

PRELIMINARY ASPECTS OF DIVERSITY PLANKTON THE SALT LAKE, BRAILA COUNTY

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Abstract

Salt Lake, located 16 m above sea level, is an old course of Danube, now stuck in the south of county of Braila. The biological samples were collected in May 2013 from four points, denoted by S1, S2 (in the climatic health resort) and S3, S4 (in the sources). The plankton analysis was performed using stereomicroscope, using an extensive literature (key determinations, atlases etc.). For the structural characterization of biological samples, in a quantitative perspective, were especially calculated the following parameters: number density, numerical abundance. The diversity analysis of biological samples was quantified using Shannon-Wiener index (HS). The phytoplankton is represented by plants that have a simple organization: Cyanophyceae, Bacillariophyceae, and Chlorophyceae, which can withstand unfavorable conditions of life. A total of 13 species of phytoplankton have been identified in the four stations studied. From a quantitative perspective, Bacillariophyceae dominated them, accounting for 59.74-69.49%, followed by Cyanophyceae accounting for 30.51-36.71% and Chlorophyceae accounting for 0-6.49%. The zooplankton is represented by a crustacean Artemia salina. The number of individuals located in different ontogenetic stages preadulte generally exceeded 10-20 times the number of adult individuals of Artemia salina. The Shannon-Wiener index values in the analyzed stations were comparable. The plankton of the Salt Lake is poor in species.

Key words: Salt Lake, plankton, species, diversity

INTRODUCTION

Braila Salt Lake is located 16 m above sea level, is an old course of the river, now stuck in southern of Braila city. Water has a high salinity and the bottom of the lake is covered with a layer of sludge mineralized with important therapeutic qualities.

Braila Salt Lake has the attention of specialists, to be protected and to stop the sweetening course or to stop the destruction of the biological equilibrium. In the Salt Lake, due to salinity, are quite severe conditions of life; precipitation varies depending on the salinity and human intervention.

The plankton plays a vital role in the functioning of the aquatic ecosystems Salt Lake.

The term biodiversity characterizes the health of ecosystems [1]. At the simplest level, the biodiversity measures the number

and the variety of species from an ecosystem. In a deeper sense, the biodiversity represents the genetic diversity which contributes to the dynamics of the species population and gives measure of abundance and interdependence.

MATERIAL AND METHODS

The biological samples were collected in late May 2013, during the early summer, it was during Artemia's development. The biological sampling was done in four sampling stations, denoted by S1, S2, S3 and S4 them (Figure 1).

The stations were established in advance using a Garmin-based navigation system GPS 72. The first two stations are located near Salt Lake resort balneoclimatică (S1, S2), and the next two are located around the central area sources (S3, S4).

The Planktonic biota study involved both qualitative analysis methods (simple lists based on presence / absence of species) and quantitative analysis methods (based on numerical data of abundance).

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Figure 1 Area study

The diversity is a functional and structural parameter for ecosystems, a descriptor for their health [7].

The assessment of the diversity index was made using the Shannon - Wiener Index, which is an index derived from information theory. This index can have a value of 0 when there is only one species and it is maximum when all species are equal to the number of individuals [8].

To study the diversity of planktonic stations established in the lake, were calculated the following indexes: Shannon - Wiener (HS), maximum diversity (Hmax) (theoretical) and Shannon equitability index ($E = HR$) using version 2 Biodiversity_pro program.

RESULTS AND DISCUSSION

PHYTOPLANKTON

The qualitative structure

Due to the high salt concentration of the Lake water, the plant plankton is represented by three taxa that can withstand harsh conditions of life. The determination of the

main taxonomic groups used an extensive literature (key determinations, atlases etc.) [2], [3], [4], [5], [6], [9] and [10].

A total of 12 species have been generated and other 14 identified, among These nine species belonged to Bacillariophyceae, Cyanophyceae to three species, two species to Chlorophyceae (table 1).

The quantitative structure


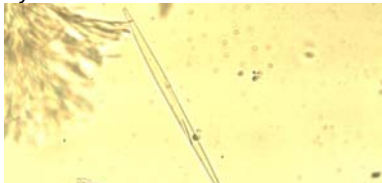




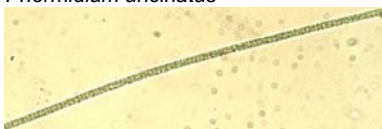

To have an overview on the phytoplankton structure in the Salt Lake Braila, were processed all samples collected at each station.

In the samples taken in May 2013, the abundance of bacillariophyceae varies between 59.74-69.49%, of cyanophyceae varies between 30.51-36.71% and chlorophyceae between 0-6.49% (Table 2).

Bacillariophyceae vegetable plankton had the highest density of 4643.6 ex/l in S3. Here grow cyanophyceae (2865.2 ex/l) also, with high density. Chlorophyceae had the highest density in the S4 with 494 ex/l (Table 2).

Table 1 List of phytoplankton species identified Salt Lake

Taxa	S1	S2	S3	S4
Bacillariophyceae				
<i>Pinularia viridis</i>	+	+	+	+
				
<i>Cymatopleura solea</i>	+	+	+	+
				

<i>Navicula cuspidata</i> 	+	+	+	+
<i>Synedra acus</i> 	+	-	-	+
<i>Cymbella</i> sp. 	-	-	+	+
<i>Caloneis amphisaenta</i> 	+	+	+	+
<i>Stephanodiscus hantzachii</i>	+	+	+	+
<i>Achnanthes</i> sp. 	+	+	+	+
<i>Tabellaria</i> sp.	+	+	-	-
Chlorophyceae				
<i>Tetraedon minimum</i> 	-	+	+	+
<i>Tetraedon trigonum</i>	-	-	+	+
Cyanophyceae				
<i>Phormidium uncinatus</i> 	+	+	+	+
<i>Oscillatoria tenuis</i> 	+	+	+	+
<i>Oscillatoria putrida</i>	-	+	+	+

Legend: + = present form,
- = Absent form

Table 2 Numerical abundance and numerical density

Taxa	S1		S2		S3		S4	
	D No.ex./l	A %	D No.ex./l	A %	D No.ex./l	A %	D No.ex./l	A %
Bacillariophyceae	4050.8	69.49	3754.4	62.30	4643.6	59.49	4544.8	59.74
Cyanophyceae	1778.4	30.51	2173.6	36.07	2865.2	36.71	2568.8	33.77
Chlorophyceae	0	0	98.8	1.64	296.4	3.80	494	6.49

A- numerical abundance, D- numerical density

ZOOPLANKTON

By processing qualitative and quantitative samples collected in May 2013, in the blanket on the water surface (about 1m thick) were highlighted small crustacean *Artemia salina* red in various stages of development

in all 4 stations (figure 2). The number of individuals at different ontogenetic preadulte stages, generally exceeded 10-20 times the number of adult individuals of *Artemia salina*. The numerical abundance is 100%.



Figure 2 *Artemia salina* in different ontogenetic stages preadulte (original photo)

DIVERSITY

Analyzing plant plankton biodiversity in May 2013 measured by the Shannon-Wiener index (H'_s), it is observed that the highest value is found in S4 (3311), followed by S3 (3046) and S1 (2959). The lowest biodiversity is found in S2 (2774), as can be seen in Table 3.

The index typically ranges between 1.5 and 3.5, rarely exceeding a value of 4 [11].

Theoretical maximum values of the index Shannon - Wiener (H_{max}) are in the range 3.322 and 3.7.

It can be seen that the values of Shannon - Wiener (H'_s) index, are close to the theoretical maximum values of the Shannon - Wiener (H_{max}) index, hence we can conclude that in the analyzed samples are no dominant species, represented by a large number of individuals.

Given the equitability values we can say that the stations with the highest diversity are S4 - the real diversity represents 89.5% of the theoretical maximum diversity and the true diversity –in S1 reaches about 89.1% of the theoretical maximum diversity.

In the figure below you can see the dynamic of Shannon - Wiener index and of the maximum diversity of the plant plankton in 2013.

Table 3 Dynamics diversity index Shannon - Wiener in May 2013

Index	S1	S2	S3	S4
$H'_{(S)}$	2.959	2.774	3.046	3.311
$H_{(S)max}$	3.322	3.459	3.585	3.7
H_R	0.891	0.802	0.85	0.895

$H'_{(S)}$ - real diversity; $H_{(S)MAX}$ - maximum diversity; H_R =E- relative diversity (equitability);

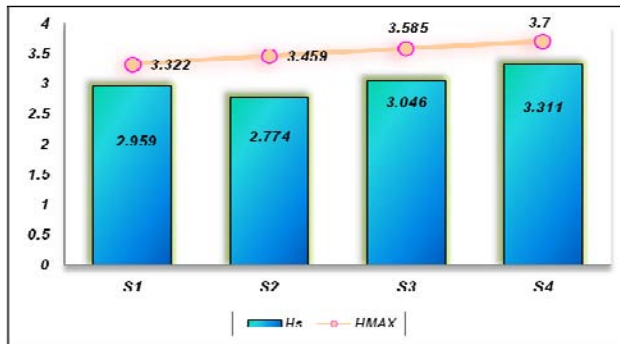


Figure 3 Variation Shannon-Wiener index

CONCLUSIONS

Through qualitative processing of the samples collected in May 2013, were highlighted three taxonomic phytoplankton groups (Bacillariophyceae, Cyanophyceae, Chlorophyceae) and one zooplankton taxonomic group (Crustaceae). In the phytoplankton samples, in all four analyzed stations, the predominant species were bacillariophyceae *Pinularia viridis* and cyanophyceae with *uncinatus* *Phormidium* species, and in the zooplankton samples, the predominant species was *Shellfish* with *Artemia salina*.

We can conclude that in the May 2013 period, the state of the planktonic populations from Braila Salt Lake can be considered good, even if it is low in plankton species, in the water are developing species that can withstand the harsh conditions of life. The

point with the highest diversity of planktonic organisms is station S4, in the springs area.

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