

# **The Relevance of the MSFD Descriptor ‘Seafloor Integrity’ for Dredging & Disposal**

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# Background for the CEDA WG

## *Seafloor Integrity*

### ***The task***

- To prepare a CEDA information paper on MSFD Descriptor D6 – *Seafloor Integrity* - and its related criteria and methodological standards.

### ***The aim***

- To raise awareness and to provide essential, relevant information in an easily accessible manner to the dredging community about *Seafloor Integrity*.

### ***Focus group***

- Dredging community, port authorities.



# Content of the information paper

- What is Seafloor Integrity?
- How does dredging and disposal affect Seafloor Integrity?
- How can impacts on Seafloor Integrity be measured?
- How does MSFD assess Seafloor Integrity
- How to work towards MSFD D6 GES (Good Environmental Status)
- Cases
- CEDA position



***Status: the paper is well in progress, but still needs some work. Planned to be finalised by end of 2018...***



# What is Seafloor Integrity?

The “*seafloor*” is generally characterized by:

- The physical and chemical characteristics of the seabed (depth, substrate type, temperature, oxygen, nutrients and pollutant levels, light availability,...).
- The biological components constituted by benthic organisms living on or in the seafloor (flora, fauna, microbes).



“*Integrity*” refers to:

- Spatial connectivity between the (components of the) benthic ecosystems.
- Interactions of natural processes.
- Characteristics of the sea bottom: structure and functioning of marine benthic ecosystems.
- Maintaining seafloor integrity is needed to preserve benthic resources & marine biodiversity.

# Why bother about Seafloor Integrity?

## The Marine Strategy Framework Directive (2008)

EU's legal instrument for the protection of our seas

- ❑ Overall objective: achieve or maintain Good Environmental Status (GES) of all EU marine waters by 2020.
- ❑ Adoption of an ecosystem-based and integrated approach to the management of all human activities which have an impact on the marine environment.
- ❑ Regional approach to implementation, through establishment of Marine Regions and Sub-regions



Regional Seas Conventions and Marine Strategy Framework Directive



# Why bother about Seafloor Integrity?

## MSFD descriptor!

Aim: “Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.”

1. Biological diversity 	2. Non-indigenous species 	3. Population of commercial fish/shellfish 	4. Elements of marine food webs 
5. Eutrophication 	6. Sea floor integrity 	7. Alteration of hydrographical conditions 	8. Concentrations of contaminants 
Good Environmental Status	9. Contaminants in fish/seafood for human consumption 	10. Marine litter 	11. Introduction of energy including underwater noise 

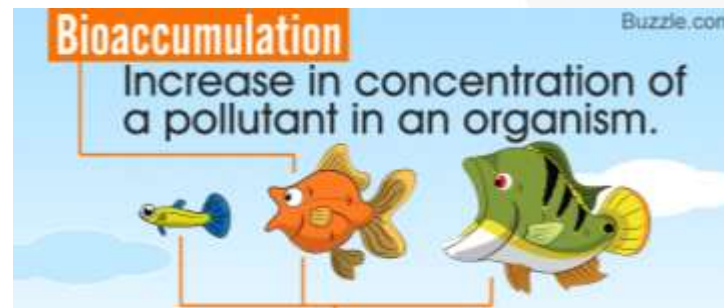
# How does dredging and disposal affect Seafloor Integrity?

## *Direct and indirect effects*

- Habitat disturbance/loss and death of organisms
- Burial of habitats and organisms
- Changes in species composition
- Reduced primary production
- Reduced biomass of fauna
- Bioaccumulation of toxins or heavy metals in marine food chain



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# How does dredging and disposal affect Seafloor Integrity?

Impact of the activity depends on:

- the design and execution of the operation itself,
- duration (long term/permanent or temporary) and spatial extent of the operation,
- the abiotic and biotic characteristics of the operational area and surroundings,
- the sensitivity of the affected organisms and habitats and their ability for re-establishment, and
- the overall variability of the whole abiotic and biotic environment.

## *MSFD definitions*

**Physical loss:** habitat change lasting for 2 reporting cycles (12 years) or more

**Physical disturbance:** change to the seabed from which it can recover if the activity causing the disturbance pressure ceases.



# How can impacts on Seafloor Integrity be measured?

## Duty of EU member states (MS)

- Assessment in broad habitat types
- Reporting every 6 years to EU
- Threshold values set at regional sea level– e.g. HELCOM, OSPAR
- Integrate with results from WFD and Birds and Habitat directives

## ! Duty of applicant for an activity

- Conduct EIA “Assessment of effects, e.g. of dredging and disposal”

# How can impacts on Seafloor Integrity be measured?

## **Criteria** (set by EU):

Characteristics of the descriptor to make the descriptors more concrete & quantifiable.

*Examples: Distribution of physical loss or disturbance.*

*Spatial extent of each habitat type which is (adversely) affected.*

- ➔ *Change in biotic/abiotic structure and functions (species composition & abundance)*

## **Indicators** (under development, Regional Seas):

Values determine GES -> to describe seabed quality based on the parameters measured in the field.

Targets for GES are developed and set on national or even local scale.

# Examples of indicators

(from Palialexis et al 2014)

## *Physical loss*

- Spatial extent of area of biogenic structure.
- Spatial extent of area affected by e.g. dredging, major construction, trawling...

## *Physical disturbance*

- Presence of sensitive species (different species list for MS),
- Indices: Benthic Quality index (BQI), Shannon index, etc.,
- Proportion of biomass or number of individuals in the macrobenthos above some specified length/size,
- Median colony/body size of the species *Buccinum undatum* (snail), *Mytilus edulis* (blue mussels), ...



# How to work towards MSFD GES?

- Quantitative assessment methods support less conservative assessments
- Understanding dredging and disposal spatial scale impacts
- Ecosystem Services approach
- Early engagement of stakeholders
- Management tools for dredging activities
  - Pro-active planning
  - Mitigation measure
  - Adaptive management
  - Compensation



# Challenges

## Things that are not known, uncertainties and knowledge gaps

- How to quantitatively measure 'distribution' or 'loss of habitat type' ?
- Large scale of the MSFD assessment (Regional Seas) - how to assess small scale impacts from dredging activities in relation to MSFD?
- How to deal with variability and patchiness?
- How to deal with cumulative effects?
- Lack of data.

***Scope for a debate on a proper assessment of human activities!***

# Case study: sea bed landscaping in dredging areas



Seabed landscaping = fast recovery

Traditional approach

[www.ecoshape.nl](http://www.ecoshape.nl)

- Seabed heterogeneity (bed forms) -> habitats with for more biodiversity & biomass.
- Flat seabeds tend to be ecologically less valuable than seabeds with meso-scale bedforms (tidal ridges, sand waves,...) -> larger range of species assemblages.
- **Design & execute dredging activities to leave behind dredged areas in heterogeneous state to improve seafloor integrity !**

# CEDA position



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# Thank you very much for your attention!

## Questions?

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