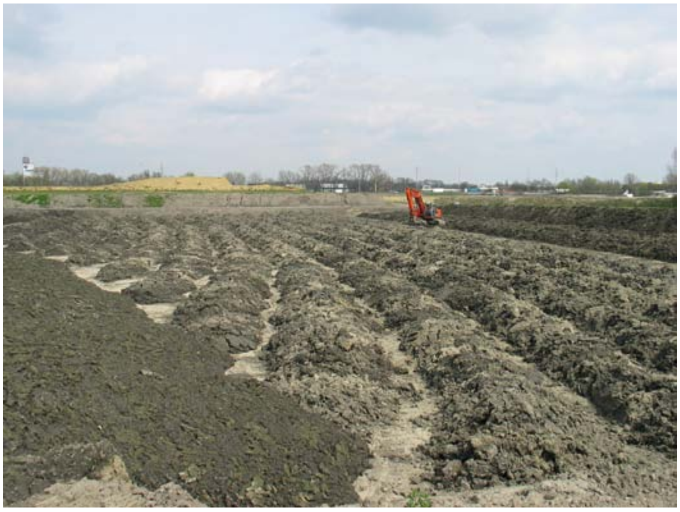
Central Dredging Association

Dredged Material as a Resource: Options and Constraints

Dredging is essential for the maintenance and development of ports, harbours and waterways for navigation, remediation and flood management. This generates large volumes of dredged material. This material can be a valuable resource although much of it is currently disposed because of economic, logistical, legislative or environmental constraints.

Although not common practice in all parts of the world, there is a growing recognition that dredged material is a valuable resource and an interest exists in creative solutions for its use. The use of dredged material has a major contribution to make to sustainable development and can reduce the quantities of primary resource needed for activities such as construction and habitat creation. Some countries do already make extensive use of dredged material, for example in Japan in 2003 more than 90% of dredged material was used. In other countries a number of constraints have prevented more extensive use. These include higher costs than traditional disposal, complex and inconsistent legislation and regulation, the difficulty of finding suitable schemes for using the material at the appropriate time or markets for treated products and sometimes a negative public perception.

Recently it has been recognised that the complete removal of dredged material from a natural system may alter the morpho-dynamic structure and ecological functions of the system, and that an alternative may be to maintain the sediment supply within the local system by recharge at rates that retain existing structure and function. Such practices have been defined as sustainable relocation or 'sediment cell maintenance' and should be considered as one of the many possible uses of dredged material. In some situations it is appropriate to consider such management techniques prior to any use of the material outside the immediate water system. A survey of the disposal and use of dredged material in Europe conducted by CEDA in 2005 showed that less than 10% was used. However this figure did not include sustainable relocation in river and near coast systems and it was estimated that a further 30% was used this way. Examples include the river Scheldt where dredged material is recharged into both Dutch and Belgian sectors and in the UK Humber Estuary where an average of 7 million cubic metres of material is deposited annually within the estuary system.



Treated dredged material is used to prepare a brownfield site for building. (Fasiver Project, Belgium).
Top: Arial view of the site
Bottom: Dredged material is being dried and worked

Where material is removed from the immediate dredging area, a range of uses of dredged material can be adopted. These have been classified into two broad categories within the PIANC report no 104, compiled by PIANC EnviCom Working Group 14, which was chaired by CEDA, and on which much of the information for this paper is based. The categories are:

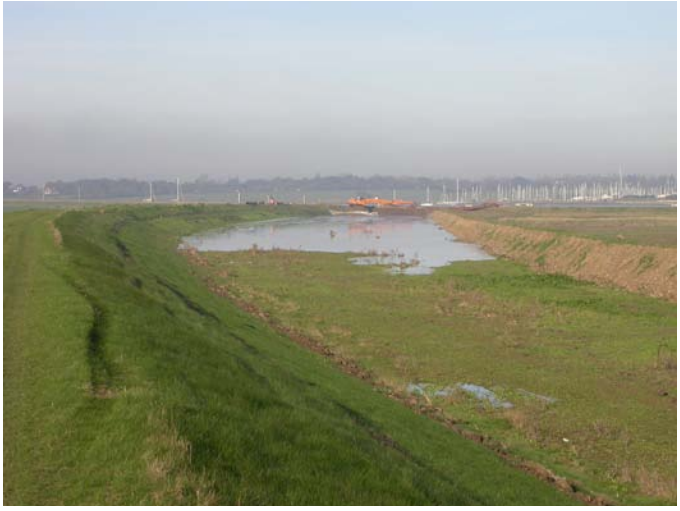
- Engineering Uses such as for construction materials, isolation, flood defence, land reclamation and beach nourishment.
- Environmental Enhancement including habitat creation and enhancement, aquaculture and recreation.

Early consideration of the use of the dredged material when first planning the dredging project is key to its successful use. The possibility of retaining it within the system for environmental benefit is a first consideration.

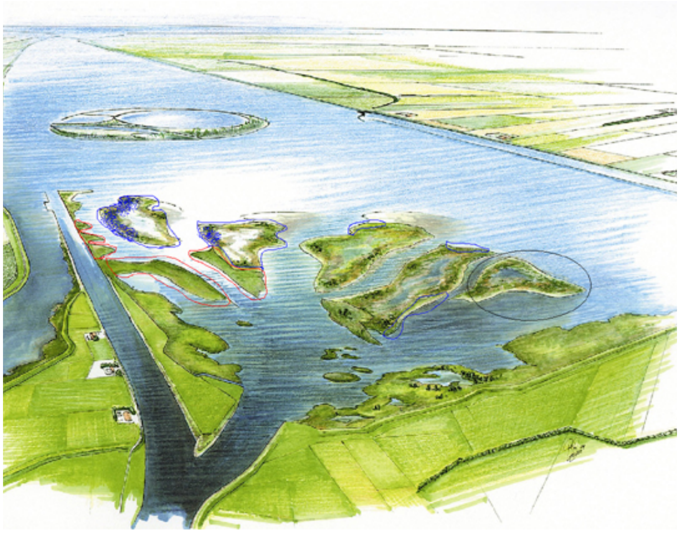
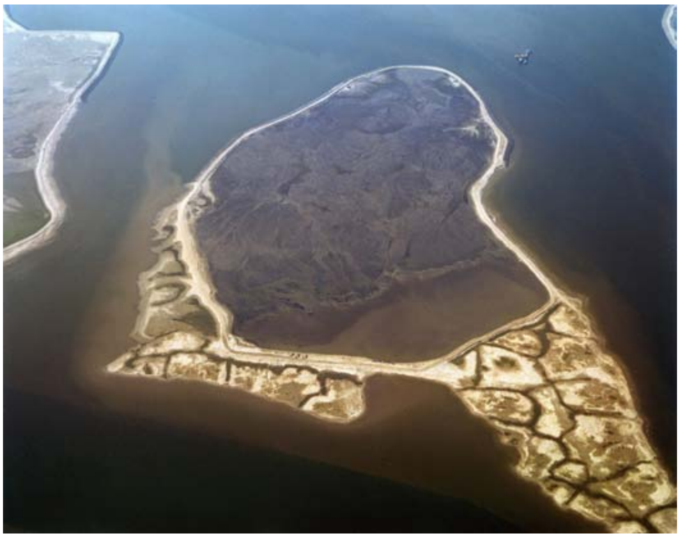
The PIANC Working Group examined the practices for successful use of dredged material from around the world and concluded there are many possibilities for increasing the use of dredged material but that currently there are constraints that restrict such use. To remove these constraints and so maximise its use, it recommended a number of actions:

- Communicate. The imperative is to gain support from the public, regulators and wider stakeholders to view dredged material as a valuable resource and to recognise a contribution to sustainable development.
- Employ sound economics. Saving primary resources through the use of dredged material should be recognised and a proper evaluation of the costs and benefits to society made.
- Interpret legislation. It is important that national policies do not classify dredged material as a waste by default. We should adopt legislation that characterises dredged material as a potential resource and remove conflicting language in existing legislation
- Co-ordinate supply and demand. It is necessary to co-ordinate the supply and demand on a local, regional and river catchment scale.
- Employ good technical and management approaches. These include planning, handling and delivery schedules, process management and quality control.
- Develop a sound understanding of environmental benefits and risks. These must be understood at a project scale.
- Promote environmental enhancement through the use of dredged material, using examples from around the world.

The quality of dredged material reflects the environment from which it is dredged, and in some instances is subject to contamination from local or distant sources. The presence of contamination does not rule out its use, but must be taken into careful consideration in selecting that use. Treatment of dredged material to stabilise or remove contaminants may be required before it can be used. This is likely to increase costs and handling time. The treatment technologies in use around the world were considered in the PIANC report, and a range of possibilities presented. The principle treatment technologies available include separation, dewatering, thermal immobilisation and bioremediation. Treatment in relation to use of dredged material generally refers to removed dredged material since treatment in situ for is not usually an option. The quality of the sediment defines whether a treatment is feasible or not. In most cases the content of heavy metal and organic contaminants is primarily related to grain size. In general the finer the particles and the higher the content of organic matter in the sediment, the higher potential for contamination, although there are contaminants such as Tri-butyl tin, TBT, where the contamination is present as paint flakes and hence also present in the larger particle size fractions.



Maintenance dredged material is being pumped into containment bunds to create new salt-marsh (Wallasea, UK).

Use of maintenance dredged material for nature development in the riverdelta IJssel, Netherlands. Left: Artist impression. Right: Island under construction

It is important to find realistic solutions for treating dredged material based on site- specific conditions and type of dredged material. Simple technologies such as sand separation, land farming, ripening and stabilisation can be applied if the material is not heavily contaminated. More advanced technologies such as immobilisation may be required to treat heavily contaminated sediments. Technology is available for all kinds of treatment processes, however treatment costs should be considered within the cost- benefit analysis of each project.

In conclusion there are extensive options for the use of dredged material and these contribute to societal benefit. Much dredged material can be used directly within water systems or on land after dewatering. Contamination does not rule out its use, but requires stabilisation or removal that increases its costs. A range of factors will contribute to overcoming the current constraints on dredged material use including communication, recognition of the broader socio-economic advantages, matching supply and demand and appropriate legislation. This information paper recommends a series of actions to maximise the use of dredged material. For those readers considering the use of dredged material, we recommend the PIANC report and the recent IADC document "Facts about dredged material as a resource" for further reading.

References:

PIANC 2009. PIANC report no 104-2009 Dredged Material as a Resource: Options and Constraints. Available from http://www.pianc.org

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