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Istituto Superiore per la Protezione
e la Ricerca Ambientale



***Special Session:
Dredged material assessment nowadays and in the future***

Dredged material assessment in Italy

**Serena Geraldini
ISPRA**

7th international SedNet event
6-9 April 2011 - Venice, Italy



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The Institute for Environmental Protection and Research, ISPRA, has been established by Decree no. 112 of 25 June 2008, converted into Law no. 133 (with amendments) on 21 August 2008.

ISPRA performs, with the inherent financial resources, equipment and personnel, the duties of:

- ex-APAT, Italian Environment Protection and Technical Services Agency;
- ex-INFS, National Institute for Wildlife;
- ex-ICRAM, Central Institute for Scientific and Technological Research applied to the Sea.

The Institute acts under the vigilance and policy guidance of the Italian Ministry for the Environment and the Protection of Land and Sea.

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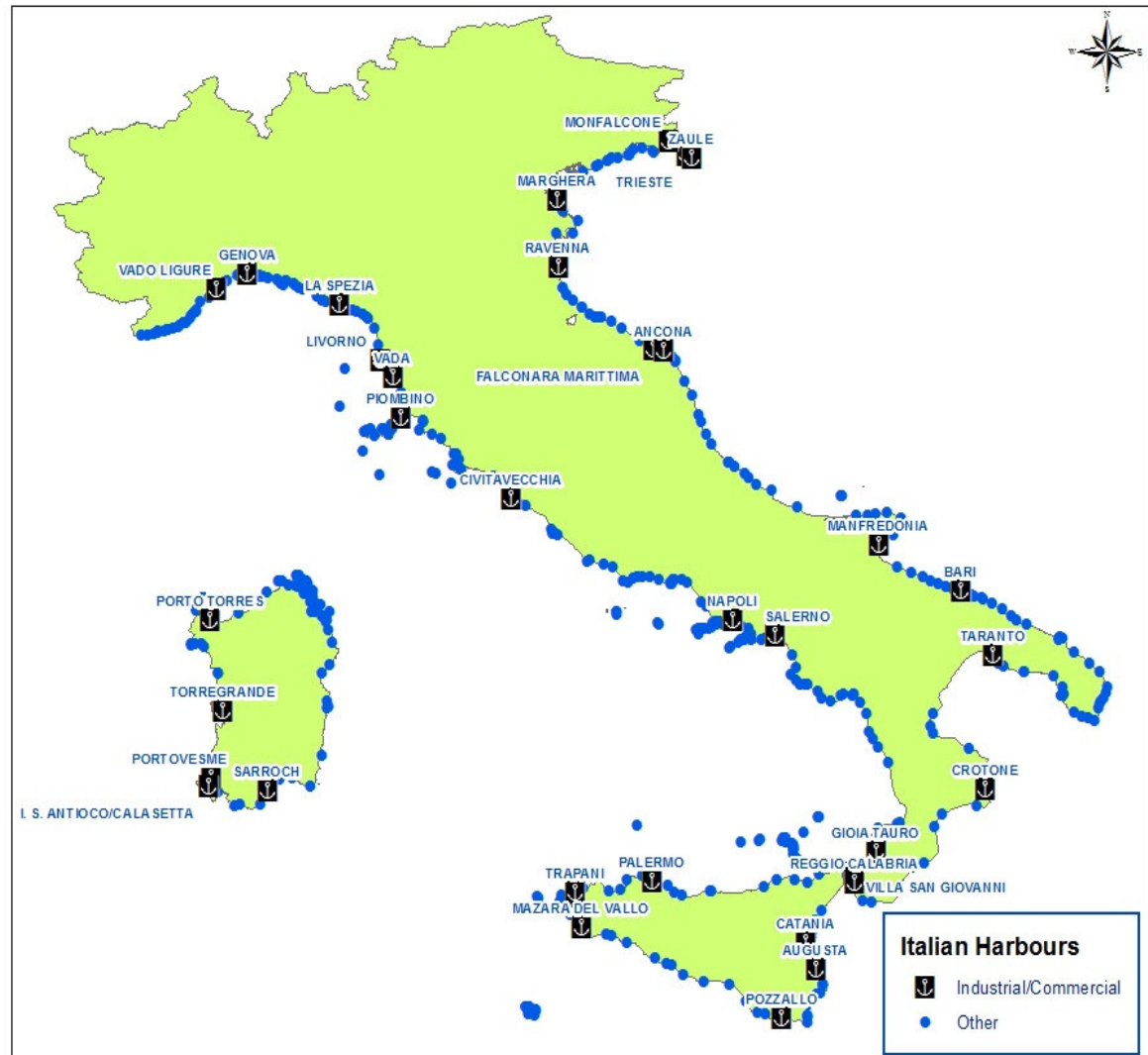
Italian scenario on dredged sediment assessment

Dredging of sediment represents an issue of great social and economic relevance in Italy.

Large coastal development:
Italy has about 7,500 km of coastline.

Port traffic represents an important economic resource and, in order to be competitive, several ports need to realize infrastructural works and to deepen navigational channels for port development.

Furthermore, maintenance dredging periodically takes place in order to preserve navigability.



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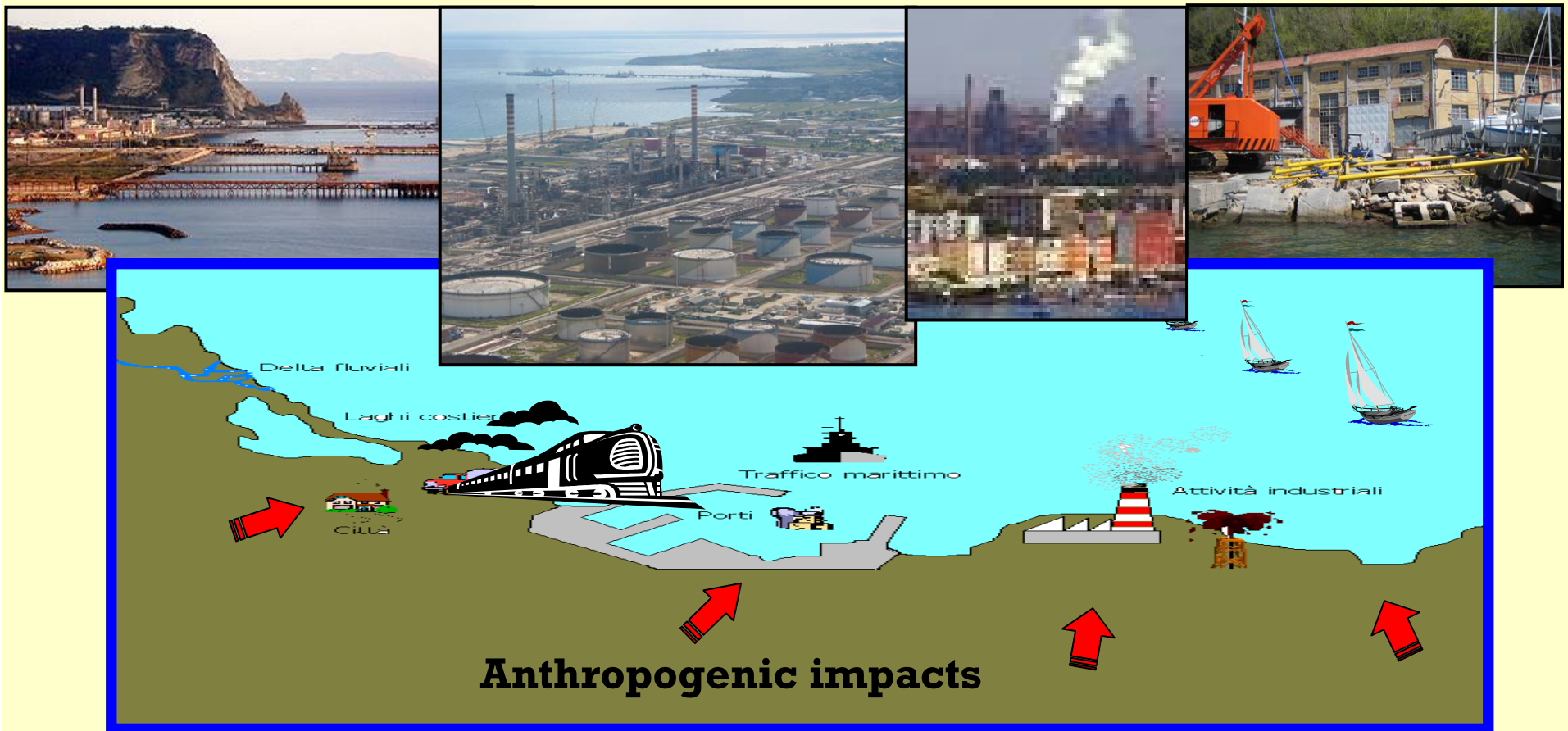
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In most cases, the big port areas serve large industrial sites, where extremely heterogeneous and often heavily impacting activities are located.

Costal areas are the receptors of mineral or organic solid particles, coming from natural chemical and physical processes, and of contaminants, discharged by industrial effluents into water bodies, sea, river or lake, that eventually build up in sediments.



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National Relevance Contaminated Sites (concerning sea areas)



heavily impacted sites for which the Italian Government has allocated specific resources for remediation

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LARGE HARBOUR



major ports in terms of commercial and industrial

- maintenance dredging, capital dredging, remediation
- huge quantity of sediment to be dredged
- high contaminated sediment to be managed
- infrastructural needs



They have the possibility to combine the infrastructural projects of PDPs (piers, docks, etc.) with the necessity of managing large volumes of dredged sediments (containment areas, treatment plants)

SMALL HARBOUR



marinas

- frequent need for maintenance dredging
- few volumes of sediment to be dredged
- low contaminated sediment to be managed



They cannot usually afford the costs of building containment areas and/or setting up plants for sediment treatment



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Remediation of contaminated sites

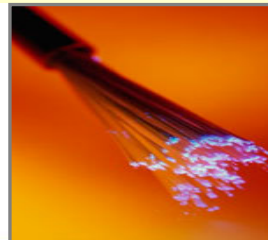


**deepening of access
channels and port waters
(maintenance dredging)**

**Need for managing sediments
dredged because of:**



**Infrastructural works
(capital dredging)**



Laying of cables and pipelines

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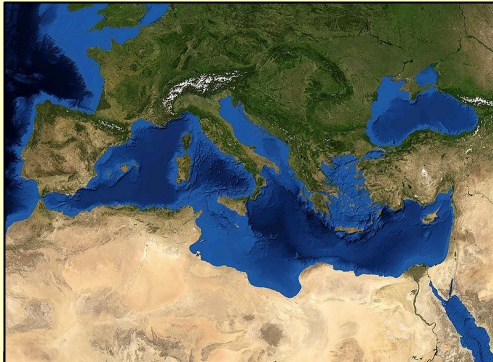


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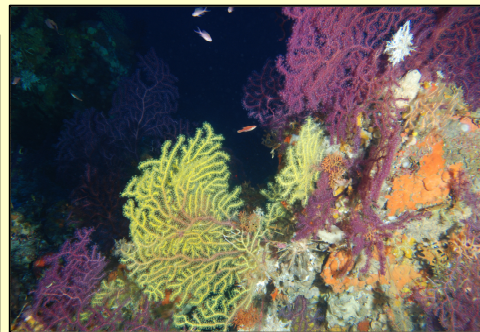
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Dredging activities environmental context



- Mediterranean Sea as sensitive and vulnerable area
- Different ecosystems (harbours, lagoons, wetlands, rocky coasts, sandy coasts, etc.)
- Highly heterogeneous sediment characteristics (geochemical, physical, chemical, microbiological)
- A lot of peculiar environments and sensitive marine communities (i.e., *P. oceanica*, coralligenous biocenoses, etc.)
- Different “destinations of use” (industrial areas, trading areas, recreational zones, fishery zones, aquaculture plants, Protected Areas, etc.)



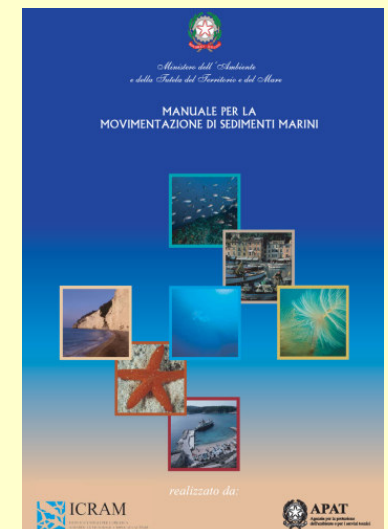
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Art.1, par. 996 of Law 296/2006 and its implementing decree (2008):

A specific law to ease port dredging activities within the National Relevance Contaminated Sites, where also remediation must be realized. Dredging can occur even when the overall remediation process is still in progress, combining port needs and environment care. It includes the criteria for sediment characterization (according to a chemical, physical, microbiological and ecotoxicological approach) and possible management options (filling of coastal CDFs, beach nourishment and, eventually, a controlled disposal into sea).

"Manual for the handling of marine sediments" (2007):

A national technical document according to the pertinent national legislation (D. Lgs. 152/06). Criteria are provided for the whole sediment dredging process, from the characterization to the final sediment destination. In particular, criteria are given to identify different sediment quality classes and to select the proper management option depending on the quality class.

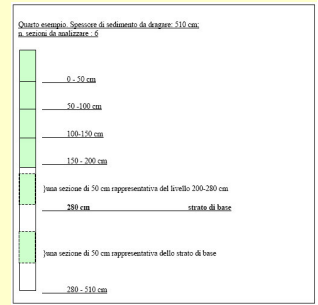
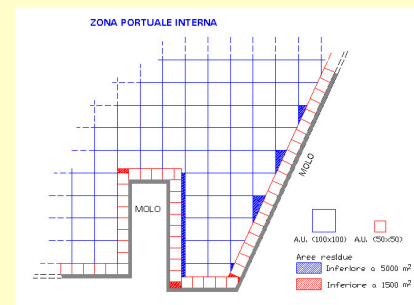




Common approach of the Italian legislation for the management of dredging processes

Characterization

to investigate physical, chemical and microbiological characteristics of the entire volume of sediments to be dredged (surface and depth)



Additional characterization

Evaluation (Integrated approach)



CHEMICAL ANALYSES

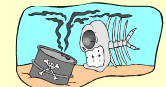


ECOTOXICOLOGICAL ANALYSES (bioassays, bioaccumulation tests, biomarkers)

SEDIMENT QUALITY



suitable to be in contact with aquatic environments



sediments with potential risk

Dredging (Environmental)

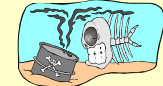
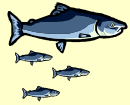


When sediments to be dredged are contaminated, attention has to be focused on the minimization of the impacts. Environmental dredging and a monitoring action is required

Management options



Management options



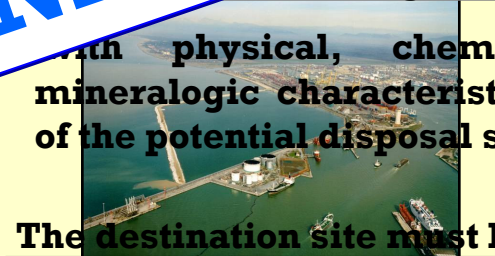
Beach nourishment



Open water sea disposal



**Confined Disposal Facilities (CDFs)
Harbour structures (piers, docks)**



Dredged sediments can be disposed within watertight CDFs:

- contaminated but not hazardous

Filled CDFs can be used as permanent works

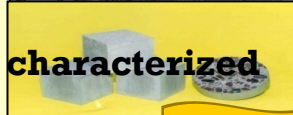


Specific treatment can be executed

with physical, chemical, microbiological and mineralogic characteristics similar to the sediments of the potential disposal site



The destination site must be characterized



Beneficial reuses

MONITORING

environmental and morphological restoration





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Management of dredged sediments in Italy: **PROBLEM 1**



NEED OF LARGE SCALE INTEGRATED SYSTEMS FOR DREDGED SEDIMENT MANAGEMENT

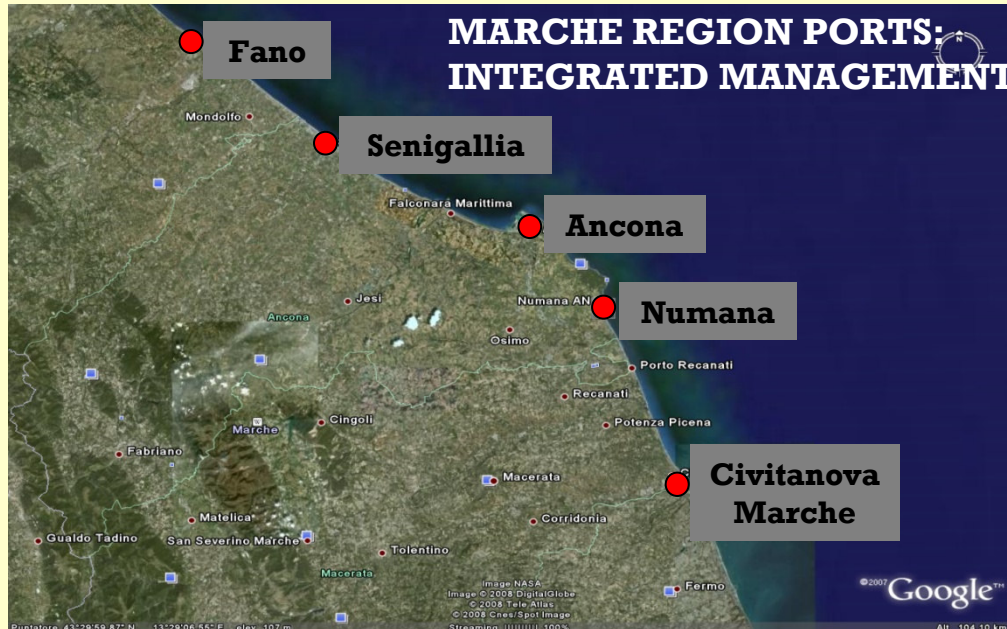
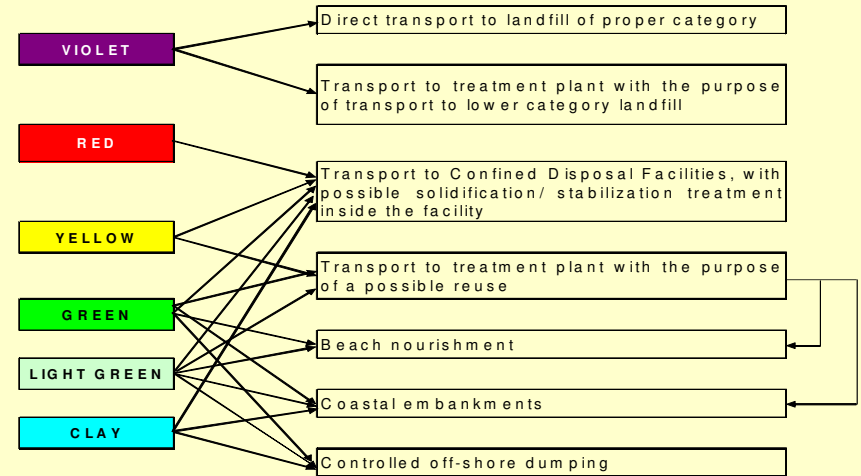
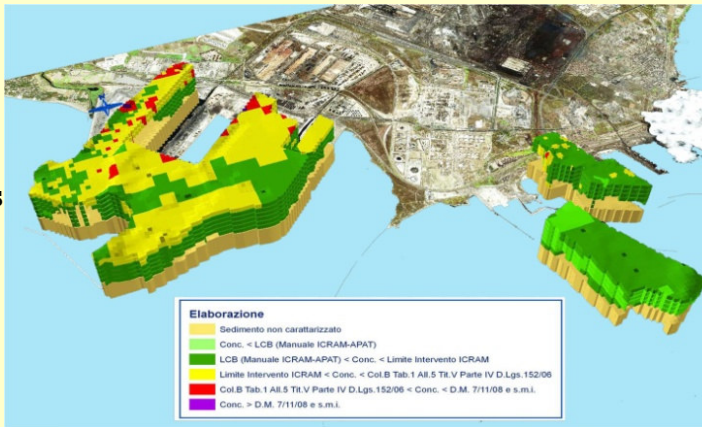
ON REGIONAL AND NATIONAL SCALE

- **Take into account different scenarios (dredged volumes, sediment quality, infrastructural needs, navigability, environment conditions, existing treatment plants, legislation)**
- **Satisfy overall needs (infrastructure development, remediation, beach nourishment, environmental and morphological restoration, environmental protection, sediment reuses according to market demand)**
- **Outline additional measures for sediment management (sediment treatment activities, structures for sediment confinement, open water disposal sites, etc.)**



Examples in which an integrated management system has been proposed for sediments to be dredged

PORT OF TARANTO:
According to the PDP and to the environmental laws an integrated system of several sediment management options has been proposed



By means of a regional integrated solution these ports can use their dredged sediments for beach nourishment, open water disposal and to fill a CDF in the port of Ancona



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Management of dredged sediments in Italy: **PROBLEM 2**



LACK OF SPECIFIC LEGISLATION FOR UP LAND MANAGEMENT OF MARINE DREDGED SEDIMENTS

- **Since there is often the need to manage big volumes of largely heterogeneous sediments, it is extremely important to identify feasible solutions for up land reuse.**
- **Applied research of treatment technologies has to be increased in order to find processes able to decrease contaminant levels in the marine dredged sediments and/or to separate dredged sediments into classes with homogeneous physical and chemical characteristics.**
- **Testing different treatment technologies (such as grain size separation, sediment washing, la solidification-stabilization, thermic process) at proper plants or within CDFs can be the solution to manage different type of contaminated dredged sediments.**
- **The increase in knowledge of different treatment technologies (together with the testing of treated sediments reuse in civil engineering works or for environmental and morphological restoration) can provide relevant technical and scientific support in order to improve existing legislation.**

Nowadays ISPRA is evaluating the process efficiency of several treatment technologies applied to marine sediments with different physical and chemical characteristics.



1. SETTING UP AN INTEGRATED MANAGEMENT SYSTEM, ON REGIONAL AND NATIONAL SCALE

+

2. THE IMPROVEMENT OF EXISTING LEGISLATION FOR MARINE SEDIMENT UP LAND REUSE



- **Selection of the appropriate solutions environmentally sustainable for the management of the “resource” dredged materials**
- **Decrease in overall management costs**



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Thank you for your attention!

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