METHODOLOGICAL CRITERIA FOR THE SELECTION OF MARINE DISPOSAL SITES

Pulcini M.*, Virno Lamberti C., Gabellini M., Onorati F., Ausili A. and Pellegrini D.
ICRAM. Rome. Italy - mpulcini@rdn.it

Abstract

In Italy the most common management of harbour dredged material is sea dumping; nevertheless, several alternatives destinations are suggested in the recent Italian Guidelines according to the international procedures. In order to develop methodological criteria to locate marine disposal sites a multidisciplinary project was developed, integrating literature information, experimental data and G.I.S. elaboration. The attention was focused on Tyrrenian and Adriatic Sea, where five areas of interest in potential discharge operations were located. This allowed developing tools for policy makers in the decision making of environmental planning.

Keywords: coastal management, GIS, sediments

The coastal management directed to the sustainable development of human activities is a complex process that involves the systematic use and integration of different kind of information regarding environmental quality, political and economical aspects. In this context environmental planning is a process for deciding how to control the anthropogenic effects on the environment and to operate in order to protect its health.

In 1998 the Italian Ministry of the Environment, with the aim to encourage the environmental planning, financed an ICRAM (Istituto Centrale per la Ricerca scientifica e tecnologica Applicata al Mare) research program to indicate the methodological criteria for the selection and management of marine disposal sites.

Dredging activities are necessary to allow the functionality of the harbours and large amount of dredged sediments have to be removed and disposed off every year.

According with the international criteria (1,2,3) about the management of the dredged material the Italian Guidelines (4) suggest different alternatives in relation with the integration of chemical-physical and ecotoxicological characteristics, to define several classes of sediment quality. In relation to the harbour sediment quality the guidelines advise the destination of clean sediments for beach nourishment, as first management solution; secondly, different kinds of reuse, after or without specific mechanical treatment are proposed. Several examples of the most common international reuses and destinations are on confined disposal sites in harbours, manufacture of building material and wetlands creation. When is not possible to pursue these aims the clean material can be dumped in to the sea.

In Italy, at the moment the cleanest harbour dredged material is still disposed in marine dumping sites, after the assessment of its environmental suitability to receive sediments. As reported in the Guidelines, the sites have to be monitored during and after the dumping activities, in order to investigate possible environmental and economic impacts.

In this paper is briefly described the methodological way adopted to individuate suitable dredged material disposal sites.

The main objectives of the project were related to :

- creation of a database of environmental parameters;
- data management and maps creation by using a Geographic Information System (G.I.S);
- rationalisation of the use of sea bottom and protection of the natural resources;
- implementation of a balanced relation between the economic activities and the ecosystem.

In this study lasted two years we took in consideration the environmental characteristics (geochemical, biological, ecotoxicological) and economical aspects of two different Mediterranean Sea areas: the first one from La Spezia (Ligurian Sea) to the Circeo Promontory (Tyrrhenian Sea), the second from the Po River to the Conero Promontory (Adriatic Sea).

We collected all the bibliographic information about the presence of protected areas, the localisation of the fisheries nursery areas, the grain size distribution, the organic (IPA, PCB, DDTs) compounds, trace metals and the macrobenthic characteristics of the sea bottom from the coast to the isobath of 200 m. Particular attention was given to the information about all the marine disposal sites used in the past to dump dredged material and the amount of sediments discharged for each single site, to the localisation of marine optic fiber cables, platforms, no anchorage area, rifle ranges, etc. In figure 1 an example of a map reporting this information for a limited coastal region is represented.

In order to make up for local insufficient literature information, in 1998 and 1999 two field sampling activities in some marine areas were carried out. Considering the total lack of ecotoxicological data regarding Italian coasts, particular attention to the application of bioassays using different specie-test was given, in order to evaluate the bioavailability of contaminants.

From the economical point of view we analysed the most important fishery activities in the investigated areas and the requirements of each harbour, such as the amount of dredged material per year, in order to create a specific database to utilise in mapping creation and GIS elaboration. At the same way all the information obtained from bibliography and surveys were mapped by G.I.S; subsequently, different maps have been overlapped, in order to integrate the available information and to select specific marine areas to locate dumping sites with the aim to limit as possible environmental impacts (5,6).

The integration of bibliographic information, surveys data and GIS elaboration's allowed to identify five possible zones (one site in the Adriatic Sea and four in the Tyrrenian Sea), to locate dumping sites considered compatible with marine environmental and social-economical conditions.

This project represents one of the first Italian attempts to provide new methodological criteria of environmental planning available for policy makers and planners in the decision making regarding the protection of the environment and other social values.

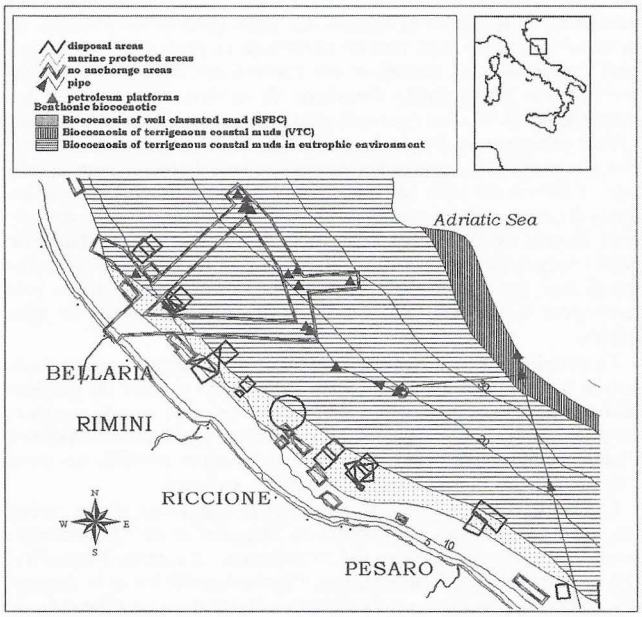

Figure 1. Example of map overlay between sea use and biocoenotic information in a limited area of adriatic coast.

References

1) Anzecc (Australian and New Zeland Environment and Conservation Council), 1998. Interim ocean disposal guidelines, pp 148.
2) EPA, 1992. Environmental Protection Agency Evaluating Environmental effects of dredged material managment alternatives. A technical framework.
3) UNEP, 1999. Guidelines for the management of dredged material. UNEP(OCA)MED WG. 161/6, pp 33.
4) ICRAM, 2001. Linee Guida sulla movimentazione dei fondali marini e di ambienti ad essi contigui, Quaderno ICRAM (in press).
5) Ashdown M. and Schaller J., 1990. Geographic information systems and their application in MAB-projects, ecosystem research and environmental monitoring. MAB – *Mitteilungen* 34: pp.250.
6) Mills N. L., 1989. A multi-phase approach to site selection. *Site-selection and Industrial Development*, 158(3): 769-773.