

The change of benthic molluscs biodiversity in the Neretva river estuary (Adriatic Sea) in a decade

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Introduction: Life communities in the shallow and sandy area of the mouth of the Neretva River are constantly under the influence of its waters, which enriches water with dissolved substances and particles, reduces the value of salinity and increases the nutrient concentration and therefore primary production. Naturally high concentrations of nutrient salts are additionally increased by intensive agricultural production. These water and sediment, which flows from the collecting area, are dispersed into the Adriatic Sea. The deposition of the coarse sediment, load as well as the dispersal of fine-grained material and river water, forms the sand banks in the estuary area, which prevent seawater intrusion in the lower river. Owing to the rich biodiversity in the area, on the land as well as in the waters, Neretva delta has been not only agricultural site, but hunting and fishing area which is exposed to inadequate and non-selective use of weapons and gears. Estuary landscape provides good opportunity for sports, especially kite boarding. All human activities connected to the marine environment, which include sand mining, pose a high pressure on natural populations, which are endangered not only by overfishing but disturbing of their habitat.

Since sandy sediment, without epiphytes and vegetation, provides habitat to the benthic biocenosis dominated by bivalve shellfish, the research on the biodiversity change of the bivalve shellfish *Chamelea gallina* Linnaeus 1758 community was conducted.

Methods: Samples were collected at two sites during 2003, 2004 and 2014, monthly. In order to detect influence of fishing, hand dredge was used. The surface material of 1 m² was collected from 5 cm thick sediment on the lower midlittoral, which is under direct influence of waves and fluctuations in sea level [1] A total of five subsamples were sampled. Collected organisms were processed and determined in the laboratory. To describe the change of biodiversity at the site during research, accounting both, abundance and evenness of the species present, Shannon–Weaver biodiversity index was used. It is calculated as follows: $H' = -\sum_{i=1}^N p_i \ln p_i$. The proportion of species (i) relative to the total number

of species (p_i) is calculated, and then multiplied by the natural logarithm of this proportion ($\ln p_i$). The resulting product is summed across species, and multiplied by -1.

Results: The number of mollusc species in the shallow sandy bottom of the Neretva estuary included total of 39 species determined during researches. Average numbers of species (S), average total number of the specimen per square meter (N) and average annual Shannon–Weaver biodiversity index (H) at stations Ušće and Osinj are shown in **Fig.1**.

	2003	2004	2013-14
S (Ušće)	12,82	11,69	5,14
S (Osinj)	33,00	17,00	9,00
N (Ušće)	51,70	118,62	57,00
N (Osinj)	125,48	94,54	26,52
H'(Ušće)	1,85	1,09	0,78
H'(Osinj)	1,74	1,11	1,48

Fig.1: Sampling sites in Neretva river estuary

Discussion: The investigated area showed high biodiversity comparing to the research of macrofauna on sandy ground in Spain, where nine species of shellfish were found [2]. The annual abundance and biomass of the mollusc fauna at both stations showed declining trend. Considering the fact that the anthropogenic pressure, which includes touristic activities with direct impact on the habitat, has been increasing, decline of biodiversity is expected.

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References: [1] Battelli C(2016) A new proposal for zonation of the midlittoral in Koper Bay (Gulf of Trieste) *Acta Adriat* **57**(1):63 – 80; [2] Sardá R et al (1999) Seasonal dynamics of macroinfaunal key species inhabiting shallow soft-bottoms in the Bay of Blanes (NW Mediterranean). *Acta Oecol* **20**(4):315-326.