Environmental Aspects of Dredging in Ports

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What is CEDA?

- an independent, non-governmental, non-profit professional association for the dredging community
- interest includes all aspects of dredging
- members are drawn from many different fields (individual and corporate)

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What is CEDA?

- is a vital network for the exchange of knowledge and experiences in dredging
- is a centre for communication and training about environmental aspects of dredging
- is a platform for promotion of dredging as a tool for sustainable development

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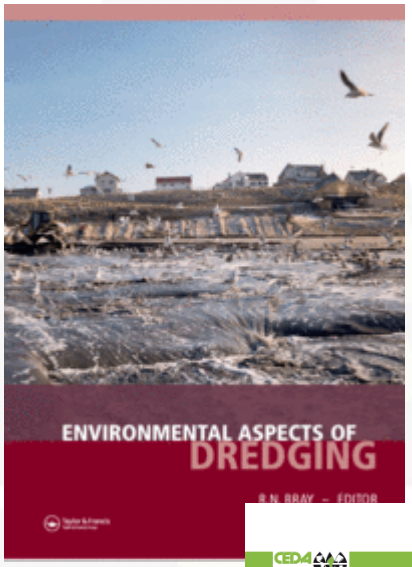
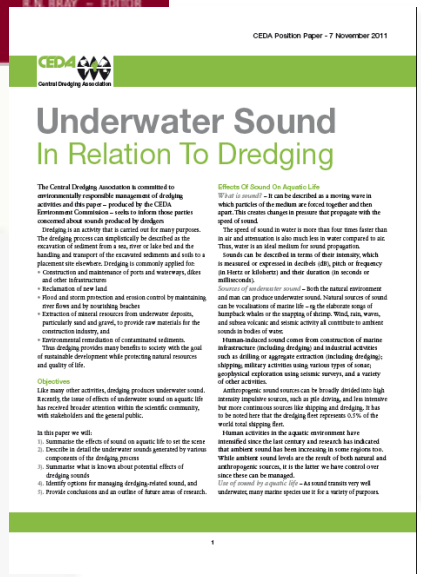
Activities

- Workshops/seminars/webinars
- Task groups
- Participating in LC, OSPAR, Danube Commission
- WFD Navigation Task Group
- Marine Strategy FWD
- Positioning papers
- Own guides
- Other guides
- Environmental Day on WODCON




CEDA Position Paper - 7 November 2011

Underwater Sound
In Relation To Dredging

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Need for Dredging

- Capital works
- Maintenance
- Land reclamation
- Flood management
- Clean up

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Environmental Impacts

- (Short-term) effects of the dredging activity:
  - –suspended sediment leading to turbidity;
  - –overflow from hoppers;
  - –loss of dredged material during transport (hopper, pipeline);
  - –loss of benthic fauna at dredging or placement site:
  - - sound

- Decision-making on dredging needs a site specific assessment to determine if there are unacceptable effects and if they can be sufficiently mitigated or compensated

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Mitigation of Potential Environmental Impacts

- Improve accuracy
  - dredging thin layers and reduce dredging volume
  - improved onboard automation and monitoring
- Reduce turbidity
- Reduce spill, loss
- Minimise dilution, increasing density

Examples of mitigation measures

- Measures on board the dredger
  - Special designed cutter heads, degassing systems, monitoring
  - Careful navigation in shallow water
  - Limit overflow
  - Avoid spillage from open barges/hoppers
- Measures at the dredging site
  - Silt screens
  - Complete enclosure of the dredging equipment
- Measures at the placement site
  - Underwater diffuser
  - Seasonal restrictions/tidal restrictions
  - Confined Disposal Facility

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Management options for destination of dredged material

- Relocation in the aquatic system preferred option to maintain sediment balance
- Use directly or after treatment
- Un/semi confined aquatic placement
- Confined disposal facility

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Sustainable Management of Dredging

- Cleaning up contaminants
- Minimising transport (energy, air pollution)
- Using dredged materials
- Closed balance of material
- Do nothing !
- Sensible decisions (emotion)
- Use available knowledge

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WODA PRINCIPLES OF SUSTAINABLE DREDGING

1. Social, environmental, and economic objectives should be systematically considered and integrated
2. Work with natural processes and the site-specific characteristics of ecosystems
3. Stakeholders should be engaged at the earliest conceptual stage
4. Use scientifically based criteria and guidelines
5. Beneficial use of dredged materials should be given priority
6. Dredging can be a key solution for remediation and restoration
7. monitoring and assessment information before, during and after project

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The experience of CEDA

- Most of dredged sediments are not contaminated.
- Dredging is is part of the solutions and a dredging decision has to be taken based on a management plan.
- Source control is the first option for a real solution of a problem where contaminated sediments are involved.
- Placing dredged material back into the estuarine or coastal system can be the best solution to safeguard the ecological conditions.

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The experience of CEDA

- Treatment of dredged material can be considered as a last resort. Not as a standard solution. First beneficial use, than storage and finally treatment
- The only operational treatment techniques are separation and dewatering. Treatments for decontamination is in general no option because not feasible.

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The experience of CEDA

- In long term management plans beneficial use is the only long term sustainable option. Any storage volume is finite and often siltation is an ongoing process with continuously growing quantities. Even in case of disposal one should take care for the beneficial use of the site after completion of the disposal operations.

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Encountering dilemma's

- How do we make decisions in a balanced way?
- How do we handle if we do not have all the knowledge (precautionary principle)
- What is more important nature or safety?

CEDA has a role:

- Providing expertise
- Case studies
- Start discussions
- Position papers

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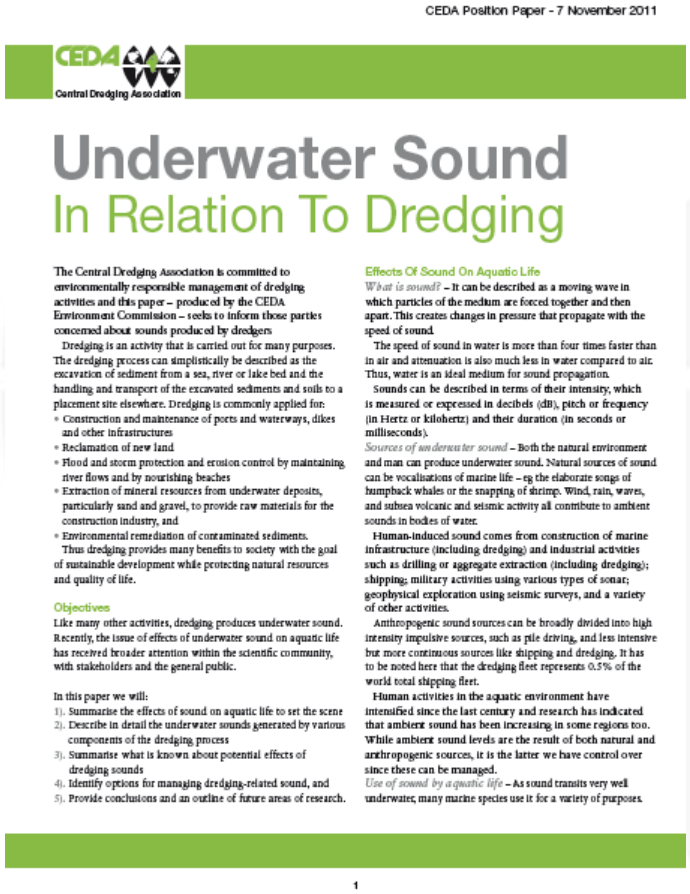
Publications

- Underwater sound with regard to dredging
- Climate change adaptation as it affects the dredging community
- Environmental Control on Dredging Projects
- Dredged Material as a resource
- Moving sediments in a Natural system
- Adaptive Management of Dredging Projects
- Ecosystem services
- New Guideline: more pro active



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Underwater Sound
In Relation To Dredging

The Central Dredging Association is committed to environmentally responsible management of dredging activities and this paper – produced by the CEDA Environment Commission – seeks to inform those parties concerned about sounds produced by dredgers

Dredging is an activity that is carried out for many purposes. The dredging process can simplistically be described as the excavation of sediment from a sea, river or lake bed and the handling and transport of the excavated sediments and soils to a placement site elsewhere. Dredging is commonly applied for:

- Construction and maintenance of ports and waterways, dikes and other infrastructures
- Reclamation of new land
- Flood and storm protection and erosion control by maintaining river flows and by nourishing beaches
- Extraction of mineral resources from underwater deposits, particularly sand and gravel, to provide raw materials for the construction industry, and
- Environmental remediation of contaminated sediments.

Thus dredging provides many benefits to society with the goal of sustainable development while protecting natural resources and quality of life.

Objectives

Like many other activities, dredging produces underwater sound. Recently, the issue of effects of underwater sound on aquatic life has received broader attention within the scientific community, with stakeholders and the general public.

In this paper we will:

1). Summarise the effects of sound on aquatic life to set the scene
2). Describe in detail the underwater sounds generated by various components of the dredging process
3). Summarise what is known about potential effects of dredging sounds
4). Identify options for managing dredging-related sound, and
5). Provide conclusions and an outline of future areas of research.

Effects Of Sound On Aquatic Life

What is sound? – It can be described as a moving wave in which particles of the medium are forced together and then apart. This creates changes in pressure that propagate with the speed of sound.

The speed of sound in water is more than four times faster than in air and attenuation is also much less in water compared to air. Thus, water is an ideal medium for sound propagation.

Sounds can be described in terms of their intensity, which is measured or expressed in decibels (dB), pitch or frequency (in Hertz or kilohertz) and their duration (in seconds or milliseconds).

Sources of underwater sound – Both the natural environment and man can produce underwater sound. Natural sources of sound can be vocalisations of marine life – eg the elaborate songs of humpback whales or the snapping of shrimp. Wind, rain, waves, and subsea volcanic and seismic activity all contribute to ambient sounds in bodies of water.

Human-induced sound comes from construction of marine infrastructure (including dredging) and industrial activities such as drilling or aggregate extraction (including dredging); shipping; military activities using various types of sonar; geophysical exploration using seismic surveys, and a variety of other activities.

Anthropogenic sound sources can be broadly divided into high intensity impulsive sources, such as pile driving, and less intensive but more continuous sources like shipping and dredging. It has to be noted here that the dredging fleet represents 0.5% of the world total shipping fleet.

Human activities in the aquatic environment have intensified since the last century and research has indicated that ambient sound has been increasing in some regions too. While ambient sound levels are the result of both natural and anthropogenic sources, it is the latter we have control over since these can be managed.

Use of sound by a quatic life – As sound transits very well underwater, many marine species use it for a variety of purposes.

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Conclusion and recommendations

- More pro active than re active approach
- There is a lot of knowledge available so use it and do not try to find out the wheel again
- There are organizations who can help in finding the right knowledge
- Also more knowledge exchange is essential
- There are still uncertainties so research and discussion is needed
- There are no blue prints
- More cooperation is needed

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