

MAPPING DISTRIBUTION OF BIODIVERSITY IN MARINE RESERVES

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Abstract

An adequate knowledge of habitat and assemblage distribution has important consequences in conservation and management of Marine Protected Areas. A fine-scale study of two MPAs located in Apulia is here reported to analyse existing protection schemes and to assess if habitats and communities are properly represented in the differently protected zones and if the no-take and no-access zones are representative of the general reserve. Results emphasize that, at present, zoning is totally arbitrary in both MPAs with the consequences that detailed information on the distribution of the biota could greatly increase current zonation patterns.

Keywords: Marine Protected Areas, zoning plan, biodiversity, GIS

Introduction and Methods

A number of papers have already discussed the general lack of baseline information on biodiversity distribution in coastal marine habitats and especially within Marine Protected Areas (1, 2). This general lack of knowledge has important consequences since it prevents either an adequate zoning schemes and the potential identification of networks of habitat and communities representative at regional scale (3). A better knowledge in this field might also avoid possible sources of habitat confounding when experimental designs needing the selection of appropriate controls are used to demonstrate effectiveness of protection.

The aim of the paper is to map the distribution of habitat and communities in order to assess if they are properly represented in the differently protected zones and if the no-take and no-access zones are representative of the general reserve.

Data are reported from a series of extensive field surveys carried out in last the three years in the MPAs of Torre Guaceto and Porto Cesareo (Apulia, Italy). Both MPAs are divided in three zones (namely: A, B, C) varying with respect to the degree of restriction of human activities. Here direct observation methods, such as beach transects and SCUBA diving surveys (using global position system GPS) were adopted. Data were then imported in a GIS to create thematic maps.

Results

The MPA of Torre Guaceto (40°42'N; 17°48'E) has a surface of about 2.207 ha and is embedded within a human-dominated landscape. This MPA exhibits complex spatial patterns being characterized by a set of very different habitats (from bioconstructors to seagrasses). However, the proportion of habitat types targeted for full protection is not adequately represented. The lack of an adequate knowledge before the institution prevented appropriate decisions about reserve boundaries, with the consequences that precoralligenous and coralligenous formations and *Posidonia oceanica* meadows are not included in the no-take no access zone (Fig. 1).

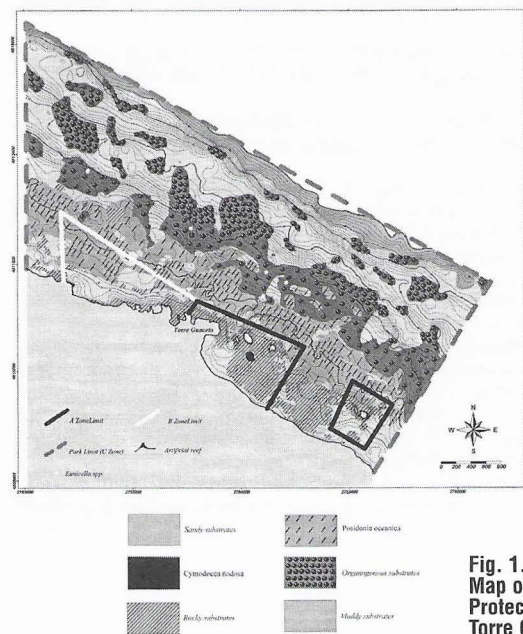


Fig. 1. Map of the Marine Protected Area of Torre Guaceto.

The MPA of Porto Cesareo (40°14'N; 17°54'E) has an extension of 16.654 ha. It is a small village with intense turistic activities. Results show that also in this case sea grasses and coralligenous formations are excluded from the no-take no access zone. Several other self-contradictions emerge. The date mussel *Lithophaga lithophaga* fishery, albeit prohibited, is very active inside the MPA, with the result that the extent of desertified seascape is continuously increasing and one of the most represented community is that of sea urchin barrens. Moreover, a sewage outfall and a fish and mussels aquaculture farm are located within the MPA in proximity of the integral protection zones and a sandy beach with free access is within the no-take no access zone (Fig. 2).

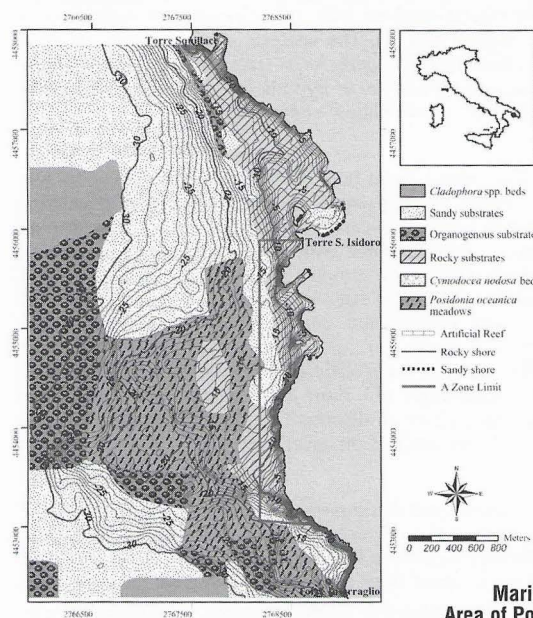


Fig. 2. Map of the Marine Protected Area of Porto Cesareo.

Discussion and Conclusion

In both cases, results emphasize that present zoning is totally arbitrary and collected data provide different scenarios for a correct zoning plan able to include both ecological and socio-economic aspects.

Thus, large-scale mapping even if are costly and time-consuming, allow managers to visualise the spatial distribution of habitats, thus aiding the planning of networks of marine protected areas and allowing the degree of habitat fragmentation (in the case of Porto Cesareo determined by the date mussel fishery) to be monitored. As Gray states (4), a mosaic of marine habitats must be protected if complete protection of biodiversity is to be achieved. Representative samples of species and assemblages distinctive of a particular locality or region should be included within reserve boundaries to grant their long-term persistence.

References

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