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QUANTITATIVE AND QUALITATIVE EVALUATION OF PHYTOPLANKTON IN THE SITE ROSCI0066 DANUBE DELTA - THE MARIN AREA - A CASE STUDY IN SEPTEMBER 2012

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Abstract

The phytoplankton is a fundamental link in the trophic chain and is one of the indicators to assess the status aquatic ecosystem. To assess the qualitative and quantitative structure of Phytoplankton in September 2012 has been used samples collected from marine area of Danube Delta Biosphere Reserve with plastic water sampler (Niskin type). The qualitative structure of phytoplankton was characterized by the presence of 53 species belonging to six algal taxonomic groups (Bacillariophyta, Dinoflagellata, Chlorophyta, Cyanobacteria, Chrysophyta and Euglenophyta). The diatoms have dominated the number of qualitative structure of phytoplankton species in most areas, their share ranging between 39% and 54%. The dinoflagellates were the second group that diversity, the proportion ranging from 27% and 44%. September 2012 was characterized by values of densities between 67 - 453·10^3 cel·l^{-1} and for biomasses between 0.22 – 1.08 g·m^{-3}. The diatoms have dominated for more than 70% in density and 50% in biomass. The conclusion of this case study, confirmed by previous researches, is that the phytoplankton is not presented as an integral whole viable, but is rather the appearance of a heterogeneous floating tanatocenosis. The site ROSCI0066 Danube Delta - the Marin Area does not have a specific phytoplankton, because the mixed waters from here are always pushed by winds and currents in all directions, especially towards South.

Keywords*: ecosystem, marine water, Natura 2000 sites, phytoplankton.*

INTRODUCTION

ROSCI0066 Danube Delta - the Marin Area besides SCI status, it has the status of the natural protected area in Natura 2000 network and Ramsar and Unesco sit. The ROSCI0066 site is located in the Romanian Black Sea area and covers an area of 121697 ha. It corresponds with the geographical unit of Biosphere Reservation - the Black Sea coast, at the mouth of the Danube - Chilia channel to Cap Midia, to the South, and up to 20 m isobaths, to the East (Figure 1).

The characterization habitats by conducting an inventory of species provides a true picture of the state of preservation and is the basis to achieve an appropriate management of the protected area and halting the loss biodiversity and natural resources. By making an inventory of species and habitats shall ensure the development of a framework for efficient and sustainable management of marine protected area Natura 2000. Through adequate measures can be perform both protection of the natural environment, as well as the conventional livestock by organic farming (Răducuță, 2011).

MATERIALS AND METHODS

The phytoplankton is the link of the aquatic trophic chain, representing the food for microscopic organisms (zooplankton) and higher vertebrate animals (fish). Apart from the positive effect on aquatic life, phytoplankton may also cause inconvenience, as precursor disease or death of aquatic organisms and beyond.

In order to characterize the quantitative and qualitative structure of phytoplankton, the samples have been taken from the Mila 9, Sahalin, Periteașca, Portița and Vadu areas in

September 2012 (Figure 2), using the research ship "Starfish", property of the National Institute for Marine Research and Development “Grigore Antipa” of Constanta.

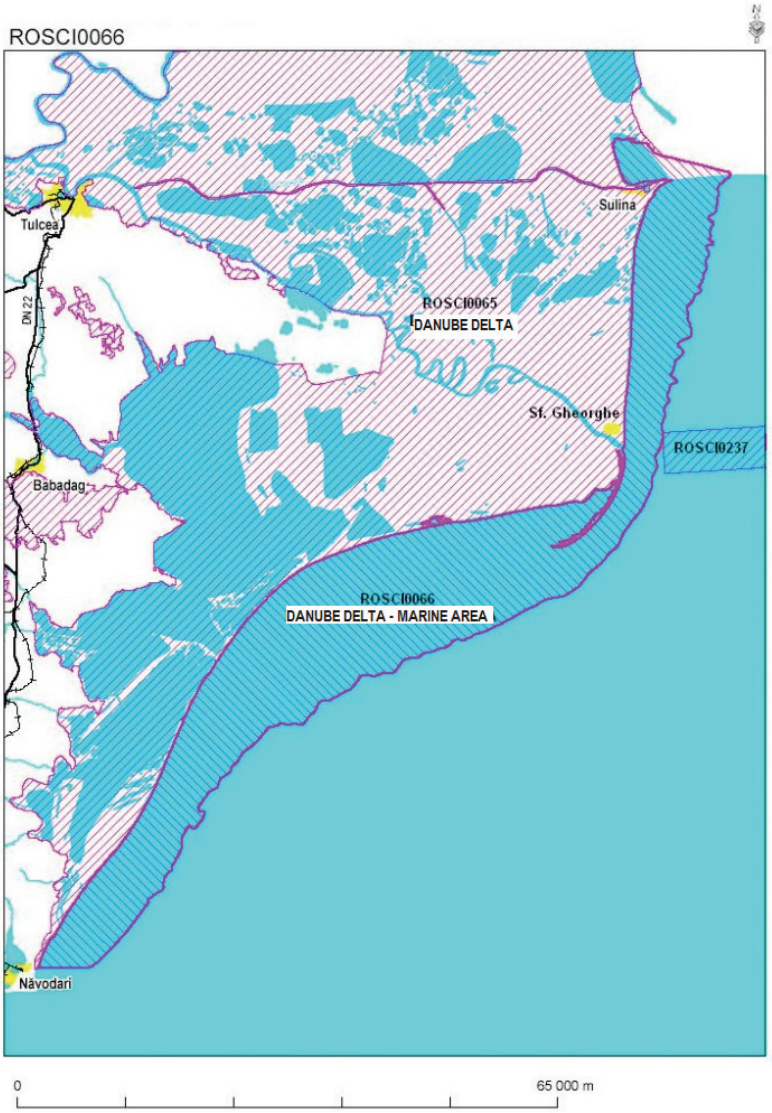
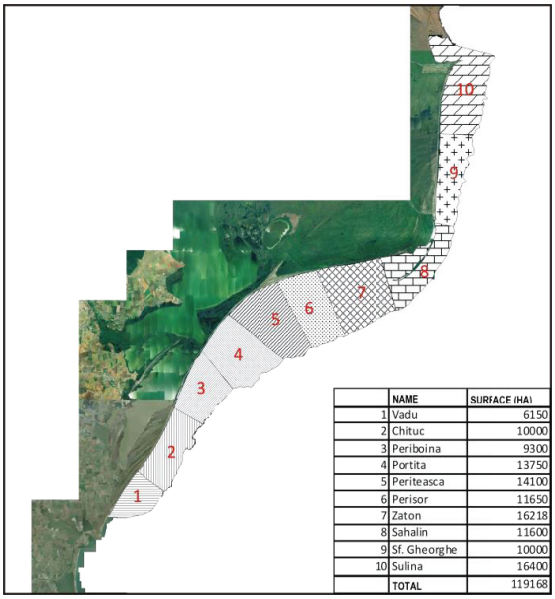


Figure 1. The location of ROSCI0066 Danube Delta - the Marine Area on the hydrographic map of Romania (Source: www.mmsm.usamv.ro, processed picture)

The samples have been collected using plastic water sampler batometers (Niskin type) on each standard horizon as 0, 10, 20 m. Once collecting, phytoplankton samples were stored in plastic containers of 500 ml, preserved with 4% buffered formaldehyde solution, transported to the laboratory and were left to sediment for 2 weeks (Morozova-Vodianitzkaia, 1954; Bodeanu, 1987-88).

In order to microscopic analyze, samples were concentrated by siphoning to a volume of 100 ml. Qualitative and quantitative analysis was performed by extracting from the sample of some subsamples of 5, 10, 20 ml, according to the frequency of species. The determination

and cell counting by species in the analyzed sample fraction was achieved by inverted plankton microscope with 20x and 40x objectives. Depending on primary data obtained, were calculated number density (cells·l^{-1}) and wet biomass (g·m^{-3}) for each specific component for each of algae taxonomic groups and phytoplankton total.



	NAME	SURFACE (HA)
1	Vadu	6150
2	Chituc	10000
3	Periboina	9300
4	Portita	13750
5	Periteasca	14100
6	Perisor	11650
7	Zaton	16218
8	Sahalin	11600
9	Sf. Gheorghe	10000
10	Sulina	16400
	TOTAL	119168

Figure 2. Sampling perimeters of ROSCI0066 (Progress Report no. 8, SOP-ENV Project, CNRS SMIS Code 17162)

RESULTS AND DISCUSSIONS

The phytoplankton is one of the best indicators to assess the status of aquatic ecosystem. Black Sea waters have significant quantities of phytoplankton influenced by variations of environmental factors. Enrichment of specific composition in freshwater forms is due to the influence of fertilizing waters of the Danube, which also going to the low salinity (Boicenco, 2010).

Analyzing the phytoplankton samples has been identified the presence of 53 species of 6 algae taxonomic groups (*Bacillariophyta, Dinoflagellata, Chlorophyta, Cyanobacteria, Chrysophyta* and *Euglenophyta*). The rich represented were diatoms (39%) and dinoflagellates (38%), in relatively equal percentage, followed by cyanobacteria with 11% of total phytoplankton species identified. The most poorly represented in the total number of species identified in specific waters of ROSCI0066 were *Chrysophyta* (6%), *Chlorophyta* (4%) and *Euglenophyta* (2%) (Figure 3).

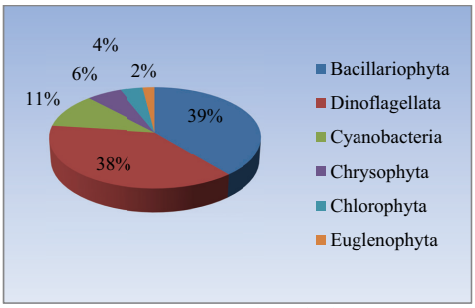


Figure 3. Composition per phytoplankton taxonomic groups in marine waters of ROSCI0066 site

Regarding the classification of species according to their resistance to salinity regime, marine and marine-brackish forms were 83% of the total number of species compared with freshwater and freshwater-brackish forms which do not exceed 17%.

As expected, freshwater populations have the greatest developments in areas in the immediate vicinity of the mouths of the Danube. The quantities there of are reduced in the vertical plane, with increasing depth, and in the horizontal plane as moves away from the source of sweetness, like for Chituc and Vadu (Boicenco, 2013).

In September 2012, the water of ROSCI0066 was characterized by values of densities between 67 - 453·10^3 cells·l^{-1} and for biomasses from 0.22 - 1.08 g·m^{-3}. The biggest share has had diatoms, over 70% in density and 50% biomass. The phytoplankton population was dominated in September, 2012, to the species *Cyclotella caspia* (231·10^3 cells·l^{-1} maximum density), *Cerataulina pelagica* (89·10^3 cells·l^{-1} maximum density) and *Emiliania huxleyi* (258·10^3 cells·l^{-1} maximum density).

The greatest diversity of phytoplankton organisms it was found in Sakhalin (28 species), Mila 9 (26 species) and Periteaşca (25 species) compared to Vadu (20 species) and Portiţa (18 species) (Figure 4).

The waters of Periteaşca and Sakhalin perimeters were characterized by the large quantities of phytoplankton, respectively 453·10^3 cells·l^{-1} şi 1.08 g·m^{-3}. At Periteaşca,

the dominant coccolitoforidee was *Emiliania huxleyi*, which had a maximum density of $258 \cdot 10^3$ cells$\cdot l^{-1}$, representing 62% of the total density. Regarding the biomass, the diatoms had the largest share (74%) and the majority was *Cerataulina pelagica* species.

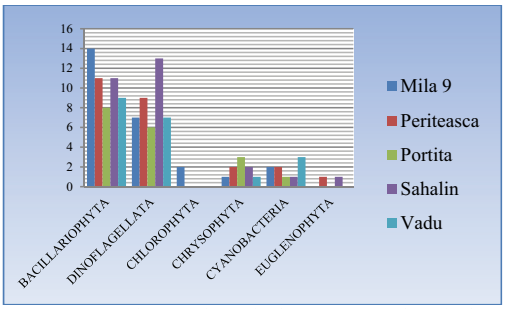


Figure 4. Number of phytoplankton species identified in the study areas, September 2012

In the Sakhalin area, the phytoplankton community was characterized by the dominance in the biomass of dinoflagellates, *Prorocentrum minimum* and *Prorocentrum micans* species reaching highs development to $18.4 \cdot 10^3$ cells$\cdot l^{-1}$, respectively $11.6 \cdot 10^3$ cells$\cdot l^{-1}$. The diatoms have dominated in density having 80% of the total density, the most abundant species as small *Cyclotella caspia* ($230 \cdot 10^3$ cells$\cdot l^{-1}$ maximum abundance). The phytoplankton community in September in Mila 9 and Portița perimeters was characterized by abundance between $124 \cdot 10^3$ cells$\cdot l^{-1}$ şi $170 \cdot 10^3$ cells$\cdot l^{-1}$. The diatoms were noticed by the largest number of species at Mile 9 (14 species), dominating the density (88%) and biomass (61%). Among dinoflagellates were found *Prorocentrum micans, Goniaulax polyedra, Ceratium furca* and *Ceratium fusus* species.

In Vadu perimeter was found weakest phytoplankton development. The diatoms have dominated in density (69%) along with a series of small flagellates, cyanobacteria and dinoflagellates, such as *Phormidium hormoides, Chroococcus minutus* and *Scrippsiella trochoidea*.

CONCLUSIONS

Following the study the conclusions are:

- In the marine site ROSCI0066 has been identified a total of 53 species of planktonic organisms belonging to six algal taxonomic groups (*Bacillariophyta, Dinoflagellata, Chlorophyta, Cyanobacteria, Chrysophyta, Euglenophyta*);
- The diatoms have dominated like number of species qualitative structure of phytoplankton in most analysis perimeters, their share ranging between 39 and 54%;
- The dinoflagellates were the second group of species as diversity, the proportion ranging between 27 and 44%;
- In September 2012, marine waters of ROSCI0066 were characterized by values of densities between 67 - $453 \cdot 10^3$ cells$\cdot l^{-1}$ and biomasses from 0.22 – 1.08 g$\cdot m^{-3}$;
- Changing the structure of phytoplankton in an aquatic ecosystem will cause major changes to the whole trophic chain. It will change the composition of the zooplankton that develops on his behalf and implicitly of fish that feed on phyto-and zooplankton

ACKNOWLEDGEMENTS

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