

# SUBLITTORAL SOFT-BOTTOM ZOOBENTHIC COMMUNITIES AND DIVERSITY OF SOUTHERN COAST OF THE BLACK SEA (TURKEY)

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## Abstract

The macrozoobenthos of Southern Black Sea coast (Turkey) was quantitatively investigated in May-July 1999. Samples taken at 39 stations (13-79 m depth range) provided the basis for the analysis of the distribution of 130 species and 6335 individuals of benthic invertebrates, as well as of their abundance and biomass. Most common species in the studied soft bottoms were, by numbers of individuals, *Melinna palmata*, *Lentidium mediterraneum*, *Lucinella divaricata* and *Chamelea gallina*. The polychaets *Micronephthys* cf. *maryae*, *Aricidea fragilis mediterranea*, and *Chone filicaudata* for the entire Black Sea coast and *Eumida sanguinea*, *Mysta picta*, and *Prionospio (Prionospio) steenstrupi* represents new records for the Turkish Black Sea coast.

**Keywords:** Zoobenthos, Biodiversity, Black Sea

## Introduction

The Black Sea is the largest (537.000 km<sup>3</sup>) permanently stratified marine basin of the world [2]. In southern part coasts the shelf is only a narrow intermittent strip. Although the coastal area is free of hydrogen sulphide, concentrations increase rapidly under the thermocline due to the restricted circulation of deeper shelf water. Consequently, the number of macrobenthic species decreases rapidly with increasing depth. Zoobenthos of the Turkish sublittoral zone of the Black Sea has not been thoroughly investigated yet. The aim of this study is to determine the faunistic composition and the main macrozoobenthic communities occurring off the southern coast of Black Sea. The factors that may affect species distribution are also discussed.

## Material and Methods

To analyse macrozoobenthos, at each station (total 39) bottom a single quantitative sample was taken using a van Veen grab (0.1 m<sup>2</sup>) (Figure 1).

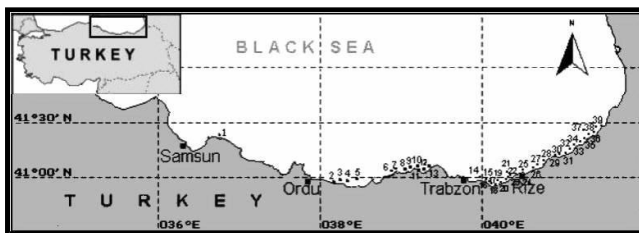


Fig. 1. Map of the study area, indicating the sampling stations

All samples were washed through a 0.5 mm mesh sieve. Thereafter, all macrofaunal organisms were sorted using a binocular microscope, identified, counted and stored in 70% alcohol. Some physicochemical parameters were measured. Frequency index, percentages of animals in relation to total faunal abundances and biomass were calculated for delineating the community structures.

## Result and Discussion

In the study region, the average oxygen level was 7.95 ml-l between 10 and 25 m depth, and it dropped to 4.9 ml-l at 25-50 m. At a depth of 50-80 m, average oxygen level was 1.25 ml-l. Temperature and salinity values were 15.9 C and 17.5 psu at 10-25 m, 8.8 C and 18.7 psu at 25-50 m, and 7.9 C and 18.9 psu at 50-80 m, respectively. The analyses of grab samples revealed a total of 130 benthic species belonging to Actinaria (one species, two individuals), Nemertini (one species, 10 individuals), Nematoda (one species, 17 individuals), Polychaeta (50 species, 3126 individuals), Phoronida (one species, 28 individuals), Pycnogonida (one species, three individuals), Crustacea (30 species, 490 individuals), Mollusca (42 species, 2373 individuals) and Echinodermata (3 species, 286 individuals). This study added three new records to entire Black Sea and 3 new records to inventory of marine fauna inhabiting the coast of Turkish Black Sea. Polychaeta accounted for 49.3% of total number of specimens, followed by Mollusca (37.4%) and Crustacea (7.9%). The dominant species in the area were *Melinna palmata* Grube, 1870 (28% of total individuals), *Lentidium mediterraneum* (8.5%), *Lucinella divaricata* (7.9%), *Chamelea gallina* (7.7%) and *Aricidea fragilis mediterranea* (5.9%), all comprising 83.5% of total specimens. Special attention should be paid to the distribution of the

opportunistic polychaet causing sediment bioturbation *M. palmata*. Gomoiu [3] deduced that the populations of *M. palmata* from the Romanian Black Sea shelf are able to process up to 4.8-9.6 kg of mud/m<sup>2</sup>/day. In our research we found that this species has a mean abundance of 450 ind. m<sup>-2</sup>. Low dissolved oxygen values of lower layer and soft substratum of sediment resulted in wide distribution of *M. palmata*, adapted to these conditions. Molluscs were among the second abundant taxa, accounting for 32% of the total number of macrofaunal species. Among molluscs, gastropods dominate in species number (24 vs 18 of bivalve species), but bivalves are much higher as average density (534 ind. m<sup>-2</sup> vs 72 ind. m<sup>-2</sup>). The commonest bivalve, *C. gallina* (69%) had a highest frequency value of the 39 stations, followed by the bivalve, *P. rudis* (64%), the gastropod, *Cyclope neritea* (59%), respectively. Crustaceans are a qualitative and quantitative key component of the benthic fauna on soft and hard substrata [1]. In study area, Crustacea fauna was mainly composed of Amphipoda (70%), Cumacea (13%), Decapoda (10%), and Tanaidacea (7%), by numbers of species. Of the total of 30 benthic crustaceans, 15 species were encountered at a single station only. The commonest cumacean, *Pseudocuma longicornis* (37%) had a highest frequency value of the 39 stations, followed by the cumacean, *Iphinoe tenella* (33%), the amphipod, *Ampelisca diadema* (33%), the cumacean, *Iphinoe elisae*, and the amphipod, *Periculodes longimanus* subsp. *longimanus*, respectively. The highest dominance value according to number of individuals was found for the cumacean, *I. elisae* (25%), followed by *I. tenella* (17%), the amphipod *A. diadema* (16%), the cumacean, *P. longicornis* (11%), and the amphipod, *Bathyporeia guilliamsoniana* (6%). Mutlu et al. [4] also mentioned that these same species were abundantly observed in this study area. Total numbers of species diversity for each group on the soft bottoms decreases with depth. Peaks of species diversity are at <50 m, in relatively shallow water zones: 10-25 and 25-50 m. Depth apparently has a major influence on the composition of the fauna, especially above the 50 m level. The most frequent species were *M. palmata* (present in 85% of the samples), *Micronephthys* cf. *maryae* (72%), *C. gallina* (69%), *Pitar rudis* (Poli, 1795) (64%) and *A. fragilis mediterranea* (59%). Mollusca accounted for 76% of the total biomass in all samples, followed by Polychaeta and Echinodermata. The species with the highest individual biomass were *C. gallina*. Our investigations have shown that the abundance, biomass and ratio of zoobenthos in the biocoenoses mostly depend on the type of bottom sediments, physicochemical parameters and on the depth of the sea. This study provides useful information about the composition and distribution of benthic invertebrate fauna in Turkish Black Sea coast. Further investigations should be devoted to analyzing species relationships and resource partitioning between species to better understand the dynamic of zoobenthic assemblages.

## References

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