

# FACTS ABOUT

## Dredging Management Practices for the Environment

AN INFORMATION UPDATE FROM THE IADC – NUMBER 2 – 2009

### WHY ARE DREDGING MANAGEMENT PRACTICES NECESSARY?

Whilst dredging is required to develop and maintain navigation infrastructure throughout the world, dredging can also entail varying degrees of risk to the environment. Protecting the environment is therefore an essential, sometimes crucial, part of planning and managing a dredging project. One of the first steps before a project actually starts is the execution of an Environmental Impact Assessment. If this assessment signals that impacts of a project may have significant environmental consequences, Management Practices for the Environment must be evaluated. The purpose of these Management Practices is to provide guidance for environmental protection and improve the environmental performance of a dredging project.

### WHAT ARE MANAGEMENT PRACTICES FOR THE ENVIRONMENT?

Management Practices (MPs) for the environment are a diverse collection of measures used to conduct a project in a way that avoids, reduces or mitigates environmental impacts. Environmental impacts of dredging can occur during the excavation process, during dredged material placement and also during the transport of the materials. These MPs can identify risks, evaluate them and hopefully manage them. MPs require a thorough understanding of the technical, environmental and economic characteristics of dredging plans and of the potential seriousness of environmental impacts. In some cases these MPs may require rather minor changes, such as slowing down the removal of sediment. In other cases the project may call for major innovative technologies requiring substantial investments.

### WHEN SHOULD MANAGEMENT PRACTICES FOR THE ENVIRONMENT BE IMPLEMENTED?

Some MPs are initiated even before a dredging project begins. These practices are taken in the planning and design phase and include:

- developing contracts and project management controls,
- using pre-qualification to short-list qualified bidders,
- selecting a contractor based on best value,
- proposing performance standards instead of specific methods to allow flexibility in project execution, and

- preparing a project and site-specific environmental and construction monitoring programme.

By evaluating the project in the planning stage according to these practices, project plans and dredging methods can be adapted to the environmental concerns and the overall dredging design can be optimised *before* the start of the project.

### WHICH MANAGEMENT PRACTICES SHOULD BE USED DURING THE PROJECT?

Some MPs are related to the actual process of dredging, that is, methods, strategies and principles of operation to be used *during* and *after* the construction phase. These process-related MPs apply to the actual dredging operation itself as well as to the transportation and placement of dredged material. They include:

- the selection and possible modification of equipment, the modes of construction, i.e., dredging and reclamation methods, and
- institutional and control tools such as monitoring and feedback.

### WHAT MANAGEMENT PRACTICES ARE RELATED TO EQUIPMENT?

Selecting the appropriate dredging equipment is an essential construction-related Management Practice. Dredging vessels come in a variety of categories such as suction dredger, cutter suction dredger, trailer suction hopper dredger, bucket ladder dredger, backhoe dredger and grab dredger. Most of these modern dredgers are equipped with or can be modified to install systems that reduce the environmental effects of the dredging process.

Besides the type of dredger, the size and production rate should be considered. Many environmental impacts can be reduced by controls onboard the vessel. For instance, good monitoring and an increase in the accuracy of the dredging can reduce over-dredging and result in a decrease in the total volume of material dredged. Some trailers can be equipped with a so-called “Green Valve” in the overflow that reduces turbidity. Other adaptations are specialised environmental cutter suction systems such as the Disc Bottom Cutter or Environmental Auger Dredger. In all cases, the selection of plant must be made based on the specifics of the project.

## **WHAT IS AN INSTITUTIONAL MANAGEMENT PRACTICE?**

An institutional MP is also part of the construction process and takes into consideration hydraulic conditions such as tidal flows and river discharges. A dredging project may have to restrict the timing of operations – night or day, weekdays or weekends. The project may have to adapt to “environmental windows”, that is, avoiding the season when wildlife may be affected to an environmentally unreasonable extent. Weather changes or changes in wind direction may also affect the progress of a project. Sometimes sensitive areas like Marine Park zones may be restricted all together because impacts cannot be tolerated.

## **WHAT MANAGEMENT PRACTICES ADDRESS IMPACTS FROM THE TRANSPORTATION AND PLACEMENT OF DREDGED MATERIAL?**

Transportation and placement of dredged material are often controversial issues. Many MPs for the Environment address these issues, including the choice of equipment, the methods of operation or of placement, e.g. through pipelines, rainbowing, sidelaying or bottom door release, as well as the site of disposal or placement, such as siltation ponds and storage basins. Especially when dredging contaminated sediment, the placement of sediment, be it on land or in the water, demands the implementation of MPs.

## **HOW ARE MANAGEMENT PRACTICES CHOSEN?**

Usually a public, private or government agency (the Client) determines a need for a maritime infrastructure project which involves dredging. Once the Client has determined this need, their search begins for a suitable partner or Contractor to execute the project. Finding the right “fit” with a Contractor in the planning and design is an essential step in ensuring a long-term successful outcome. Client, Consultant and/or Contractor can then evaluate the environmental situation together, conducting an Environmental Impact Assessment and risk assessment. Based on this information Client and Contractor will sort through the wide variety of Management Practices in order to find the “Best” Management Practices for the specific project.

## **WHAT IS THE DIFFERENCE BETWEEN “BEST” MANAGEMENT PRACTICES AND BMPs?**

Current literature distinguishes between the multitude of possible MPs and the specific Best Management Practice applicable to a specific project. Not all MPs are viable options for each and every particular project. After risk assessments are made, a “Best” Management Practice (BMP) is selected based on recognised systems of risk analysis. To arrive at a BMP requires the examination, comparison and evaluation of alternative practices and

consideration of economic, technical and social feasibility for the specific project to manage the identified risks.

An important element in choosing a BMP is the collection of appropriate baseline data. It requires knowledge of the ecosystem and the sensitivity of the habitats within the range of the project.

## **HOW IS A BEST MANAGEMENT PRACTICE DETERMINED?**

As a first step, all applicable MPs that address the environmental risks associated with the designated project should be identified. These MPs are then ranked according to criteria such as their effectiveness, logistical feasibility and cost. Once this comparison has been made, certain MPs can be eliminated and BMPs can be identified. The selection of BMPs is always project-specific; they are never one-size-fits-all solutions.

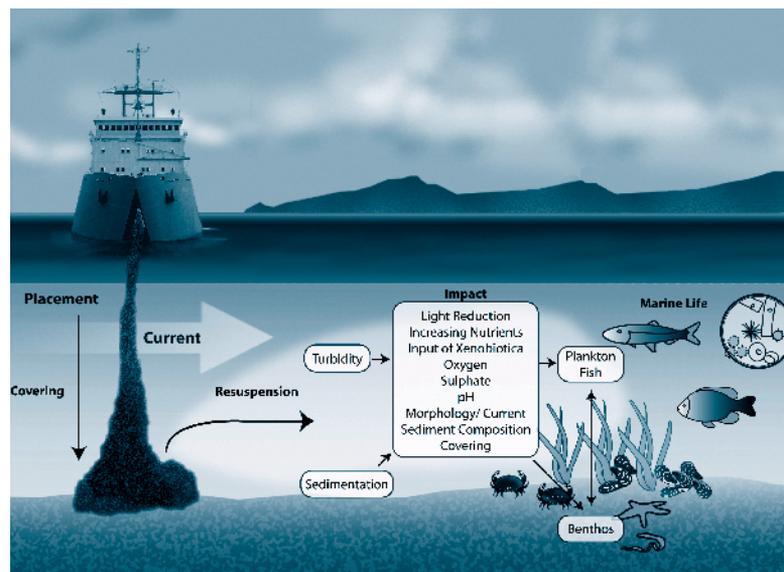
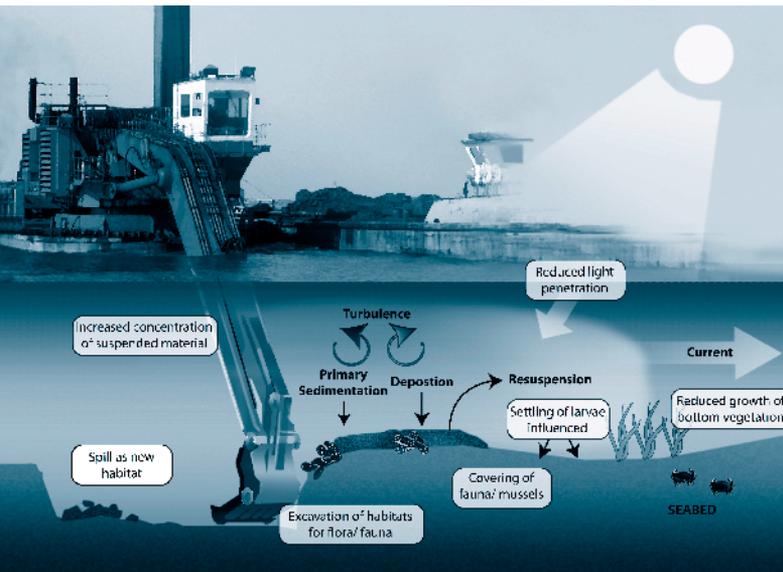
## **WHY SPEND SO MUCH EFFORT ON FINDING BEST MANAGEMENT PRACTICES?**

In an ideal world, all environmental risks associated with dredging would be quantifiable. In fact, even with all the information at hand, an element of uncertainty always exists and selecting a BMP is the best way to manage this risk. BMPs are state-of-the-art measures applied on a site-specific basis to reduce, prevent, mitigate or avoid adverse environmental or social impacts. BMPs can only be decided upon after complete impact assessments, evaluation of alternative practices and appropriate stakeholder participation. They are then determined to be the most effective, practical and sustainable means of achieving a good environmental outcome during dredging and maritime construction projects.

## **WHAT IS THE RELATION BETWEEN BEST MPs AND THE “PRECAUTIONARY PRINCIPLE”?**

When preliminary impact assessments and monitoring determine that environmental risks exist, the first impulse of some parties may be to suspend the dredging project under the motto of the “precautionary principle”. The precautionary principle has been referred to as the “err on the side of caution” option. Sometimes this translates into: If uncertainty exists about environmental impacts, take no chances. The *Communication from the Commission of the European Communities on the Precautionary Principle* (Brussels, 2000) actually states that the precautionary principle should be applied within a structured approach to the analysis of risk.

Prohibiting dredging may ensure that no (immediate) environmental impacts occur, but ultimately may cause more risks to society. The stoppage of a dredging project can adversely affect safety (e.g., failure to reinforce dykes may result in flooding) or be economically detrimental,



Potential impacts on the ecosystem caused during dredging (left) or placement of dredged material (right) by increasing turbidity or salinity or causing changes in the overall hydrography. Best Management Practices will address these issues prior to the start of the project (CEDA/IADC 2008).

resulting in lost trade and lost jobs because ships cannot access a port. The value of a BMP is that it gives a nuanced approach to risk assessment as suggested by the precautionary principle. It strives to find a balance to determine the necessary level of protection in proportion to the risk, to evaluate relative risk, so that BMPs can be selected for their effectiveness. In this way, a more robust, rational, technically defensible approach can be implemented.

### WHAT IS THE ROLE OF MONITORING IN EVALUATING BEST MPs?

Monitoring can provide valuable information before (surveillance), during (feedback) and after a dredging and placement project (compliance). It gives the Contractor the opportunity to adjust operations before and during construction to optimise positive results. Long-term monitoring in the post-construction phase and beyond will ensure that the work is in compliance with contractual agreements. It may also uncover impacts that the project has had on habitats and species, some of which may not be visible until years after the project's completion. Compiling this data can provide useful information for future projects. In fact, monitoring will help determine if a BMP is truly "best".

### DOES THE SIZE OF THE PROJECT MATTER WHEN CHOOSING BEST MP?

The size of a project actually does not matter. Other factors, such as economics, environmental sensitivity and the dynamics of the specific area play a role. A small project in an environmentally or societally sensitive area can require far more BMPs than a large project in a non-sensitive, highly dynamic area.

### WHY IS STAKEHOLDER PARTICIPATION IMPORTANT IN DETERMINING BEST MPs?

Including broad stakeholder participation at the earliest possible stage of a project is essential. Anxieties about environmental damage can be one of the greatest hindrances to the progress of a project. Outreach to the community creates the opportunity for the public to voice their concerns in a timely fashion and affords the Client and Contractor the opportunity to understand and address these concerns before final decisions have been made. Transparency and open lines of communication to the public and the media can create a wider sense of ownership of a project.

### DO BEST MANAGEMENT PRACTICES MAKE DREDGING PROJECTS MORE EXPENSIVE?

In general, the use of BMPs will require a greater investment in environmental measures and this may indeed cost more. On the other hand, cost is relative. What is the long-term cost of not protecting the environment? What is the cost to society of not dredging? What is the price for not providing coastal protection or for dredging in a less environmentally conscious way? Costs can also be measured in terms of loss of jobs and economic prosperity, or loss of habitat or loss of lives and property caused by flooding.

BMPs are investments that support the preservation or restoration of natural habitats and resources. Flood control measures may protect coastal communities and their livelihoods. Therefore, although BMPs may add to the price tag of a dredging project in the short run, the enormous economic and social value of protecting natural resources must be recognised.



**International Association of Dredging Companies**, PO Box 80521, 2508 GM The Hague, The Netherlands  
tel. +31 070 352 3334, fax +31 070 351 2654, e-mail: [info@iadc-dredging.com](mailto:info@iadc-dredging.com), [www.iadc-dredging.com](http://www.iadc-dredging.com)

### **WHO BENEFITS FROM THE IMPLEMENTATION OF BEST MANAGEMENT PRACTICES?**

The Client and the community in general benefit. BMPs result in the conservation of essential public resources as wildlife, plants, clean air and valuable land- and seascapes. By using these practices, dredging companies are able to maintain harbours and access channels, restore beaches and build new land whilst protecting and preserving the natural habitat. This means that BMPs promote a better quality of life, with cleaner water and air which means a healthier, more sustainable society in which to live.

### **IS THERE ONE BASIC SET OF BEST MANAGEMENT PRACTICES THAT IS ALWAYS APPROPRIATE FOR A DREDGING PROJECT?**

Dredging is usually categorised into three groups: capital, maintenance and remedial. And although each of these dredging processes occurs in four phases – excavation, lifting, transportation and placement – they vary considerably from each other. Each dredging project will present its own unique set of issues and risks and each must given individual attention. Still, the accumulated past experience of the major dredging companies and consultants in determining BMPs does count when approaching future projects.

### **ARE BEST MANAGEMENT PRACTICES ALWAYS BENEFICIAL?**

Identifying environmental risks associated with dredging and evaluating MPs from the beginning to end of the project will result in finding suitable BMPs that reduce risks. Reduced risks result in more successful long-term outcomes, creating sustainable projects both environmentally and economically.

But the process of determining BMPs can be long and arduous. BMPs should be innovative and dynamic in fulfilling their goal to reduce or mitigate environmental impacts. Best, however, is never an absolute. For a BMP to truly be “best” may require an iterative process of reassessment, modification, elimination of a process or reconsideration of other Management Practices. This process – examining alternative methods and seeing the most effective, practical and sustainable means of completing a project – can be time consuming. Implementing a BMP may mean creating a new natural habitat or repairing a marine environment or restoring a landscape in order to offset impacts caused by a dredging project focused on the

development of a vital economic engine such as a port or harbour. Ultimately, however, integrating science, economics, legal and societal interests and needs to find BMPs will pave the way to reasonable solutions, reduce stakeholder resistance to projects and contribute to the overall improvement of quality of life.

### **FOR FURTHER READING AND INFORMATION**

Arts, Th. *et al.* (1995). “High Accuracy Sanitation Dredging Trials”. *Terra et Aqua*, nr 61, IADC, December.

Arts, Th. and Kappe, B. (1996). “The Sweep Dredger: High Accuracy Dredging Trials Continued”. *Terra et Aqua*, nr 65, December.

Bray, R.N. and Clark, S. (2004). “Dredging and Coral: A Decision Support System for Managing Dredging Activities in Coral Reef Ecosystems”. Proceedings WODCON XVII, Hamburg, Germany, September.

Bray, R.N. (Editor). (2008). *Environmental Aspects of Dredging*. CEDA/IADC-Taylor and Francis, London, UK.

*Communication from the Commission of the European Communities on the precautionary principle.* (2000). Brussels, Belgium.

Marine Environment Monitoring Group. (2003). *Final Report of The Dredging and Dredged Material Disposal Monitoring Task Team*. CEFAS, Aquatic Environment Monitoring Report, Number 55.

Netzband, Axel and Adnitt, Christine (2009). “Dredging Management Practices for the Environment: A Structured Selection Approach”. *Terra et Aqua* #114, March, pp. 3-8.

PIANC (2009). *Dredging Management Practices for the Environment: A Structured Selection Approach*. Report no. 100. Brussels, Belgium.

*This brochure is presented by the International Association of Dredging Companies whose members offer the highest quality and professionalism in dredging and maritime construction. The information presented here is part of an on-going effort to support clients and others in understanding the fundamental principles of dredging and maritime construction.*

