

Dredging and the environment: moving sediments in natural systems

Dredging is necessary

Dredging is a necessary activity in civilisation's development. In its simplest form dredging consists of the excavation of material from a sea, river or lake bed and the relocation of the excavated material elsewhere. It is commonly used to improve the navigable depths in ports, harbours and shipping channels, as a tool in water and flood management, creation of new lands and natural habitats, or to win minerals from underwater deposits. Dredging is therefore of crucial importance for sustainable development of nature resources, economic values and human quality of life.

Dredging changes the environment

By its very nature the act of dredging will change the environment. Dredging projects are executed to alter the watersystem as desired, which inevitably has an effect on the aquatic ecosystem. It is therefore common practice, when planning dredging activities, to determine the positive and negative effects on the aquatic environment and the duration of such effects.

The marine and fresh water environment is a complex combination of natural features and phenomena, supporting a diverse but largely concealed, aquatic ecosystem. Because of this complexity, predicting the effects of human-induced interventions and short-term operations can be extremely difficult. Comprehensive and detailed investigations of environmental characteristics are commonly a prerequisite for any planned dredging activity.

Because of the complexity of the system in which dredging takes place, each dredging project is unique. The local, natural conditions have to be taken into account and the effects should be evaluated in relation to natural dynamics and fluctuations. These include hydro-dynamics (including storms), ecology and sediment quality. In addition, legislative, socio-economic and other functions such as shipping and fisheries should be considered.

Evaluation of environmental impacts should examine both the short- and long-term effects, as well as the sustainability of the altered environment. If necessary, appropriate control measures

should be taken to avoid or reduce unwanted impacts and to meet specific environmental objectives. The dredging industry has a large array of dredging tools and techniques available to take the necessary measures.

Dredging is sediment management

When starting a dredging project, it is of utmost importance to investigate and understand the sediment balance. Are there any environmental requirements concerning the return of sediment into the natural system? Are there any concurrent projects in the region that can benefit economically and environmentally from the envisaged dredging works? Such approach ensures minimal dredging volumes and optimal use of the dredged resources for the project.

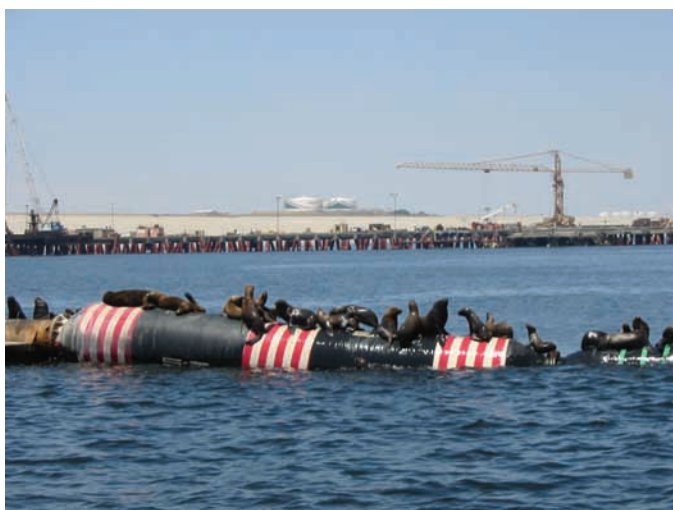
Experiences have proven that there are several options for sustainable relocation of dredged material. Typical uses include beach nourishment for coastal defence, the creation of wetlands for recreation and wildlife sanctuaries, reclamation of land for commercial and industrial development and the use as a construction material. Most dredged material is uncontaminated and can be used directly under water or on land after dewatering.



Beach nourishment for a dune compensation project on the Delfland Coast, the Netherlands. Sand is pumped to site through a pipeline crossing the 'Van Dishoorn triangle', a land reclamation near Port of Rotterdam.

Dredged material can thus be a valuable resource but unfortunately too much of it is currently being unnecessarily disposed. To change this practice, use of dredged material is actively encouraged by the controlling authorities and the legislative framework. A positive turning point is that the European Commission recently decided that sediments relocated inside surface waters are now excluded from the scope of the EU Waste Directive if it is proven that the sediments are non-hazardous.

In certain cases the (in situ) contaminated sediments may pose a potential risk to the environment for which remediation should be considered. The most common option is to remove the contaminated sediments and place them in a more secure location such as a Confined Disposal Facility (CDF). In that way dredging is a tool to improve the quality of the aquatic ecosystem. Care must be taken to ensure that release of contaminated sediments into the water column is minimized. Another option may be to isolate the contaminated sediments by capping them with clean dredged material. Ultimately, contaminants can be stabilized or removed by treatment techniques to make it suitable for use, but it should be noted that any treatment or handling step will increase the costs. Long-term improvement does, of course, depend ultimately on preventing pollution at its source.



Sea lions love dredging

Dredging is legislated

The London Convention of 1972 can be regarded as a starting point of the development of the legislative framework for dredging. It is part of the international framework of (environmental) legislation related to management of dredged material.

The legislative framework contains international regulations, which must be implemented by national authorities, for example in Europe the Water Framework Directive, the Waste Directive and the Bird and Habitat Directive. This EU legislation is being translated into national legislation in a number of different ways. Dredging operations have to comply with a complex patchwork of

international and national regulations, and a good understanding of these legislative demands is crucial for successful dredging project.

Dredging is “building with nature”

Sustainable dredging implies full consideration of the environment from the very first planning phase of a project. The principles “Building with Nature” and “Working with Nature” mean that the design of the project uses the natural environment and its dynamic processes as a starting point. Project designs explore the potential for nature development, making use of natural processes for placement and redistribution of dredged material.

Another example is the use of dredged material aimed at the enhancement of the environment.

Conclusions

Dredging is a pre-requisite for sustainable development and improvement of nature resources, economic values and human quality of life.

Present day management strategies involve the implementation of control measures to avoid-, mitigate- or compensate- project impacts based on a sound assessment of anticipated and evaluated environmental effects.

Dredging operations are carried out in full compliance with relevant legislation. It is important that during further development of the legislative framework the necessity of dredging and the usefulness of dredged material is recognised. EU adopted this insight and excluded dredged materials from the scope of the EU waste directive if they are proved to be non-hazardous.

The relocation of dredged material into the aquatic system will help maintain the natural sediment balance. It is an important environmental and economic resource, and use of dredged material should be encouraged by legislation.

Present day dredging projects should be conscious of the natural environment and work in line with nature to optimize designs and working methods.

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