pinularia*) and Chlorophyta (genus *Scenedesmus* and *Spirogyra*), while in the warm season, the number of species increased considerably (table 1).

In the warm season, the green algae was the most common, which were representated from sixteen taxa, followed by the diatoms with six taxa, euglenophyta with five and blue algae with three taxa (figure 1).

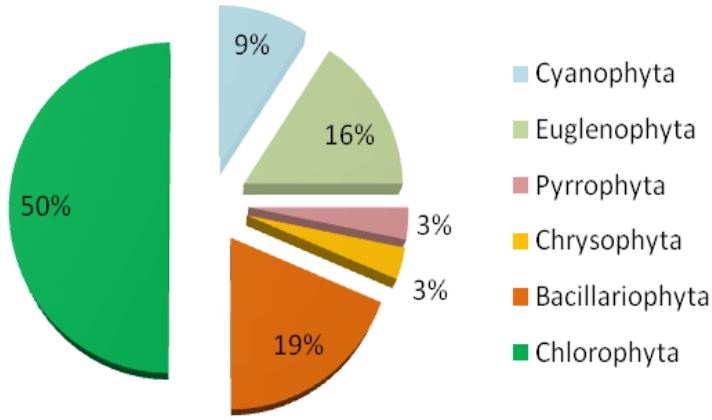

Fig. 1. Phytoplankton composition in Lake Ostroveni in April

Analyzing the samples from the two banks of the lake, it was observed a slight difference in the species composition, as shown in table 2. The following dates refer to the same species identified in the warm season and sampled from the 1,5m depth.

In the samples from the right bank of the lake, there were a larger number of species identified, but in both cases, from the numeric point of view, there were predominant species genus *Scenedesmus*.

The phytoplankton is an important ring in the trophic chain from the aquatic ecosystem of lentic type, mirroring for the most part the changes in the water quality.

The system of saprobes of Kolkwitz and Marsson (1908-1909) reviewed by Liebemann (1962), analyzing the corresponding saprobity index for each species (table 3) determined from Ostroveni lake was made part of the mezosaproba lake (the medium contaminated zone) and, especially from subzone β-mezosaproba (β-m) where the oxidation processes are predominant compared to those in reduction, the water being considered slightly polluted.

Table 2

Taxonomic composition and diversity of phytoplankton in Lake Ostroveni sampling depending on where the sample

Genus/Species	Right bank	Left bank	Genus/Species	Right bank	Left bank
Oscillatoria spp.	+	+	*Chlorella vulgaris*	+	+
Anabaena spp.	+		*Ankistrodesmus falcatus*	+	+
Cylindrospermum spp.	+		*Selenastrum gracile*	+	
Trachelomonas caudata	+		*Scenedesmus acutus*	+	+
Euglena spirogyra	+		*Scenedesmus acuminatus*	+	
Euglena caudata	+		*Scenedesmus linearis*	+	+
Euglena intermedia	+		*Scenedesmus quadricauda*	+	+
Phacus spp.	+		*Scenedesmus dimorphus*	+	+
Peridinium spp.	+		*Pediastrum spp.*		+
Synura uvella	+	+	*Chlamydomonas spp.*		+
Synedra ulna		+	*Pandorina morum*	+	
Diatoma vulgare	+		*Volvox spp*	+	
Navicula radiosa	+	+	*Cosmarium subcostatum*	+	
Pinnularia spp.	+		*Closterium attenuatum*	+	
Pinnularia viridis	+	+	*Spirogyra spp.*	+	+
Hantzschia amphioxys		+	*Mougeotia spp.*	+	+

Table 3

Composition of phytoplankton in Lake Ostroveni and saprobity index for each species

Genus/Species	Saprobity index	Genus/Species	Saprobity index
Anabaena sp.	β-m	*Pediastrum spp.*	β-m
Ankistrodesmus falcatus	β-m	*Peridinium spp.*	o
Chlamydomonas spp.	β	*Phacus spp.*	β
Chlorella spp.	p-α	*Pinnularia spp.*	o şi β-m
Closterium attenuatum	α-m şi β-m	*Pinnularia viridis*	o şi β-m
Cosmarium subostatum	o	*Scenedesmus acutus*	β-m
Cylindrospermum spp.	α-m şi β-m	*Scenedesmus acuminatus*	β-m
Diatoma vulgare	β-m	*Scenedesmus linearis*	β-m
Euglena caudata	p	*Scenedesmus quadricauda*	β-m
Euglena spirogyra	p	*Scenedesmus dimorphus*	β-m
Euglena intermedia	o-α	*Selenastrum gracile*	β-m
Hantzchia amphioxys	α	*Spirogyra spp.*	o-β
Mougeotia spp	o	*Synedra ulna*	β-m
Navicula radiosa	α-m	*Synura uvella*	β
Oscillatoria spp	α	*Trachelomonas caudata*	β
Pandorina morum	α	*Volvox spp.*	o

Legend: (o = oligosaprobity; β = beta-mezosaprobity;
α = alfa-mezosaprobity; p = polisaprobity)

CONCLUSIONS

1. Biological diversity has been reduced in Ostroveni Lake, were found 32 phytoplankton species belonging to various systematic groups: *Cyanophyta (Cyanobacteria), Pyrrophyta (Dinophyta), Chrysophyta, Bacillariophyta, Euglenophyta, Chlorophyta;*

2. Biological findings made were essential for assessing the trophic status of Lake Ostroveni;

3. The phytoplankton association presented variations from one season to the other, from a sample section to another; it was determined that autotrophic forms predominated in disfavor of those heterotrophic;

4. Just as from the qualitative aspect but also form a quantitative, the phytoplankton registers a larger number of species in the aestival period, determining a massive growth of chlorophyta which touched a maximum in the month of April;

5. Toward the end of fall and beginning of winter, algal decline appears and there are large amounts of organic matter in different stages of decomposition, especially in deep water layers;

6. Ostroveni Lake, whose main usage is that of a leisure lake and fishing lake and had water category II quality and in terms of trophic lake was classified as the mesotrophic.

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