

SCHEDA

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TITOLO: MACROPHYTES AND ECOLOGICAL QUALITY IN THE
MARINE COASTS OF THE NORTH-WESTERN ADRIATIC SEA

Digitare una X nelle caselle di interesse:

- RELAZIONE**
 INTERVENTO PROGRAMMATO

POSTER:

- Tema:** Il ruolo della biologia marina italiana nell'attuazione della direttiva quadro per la strategia marina (2008/56/CE) e del protocollo sulla gestione integrata delle zone costiere del Mediterraneo

- Comitato Acquacoltura**
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ENVIRONMENTAL ASSESSMENT OF MARINE-COASTAL AREAS OF THE NORTH-WEST ADRIATIC SEA BASED ON MACROPHYTES DIVERSITY

~~PRIMA~~ VALUTAZIONE DELLO STATO AMBIENTALE DELL'AREA MARINO-COSTIERA A
NORD-EST DEL MAR ADRIATICO BASATO SULLA DIVERSITÀ MACROFITICA

Abstract - The macrophyte assemblages of five stations located in the north-western Adriatic Sea, from the Gulf of Venice to Salvore in Croatia, have been sampled together with some environmental parameters, including nutrient concentrations in the water column and surface sediments, in order to assess the environmental quality of these areas. Results showed that the Salvore site exhibits the highest macrophyte biodiversity and environmental quality, followed by the sites of Venice, Sistiana and Porto Santa Margherita. Nutrient concentrations and water turbidity showed exactly ~~the~~ an inverse trend.

Key-words: macrobenthos, environmental assessment, nutrients, Adriatic Sea.

Introduction - The marine coastal areas of the north-western Adriatic Sea are strongly influenced by lagoon and river outflows, which convey significant nutrient and pollutant loads (Cozzi and Giani, 2011) affecting the macrophyte assemblages of these environments. Benthic macrophytes are considered good indicators of water quality, because of their sedentary condition; they integrate the effects of long-term exposure to nutrients or other pollutants with a decrease or even disappearance of the most sensitive species and their replacement by highly resistant, thionitrophilic, opportunistic species (Murray and Littler, 1978).

The aims of this paper is to obtain information on environmental quality of these marine-coastal areas by studying the relationships between the macrophytes biodiversity and some trophic parameters of the water column and surface sediments.

Materials and methods - Samplings were carried out monthly, between May and October 2012, in five sites along the coastal areas of the north-western Adriatic Sea. From West to East they are: Pellestrina, Lido-Malamocco, Porto Santa Margherita, Sistiana e Punta Salvore (Savudrija, Croatia). Macrophytes samples were collected randomly in each station by SCUBA divers in a depth ranging from 0 to 6 meters, fixed with 4% formaldehyde and determined in the laboratory. In order to obtain the greatest number of species, macrophytes were sampled within a ray of 100 m. In two sites, Salvore and Sistiana, macrophytes were sampled also by a frame of 40×40 cm (1600 cm²) according to Curiel *et al.* (2000) and the per cent coverage of each species was determined in the laboratory by the resuspension method (Orfanidis *et al.*, 2001). At the same stations, temperature, dissolved oxygen and pH were measured by portable instruments, while salinity was determined in the laboratory by chlorine titration. Aliquots of water samples from 500 to 1000 ml were filtered by Whatman fiber filters (porosity 0.7 µm). Both the filtered water and filters were stored to -20 °C till the nutrient (soluble reactive phosphorus and dissolved inorganic nitrogen) and Chlorophyll-*a* determination. Other two subsamples of 500 ml were filtered to obtain

the suspended particulate matter after salt removal by be-distilled waters. At each site, 3 cores of the 5 cm sediment top layer were collected by a Plexiglas corer (i.d. 10 cm) and carefully mixed together in order to determine the grain-size and nutrient content (total nitrogen and total inorganic and organic carbon and phosphorus).

Results - On the whole of the sampled stations, 133 taxa of macroalgae determined at specific and intraspecific level (41 Chlorophyta, 14 Ochrophyta and 78 Rhodophyta) were recorded. The results showed that species richness and composition varied significantly among the stations; in particular, the areas with the highest species richness were Salvore (92 taxa) and Pellestrina-Lido (74/75 taxa), but the recorded taxa were very different. Salvore is colonised by both highly sensitive taxa and the seagrass *Cymodocea nodosa* (Ucria) Ascherson, whereas Pellestrina and Lido exhibit a high biodiversity, but mainly due to the presence of more tolerant species like Ulvaceae and Gracilariaceae. These macroalgae have never been found at Salvore, as they begin to appear at Sistiana, and their abundance increases towards Lido and Pellestrina. In contrast, the lowest number of taxa was recorded at Porto Santa Margherita. The percentage of common macrophytes found in all the stations was 21%, while the highest number of exclusive species (30%) was recorded at Salvore. The concentration of nutrients in the water column were the highest at Porto Santa Margherita, where the lowest number of macrophytes was found, and at Sistiana, affected by lower salinity and pH. Except for Sistiana, characterized by fine sediments and the highest content of phosphorus, organic phosphorus in particular, in the other stations sediments were mainly sandy.

Conclusions - Macrophytes species richness and composition change significantly among the considered stations, but at Lido-Malamocco and Pellestrina are quite similar. At Salvore, where waters are highly transparent and nutrients are low, the highest number of sensitive taxa is present. That is the only station where also seagrasses are present. Pellestrina and Lido exhibit a high biodiversity, but many are thionitrophilic or opportunistic species, because these stations are characterized by a greater turbidity and an increased water nutrient concentration. The flora recorded at Sistiana is quite different, because the area is affected by a freshwater outflow from karstic rocks and the influence of Trieste. As a consequence, the species richness is lower than at Salvore or at Venice sites.

The low number of species collected in the station of Porto Santa Margherita suggests that this coastal area is influenced by the outflows of the nearby Livenza River. In fact, the high water turbidity and nutrient concentrations of this station have negative effects on the presence of macroalgae. The first environmental analyses seem to indicate in the water turbidity and, in a minor extent, in the nutrient concentrations the main stressors responsible for the recorded differences among stations.

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