DATA REGARDING QUALITATIVE AND QUANTITATIVE COMPOSITION OF BENTHIC POPULATIONS FROM MUSURA BAY – DANUBE DELTA, ROMANIA

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ABSTRACT

The Danube Delta is one of the most amazing ecobiome of the European continent, being a mosaic of aquatic and terrestrial ecosystems intertwined with wetlands, which develops a huge variety of flora and fauna. In the last years a series of studies were developed in the coastal area of the Romanian coast of the Black Sea, and in the Danube Delta, in order to monitories the biodiversity of the coastal ecosystems, mainly as a Natura 2000 protected areas network.

On this occasion, marine protected areas were studied, including areas of northern Romanian seaside lagoons. A series of biological, chemical and physical observations were done. Biological monitoring included studies at both pelagic and benthic level.

Observations, analyzes and interpretations have taken into account the principles of Marine Biogeographically Seminars from Brindisi in 2010, and of the European Commission guidelines on Published marine Natura 2000 sites.

The present paper refers to some data regarding zoobenthic communities from one of northern lagoon of the Danube Delta, known as Musura Bay (ROSCI0065, coded as coastal lagoon *1150).
Musura Bay, located between Chilia (north) and Sulina (south) is a relatively recent geomorphologic formation with a less of a century age. In the last two decades alluvial process formed an island which tends to potential close the gulf in the future.

Faunal composition is influenced by the mixture of waters, from the Danube and from the marine coastal zone. According to monitored areas, there are dominant freshwater or marine invertebrates forming populations that live in the sediments.

The aim of this paper is to offer a view of the endopsammic and endopelitic benthic communities from Musura Bay, during two years of observations (2013 and 2014) and to analyze the seasonal dynamics of invertebrates' populations. Based on quantitative samples collected from infralittoral zone, the paper presents the qualitative structure and a quantitative analyze (Abundance, Constancy - F%, Dominance - D% and W_D%) of invertebrate populations from all taxa (belonging to Foraminifera, Nematoda, Gasteropoda, Oligochaeta, Polychaeta, Ostracoda, Copepoda, Cumacea, Amphipoda, Chironomidae etc.) found in the researched zones, in connection with variation of local ecological conditions.

Keywords: Black Sea, Danube Delta, Musura Bay, zoobenthos.

1. Introduction

The Danube Delta, formed by the Danube River before it flows in the Black Sea, is the second largest river in Europe. The Danube Delta Biosphere Reserve has an area of 5800 km^2. 79% of it lies in Romania occupying 3510 km^2 area (Gâştescu and Ştiucă, 2006) and it lies between three main branches – Sfântu Gheorghe, Sulina and Chilia.

The terrestrial and aquatic biodiversity is very high. According to the literature fauna is very rich, including several thousand species of terrestrial and aquatic invertebrates; among vertebrates, fish and birds are the most representative species of this ecobiome. Regarding flora and

vegetation more than 1642 species of plants were recorded along the decades, dominants being the aquatic species. It is considered that the Danube Delta includes the greatest area of reed beds in the world, including floating islands of reed, called "*plaur*".

The coastal lagoons (1150 *) from the Danube Delta are *Musura Bay, Zătonul Mic, Zătonul Mare, and The Lagoon Complex Razelm - Sinoe.* Musura Bay is situated at north of Sulina channel up to a branch, called Stambulul Vechi (Staro Stambul) which belongs to the secondary delta of Chilia branch, at Ukraine border. It represents one of the coastal sectors with special evolution (Gâştescu and Grigoraş, 2014); in front of Musura Bay processes of accumulation, formed in the last 20 years an island with no name which could close the gulf in the next decades.

2. Materials and methods

The study was conducted during different seasons of 2013 and 2014 with occasion of a research project which aimed to monitor the current state of coastal and marine habitats.

In this paper, we analyze the situation of Musura Bay benthic populations based on samples collected in spring, summer and autumn of 2013 and the spring of 2014.

Figure 1: Map of Romanian Danube Delta with the main branches and Musura Bay (http://xoxol.org/danube/map-delta-rom-010.html)

Figure 2: Musura Bay -The scheme of the monitoring track and the sampling sites

Sampling were done from four sites, which were fixed taking into account the influence of the Danube (Sulina and Chilia), and the Black Sea (Fig. 1). They were called conventional, depending on their position as follows (Fig. 2):

- Site 1 - Island Lighthouse (with predominantly sandy bottom)
- Site 2 - Musura Center (black smelly mud bottom)
- Site 3 - Drain Chilia Branch (muddy bottom)
- Site 4 - Musura Continental (bottom with sand and silt)

Quantitative samples were collected from infralittoral zone on mobile substratum with a Van Veen bodengreiffer (with an evaluate surface of 256 cm²) from depths between 220 -225 cm in site 1; 125 -130 -140 cm in site 2; 80 -100 -135 cm in site 3; 150 -165 cm in site 4.

A number of other physical and chemical parameters (temperature, pH, transparency, turbidity, salinity and conductivity) were recorded using a CTD. During the study the wind recorded different speeds (spring of 2013 - 22 m/sec, in 2014 - 5m/sec; autumn 2013 – 2-3 m/sec) but in the summer of 2013 was very strong, exceeding 30m/sec. The water and air temperatures recorded normal values for respective seasons, without registering extremes; for water 14.17 º C - 20.83 º C and for air 16.57 º C – 22.53 º C.

The samples were processed after classical methods (Hullings *et al.*, 1969). Statistics analyze was done.

## 3. Results and discussions

In order to know the composition of benthic communities from the Musura Bay a qualitative and quantitative evaluation has been done, and some ecological indexes like density, frequency and rank were calculated (Băcescu *et al*, 1971).
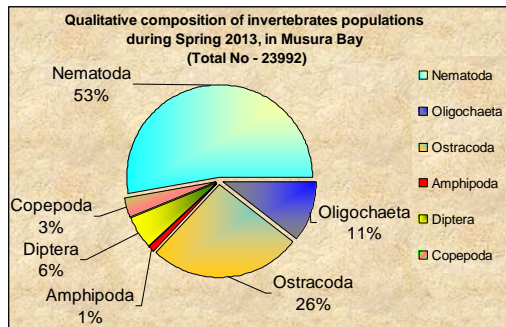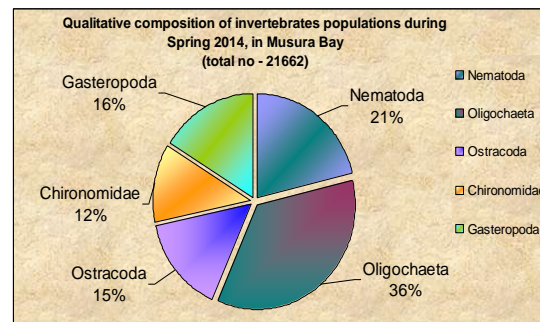

Figure 3: Qualitative composition of invertebrates' population – spring, 2013
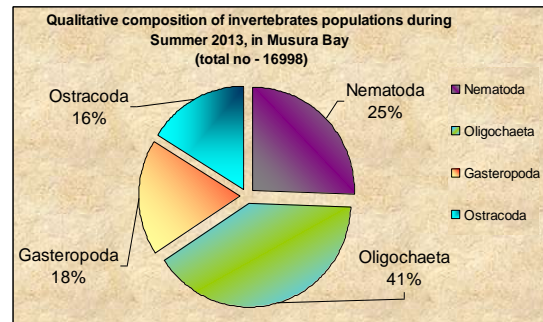
Figure 4: Qualitative composition of invertebrates' population – summer, 2013
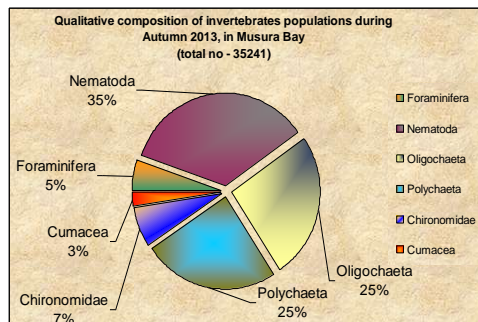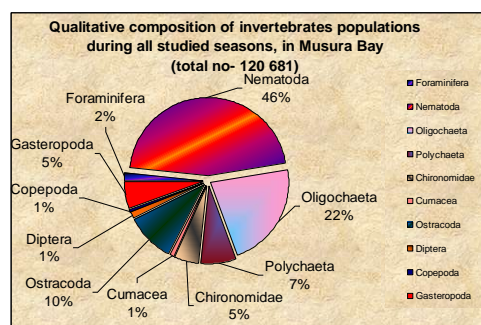

**Figure 5:** Qualitative composition of invertebrates population – autumn, 2013

Figure 6: Qualitative composition of invertebrates population – spring, 2014

In all quantitative samples were identified individuals belonging to: Foraminifera, Nematoda, Polychaeta, Oligochaeta, Hirudinea, Gasteropoda, Ostracoda, Copepoda, Cumacea, Amphipoda, Chironomidae (larvae) and other Diptera larvae. The proportion and their presence vary considerably from one season to another. Sedimentofile species as nematods and oligochaets have the greatest proportions throughout the studied period (fig. 3, 4, 5, 6, and 7). Representatives of these groups can harness the best the food resources founded in the muddy substrate.

Analyzing the frequency (fig. 8) of the major taxonomic groups' populations collected from the Musura Bay, it is noted that Nematoda and Oligochaeta are present in 100% of samples, being the *constant* component of biocoenoses.

Figure 7: Qualitative composition of invertebrates population for all studied seasons
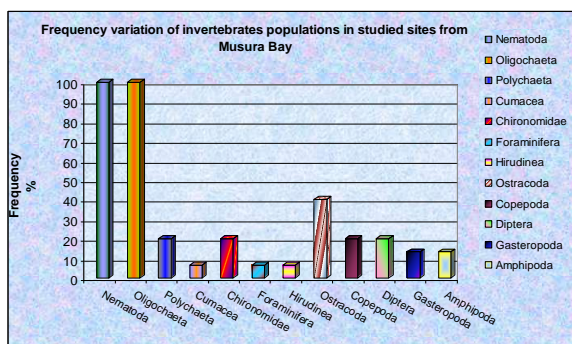
Figure 8: Frequency variation of invertebrates populations in studied sites
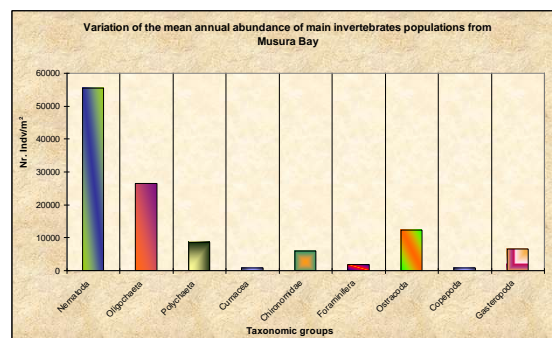
Figure 9: Variation of the mean annual abundance

Ostracoda recorded value of 40% as *accessories* species; the other groups are considered as *accidental* with values under 25%. Even some of them were found in certain sites or seasons, their presence and their abundances are very hard to take into account in order to characterized the whole ecosystem (fig. 9).

Analyzing the mean annual abundances variation of benthic populations in all sites and in dependence of sediment type composition and granulometry (fig. 9), the greatest values were recorded still by Nematoda, Oligochaeta and Ostracoda; this reveals a typical mixture of freshwater species with marine or mesomixohaline one, depending on the distance of the Danube freshwaters inflow or by the sea.

Tabel 1: Ecological significance indices W_D% and the Ranke of main invertebrates recorded groups

Nr.	Taxonomic Group /Taxon	D%	A%	W_D%	Rk
1.	Foraminifera	6,66	1,53	0,102	9
2.	Nematoda	100	45,95	45,95	1
3.	Oligochaeta	100	21,95	21,95	2
4.	Polychaeta: Alitta succinea	20	7,19	1,438	4
5.	Gasteropoda Theodoxus danubialis	13,33	5,43	0,724	7
6.	Copepoda	20	6,66	0,132	8
7.	Ostracoda	40	10,21	4,084	3
8.	Cumacea	6,66	0,74	0,049	10
9.	Chironomidae - larvae	20	5	1	5
10.	Diptera - larvae varia	20	4	0,8	6

Ecological significance indices W_D % shows that as characteristics species for the entire biocoenosis are nematodes and oligochaetes, occupying the first two rank positions. Representatives of Ostracoda, Polychaeta and Chironomidae – larvae, could be considered as accessorized species, with bigger values of dominance only in some season or in some sites.

4. Conclusions

The benthic populations from studied sites are various included 12 invertebrates' groups' inhabiting middlittoral and infralittoral waters. It is a mixture of freshwater species with marine species incoming from the sea. Even the qualitative composition is large, there are fluctuations from a season to another, and from sites influenced by the sea comparing to those situated in the proximity of the continent. These communities are selected by dominance of sand or mud in

a way more evident than the other environmental conditions (waves, temperature and turbidity) typical for the lagoon waters.

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