

## A COMPARATIVE STUDY OF ROMANIAN MARINE SHALLOW WATERS BENTHIC COMMUNITIES FROM EFORIE NORD AND EFORIE SUD

### UN STUDIU COMPARATIV AL COMUNITĂȚILOR BENTALE MARINE DIN APELE DE MICĂ ADÂNCIME DE LA EFORIE NORD ȘI EFORIE SUD

Manuela Diana SAMARGIU, Gabriela PARASCHIV, Daciana SAVA, Alexandra STOIAN

Faculty of Natural Sciences and Agriculture, "Ovidius" University of Constanța, Romania  
Corresponding author: Manuela Diana SAMARGIU, e-mail: manuelasamargiu@rdslink.ro

**Abstract:** The paper makes an evaluation of the benthic communities living associated with three different types of substrata in midlittoral and infralittoral marine Romanian shore, at Eforie Nord and Eforie Sud. Data about macrobenthic and meiobenthic populations' dynamic for each kind of substrata are done. There are also presented results of density variation of benthic populations for this specific two studied sites and variation of taxonomic group's number, in order to emphasize a comparative view of qualitative and quantitative composition of the main phylogenetic groups of invertebrates which were collected during the research.

**Rezumat:** Lucrarea face o evaluare a comunităților bentale ce trăiesc asociate cu trei tipuri diferite de substrat, în mediolitoralul și infralitoralul apelor marine costiere românești, la Eforie Nord și Eforie Sud. Se prezintă date legate de dinamica populațiilor macro- și meiobentale pentru fiecare tip de substrat. Sunt înfățișate, totodată, rezultate privind variația densității populațiilor bentale pentru cele două zone studiate și variația numărului de grupe taxonomice, pentru a avea o imagine comparativă asupra compoziției calitative și cantitative ale principalelor grupe filogenetice de nevertebrate care au fost prelevate și identificate în timpul studiului respectiv.

**Key words:** benthic communities, sand, algae, rock substrata, meiofauna, macrofauna, invertebrates, Black Sea, Eforie Nord, Eforie Sud, Romanian shore.

**Cuvinte cheie:** comunități bentale, nisip, alge, substrat pietros, meiofauna, macrofauna, nevertebrate, Marea Neagră, Eforie Nord, Eforie Sud, țărm românesc.

## INTRODUCTION

The Black Sea represents the greatest brackish water basin of the world. After *The international symposium of natural waters classification* (Venice, 1958) the Black Sea was included in *mixohaline* waters category, which means salty, with a 17- 18g· l<sup>-1</sup> average salinity. But, in compare with other seas the biodiversity is different in some aspects regarding the origin of the species and their modality of adaptation at this typical meromictic basin. About 40 years ago Black Sea was considered one of the most productive marine basins from the European seas, with particular flora and fauna originated from the Mediterranean Sea, but also included very old species of Ponto-Caspian origin and well adapted, together with brackish water or fresh water species and with recent immigrants, ecologically unstable.

Quantitative and qualitative changes which happened in the last decades due to developing of industrialization, intensive agriculture and anthropogenic activities caused great modifications in the actual configuration of the coastal ecosystems. These changes have had a great impact on both types of substrata – mobile (with sand and mud) and the solid one (rocky faces, or stones associates with macrophytes algae and mussels banks).

Eforie Nord and Eforie Sud resorts are two of the most affected zones in south part of the Romanian littoral. Coastal erosion processes are very intense in the specific sites and many human activities are developing there, especially in the summer time. That is why, along the last years these littoral waters and their hydrobionts represented one of our research issue.

The paper is a part of a larger study which contains data on observations which have been done during the summer of 2003 in 8 stations on the Romanian continental shelf.

## MATERIAL AND METHODS

Quantitative samples were collected from different types of substrata in midlittoral and superior infralittoral shallow water zone, between 0 m to 1, 5 m depth, in the south of Romanian littoral at Eforie Nord - Belona beach and Eforie Sud - Capul Turcului dam. The samples were taken from the mobile substratum (sand) - using a corer device; and from the sea walls, rocky platforms and stone fragments. There were taken, too samples consists of macrophytes algae thallium that covered hard substratum (especially *Cladophora*, *Enteromorpha* and *Ceramium*). For rocky faces each sample was collected from a surface of approximate 20 cm<sup>2</sup> using a metal scarper and a brush with which all surface of the rock was cleaned very good for avoid loosing the material. The samples were introduced in plastic bags and preserved with 4% formaldehyde and etiquette. In laboratory each samples was sieved by 1 mm, 0,315 mm, 0,250 mm and 0, 1 mm mesh screen and than invertebrate fauna was removed under binocular microscope (HULLINGS et al., 1969). Taxonomic identification have been done for large phylogenetic groups and counted (for some genera and species was made specific determination); results were recorded in observation and identification fiches (GOMOIU & SKOLKA, 2001). Results were reported at 1 m<sup>2</sup> area.

## RESULTS AND DISCUSSION

In order to know the composition of benthic communities from the zone in which started the study, a systematic qualitative and quantitative evaluation has been done, making also determination for some ecological indices like density, frequency and rank (BĂCESCU et al, 1971). In all quantitative samples it has been identified individuals belonging to 17 taxonomic groups: Actiniidae, Turbellaria, Nematoda, Polychaeta, Oligochaeta, Bivalvia, Gasteropoda, Copepoda, Cirripedia, Amphipoda, Isopoda, Tanaidacea, Cumacea, Decapoda, Arachnida, Chironomida - insects larva and among vertebrates, and few representative belong to Osteichthyes. But after results processing and statistical interpretation it was obtain the following situation for the studied zones.

In Eforie Nord, most of invertebrates' fauna taken from sand are represented by meiofaunistic species, as nematodes polychetes and copepods, attending various densities from July to September (fig. 1). Fauna associated with algae (fig. 2) in the same zone present densities value fewer than 10000 ind.m<sup>-2</sup>, with one exception - small crustaceans from Copepoda subclass, represented mainly by harpacticoids which reaches great densities of more than 70000 ind.m<sup>-2</sup> in September. On the sea walls and rock fragments (fig. 3) populations of sessile bivalves from *Mytilus galloprovincialis* species are well developed and constituted a typical infralittoral system known "rock mussels biocoenosis". Analyzing density variation of benthic populations on al types of substrata during the studied months (fig. 4), the greatest density values and taxonomic groups' number were recorded in phytal biotopes and on the rocky ones (fig.5).

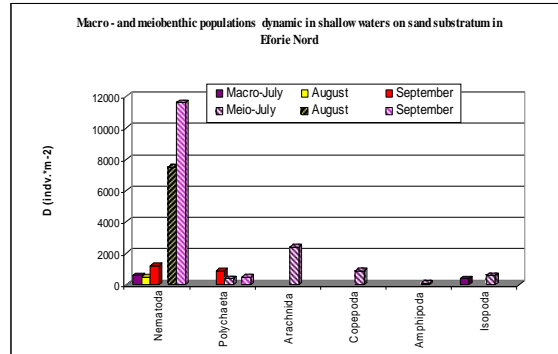


Figure 1. Macro- and meiobenthic populations dynamic in shallow waters on sand substratum in Eforie Nord

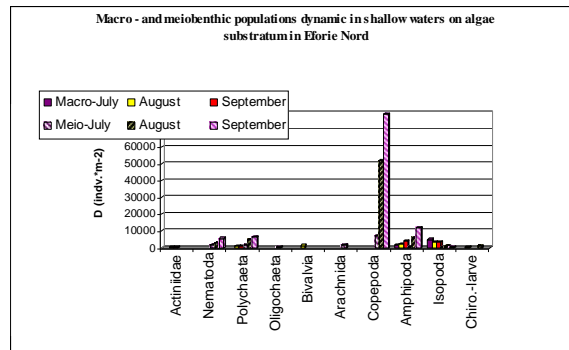


Figure 2. Macro- and meiobenthic populations dynamic in shallow waters on algae substratum in Eforie Nord

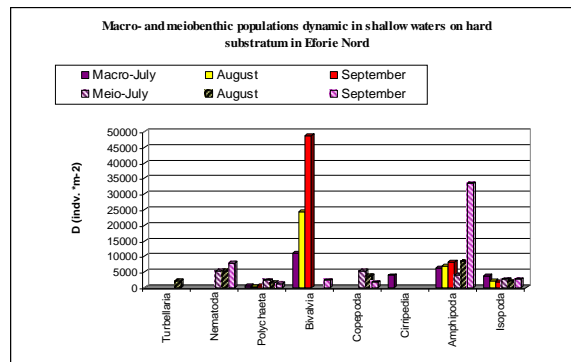


Figure 3. Macro- and meiobenthic populations dynamic in shallow waters on hard substratum in Eforie Nord

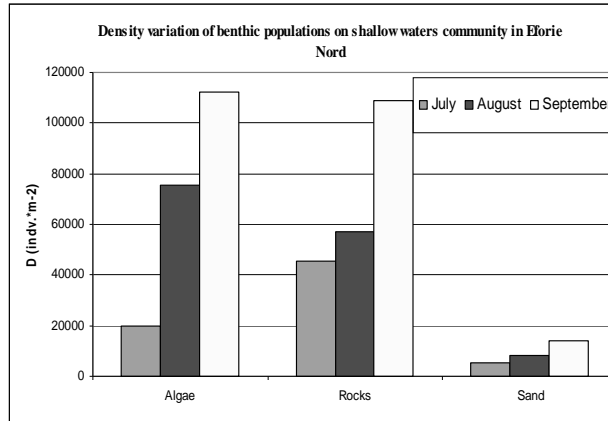


Figure 4. Density variation of benthic populations on shallow waters community in Eforie Nord

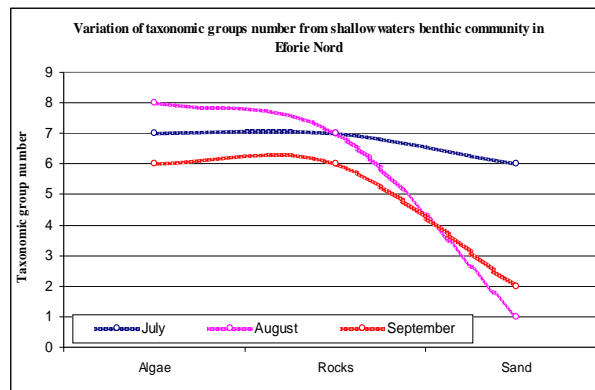


Figure 5. Variation of taxonomic groups' number from shallow waters benthic community in Eforie Nord

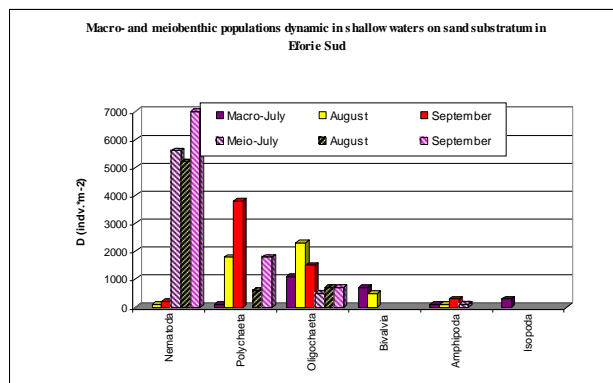


Figure 6. Macro- and meiobenthic populations dynamic in shallow waters on sand substratum in Eforie Sud

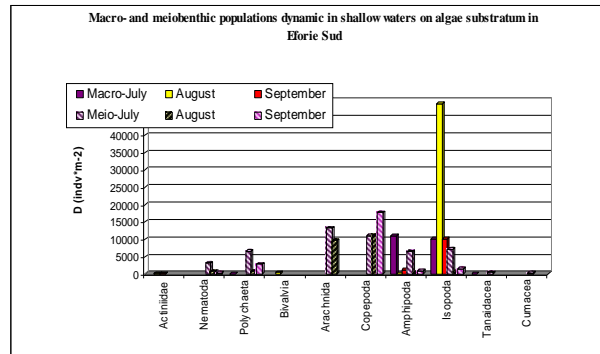


Figure 7. Macro- and meiobenthic populations dynamic in shallow waters on algae substratum in Eforie Sud

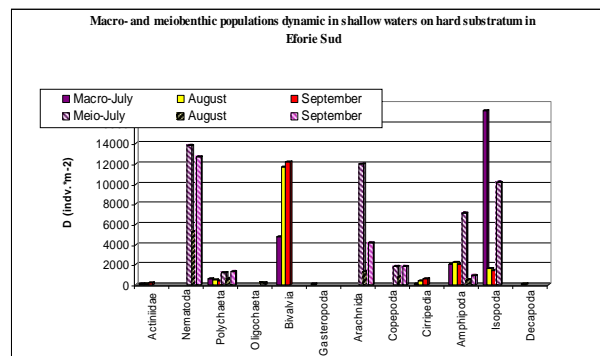


Figure 8. Macro- and meiobenthic populations dynamic in shallow waters on hard substratum in Eforie Sud

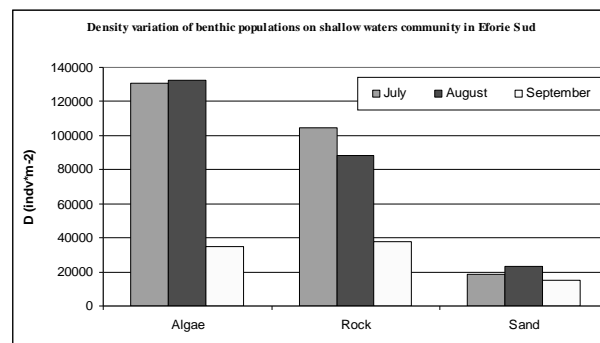


Figure 9. Density variation of benthic populations on shallow waters community in Eforie Sud

For Eforie Sud the dynamic of benthic communities living in sand shows a larger diversity in macro- and meiofaunistic groups comparing with the same substrata from Eforie Nord (fig.6), but the density values are less than in a previous site.

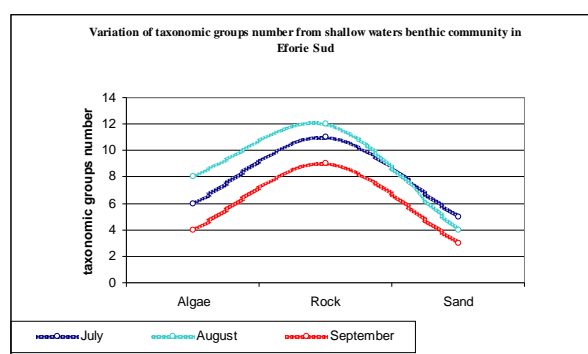


Figure 10. Variation of taxonomic groups' number from shallow waters benthic community in Eforie Sud

Associated with sea-weeds, copepods, hydroids and amphipods recorded densities from 5000 to 17000 ind.  $\cdot m^{-2}$ , and isopods reach in August more than 50000 ind.  $\cdot m^{-2}$  (fig.7). Meiofauna representatives have stable populations on hard substrata at Eforie Sud (fig. 8), as well as Bivalvia and amphipods among macrobenthic species.

Overall, at Eforie Sud, the greatest density values (fig. 9) were recorded on macrophytes biocoenosis (over 130000 ind.  $\cdot m^{-2}$ ), and on the rocks; on this substratum there were recorded individuals belonging to 12 taxonomic groups (fig.10).

## CONCLUSIONS

The benthic populations from studied sites are various included many invertebrate group characteristics for mediolittoral and infralittoral waters;

- These communities are selected by the type of substratum in a way more evident than the other environmental conditions (waves, temperature variation) typical for the shallow waters.
- Values recorded at Eforie Sud are higher than in Eforie Nord, mainly on hard substrata, revealing good living conditions with oxygenate waters, proper food resources and suitable reproduction places.

## LITERATURE

1. BĂCESCU, M., MÜLLER G.J., GOMOIU M.,T.: Ecologie marină IV – Cercetări de ecologie bentală în Marea Neagră – Analiza cantitativă, calitativă și comparată a faunei bentală pontice, Ed. Academiei R.S.R., București, 1971, pp. 357.
2. GOMOIU, M.,T., SKOLKA, M.: Ecologie, Metodologii pentru studii ecologice. Ovidius University Press, Constanta, 2001: pp.170.
3. HULINGS, N. C., HIGGINS, R. P., GRAY, J.S.: A manual of the study of meiobenthos, International Conference on Meiofauna, Tunis, Tunisia, 1969: pp.197.