

Abstract

This paper emphasizes the strict analogy between the ecological zonation along the lagoon estuary of the river Natissa and the Atlantic schemes of estuarine zonation proposed by the literature. Like in other north Adriatic estuarine ecotones, the whole gradient is appreciable in only a few kilometres. The conservative feature of the true estuarine pool is pointed out.

Keywords: estuary, lagoon, Adriatic Sea, ecotone

Introduction

Our previous papers pointed out the estuarine features of the Grado-Marano lagoon [1, 2, 3], the second for wideness after the lagoon of Venice. This paper examines in detail its ecotonal communities on hard substrata, to identify analogies with the Atlantic schemes of estuarine zonation [4].

Materials and Methods

During the summer in 2000 and 2001, biological samples have been obtained in eight stations (Fig. 1) from wooden piles, that mark the navigable canals. The lagoon and the sampling methods are extensively described in our quoted papers. Both sessile and mobile benthos have been investigated; data were analysed with the Primer 5.0 software for the community structure, MDS and cluster analysis.

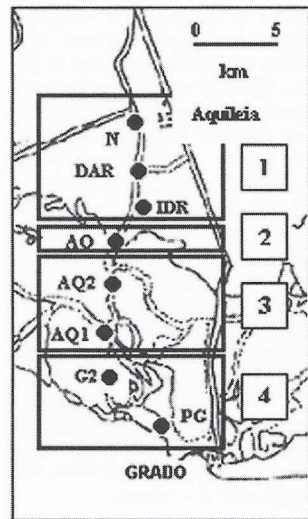


Fig. 1. The eight sampling stations with the four sectors (1-4) described in Conclusion.

Results and Discussion

More than 80 species have been identified, almost equally divided in sessile and mobile benthos. Among these, only a few species reach the town of Aquileia, where cohabit with elements of the continental domain. The richest communities, for both biomass and number of species, are placed in the middle part of the gradient, in the full lagoon sector.

This pattern is well exemplified by some structural parameters of the mobile communities (Fig. 2), whose distribution is less influenced by the aggregation of many sessile species.

The proposed example of the MDS applied on the whole community for 2001 show a clear separation in two blocks of stations (Fig. 3): the continental and the lagoon ones. The central position of the st. AQ corresponds

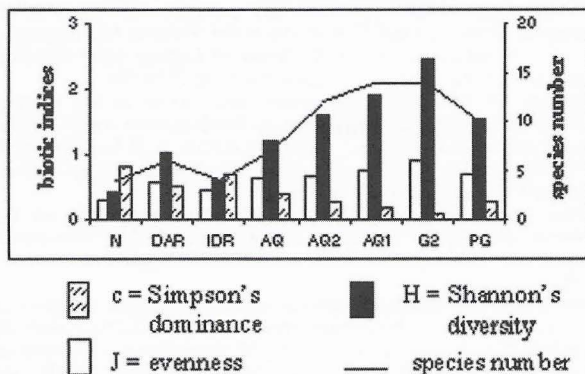


Fig. 2. Biotic indices for the mobile benthos in 2001.

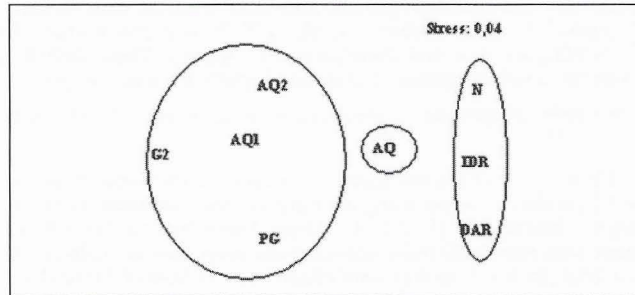


Fig. 3. MDS graph on both sessile and mobile benthos in 2001.

to the topographical collocation, at the interface between the continental and the lagoon course of the river Natissa. These assemblages are confirmed by the cluster analysis.

Therefore, the scheme proposed for Atlantic estuaries can be extended to this Mediterranean pattern, notwithstanding the reduction of the longitudinal extension.

In the upper stream, where salinities values range from 0 to 15 psu, a poor but original pool of species can be pointed out, which is recurring in analogous sectors of other estuaries [5]: the bryozoans of the family Victorellidae, the hydrozoan *Cordylophora caspia* (Pallas), the polychaete *Ficopomatus enigmaticus* (Fauvel), the tanaid *Heterotanais oerstedii* (Kroyer) and the amphipod *Leptocheirus pilosus* (Zaddach).

A few euryhaline species colonize the whole gradient, such as the bryozoan *Conopeum seurati* (Canu), the barnacle *Balanus improvisus* Darwin and the tubicle amphipod *Corophium insidiosum* Crawford.

Most of the species have been collected in the full lagoon portion of the estuary or near the sea mouth. Among these, the presence of the alloctone bryozoan *Tricellaria inopinata* (d'Hondt & Occhipinti Ambrogi) [6] is confirmed, together with a probable new species for the Mediterranean Sea, the other bryozoan *Anguinella palmata* van Beneden, whose identification must be approved by specialists.

Conclusion

The four classic sectors proposed by Mc Lusky [4] have been here recognized (Fig. 1): 1) the head of the estuary; 2) the middle reach, corresponding with the proper ecotonal transition; 3) the lower reach; 4) the mouth, near the sea port. The recurring occurrence of the same pool of species in the true estuarine portion of different estuaries signifies a strong conservative composition, whose enrichment is obstructed mainly by osmotic barrier coming from the marine domain toward the continental waters. On the contrary, the lagoon portion of the estuary is open to biological novelties, because of the little selective salinity and the favourable trophic conditions of the well vivified sectors.

References

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