HK 2.1 Ecological Landscaping of Extraction Sites

28th January 2010
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EcoShape | building with nature

Presentation

1. Introduction
2. Project description
   - Context, Aims and Issues
   - Policy and Legal framework
   - Modelling
3. Technical Content
   - Design parameters
4. Pilot extraction site
5. Next steps

Introduction

Project 'DNA':

- Building with Nature Programme, EcoShape
- Case Study Hollandse Kust (HK 2.1)
- Project: Ecological Landscaping of Extraction Sites
- Period: 2008-2012
- Main Result: Obtaining a Pilot extraction site

Team

Mixed team consisting of consultants, research institutes, universities, government and dredging industry (like CEDA)

Daan Rijks	Team Leader	DHV
Jasper Fiselier	Coastal morphology, Ecology	DHV
Stefan Aarninkhof	Morphology, Case Study Leader	EcoShape/Boskalis
Pieter Roos	Sandpit Morphology	Twente University
Kris Lulofs	Environmental Policy	Twente University
Jan van Dalfsen	Benthic Ecology	Deltares
Martin Baptist	Marine Ecology	IMARES
Maarten de Jong	Monitoring	IMARES
Wilbur van Beijnen	Systems Engineering	RWS DI

Project Description

1. Context (Why?)

- **SITUATION**: No clear guidelines on ecology and sand extraction sites
- **RISK**: Conservative approach can lead to improbable prediction of effects and related mitigation measures
- **BENEFITS**: Large potential for ecological development and mutual benefits for stakeholders
  - habitat diversity (benthos)
  - Positive effect on populations of fish, birds & mammals
  - increase economical value of a dredging area

Project Description

2. Project Aims:

- **Awareness** of benefits in the design
- Investigate **opportunities** ecology vs. economy
- Identify **physical parameters** for functions (nature, fisheries, recreation, Sand Mining)
- Ultimately **reduce procedures** and speed up project execution by creating social support
- Set up an ecological landscaped **pilot site**

Not theory but real-time results!!

Project Description

3. Project Issues:

- Need substantial size to expect effects (> 10 Mm^3)
- Define relevant design parameters
- Test effectiveness of landscape elements
- Technical feasibility (dredging equipment)
- Costs (as low as possible)

Project Description

4. Policy and juridical framework:

- EIA needed if extraction (or series of nearby extractions) >500 hectares or >10Mm^3
  - consider interests: nature, commercial fishery and tourism that might be affected
- Many laws and regulations (Ontgrondingenwet (OW), RON2, IBN2015, Nota Ruimte, Birdprotection and Habitat Directives/Natura 2000, Nbw en Ffw, OSPAR and MARPOL) and other policy plans and documents).

Project Description

4. Policy and juridical framework:

- Accepted that **substantial amounts** of sand are needed in future (Veerman Deltacommissie)
- No longer a ban on deep pits, no longer preferring 2 m pits: **preference for larger and deeper pits**
- **No (longer) (?) strict requirements** that the new sea bed should be the same as the old one, and if needed be flattened after extraction
- Preference for extraction and landscaping at the same time

Depending on results pilot: possible within current policy or new policy?

Project Description

5. Modelling (Morphological Model):

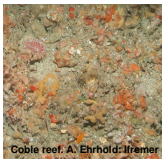
- Test design parameters on morphological stability (sustainability):
  - location, dimension, orientation, shape, amplitude, sediment distribution
- Model results
  - Preferred sand wave length: L~200-400 m
  - Large depth = slow dynamics

Next step: more detailed modelling

Technical Content

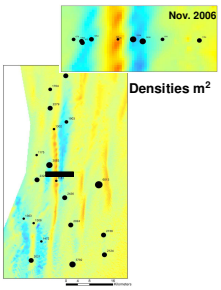
Design scenario's

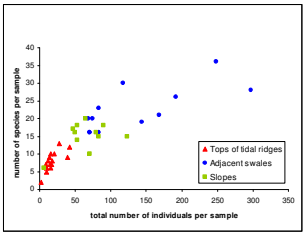
1. Nature (Benthos, Fish, Birds, Sea mammals)
   - recovery of habitat
   - increasing biodiversity ← Choice
   - protection of threatened or endangered species
2. Economy (commercial fish & shellfish fisheries, sand mining)
3. Social (recreational fishing and diving)



Technical Content

Strong relation between hydro-morpho-dynamics, sediment composition & benthic communities





Density and diversity per morphological unit of tidal ridges (both banks)

Technical Content

Design philosophy:

- Concentrate on
  - Bed forms
  - Biodiversity
- Monitor developments

Technical parameters (Dredging)
What kind of equipment is available and what extraction techniques are possible?

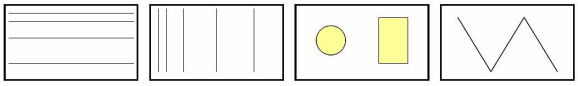
Physical parameters (Modeling)
Which types of bottom morphology (shape and size) will remain in the pit without being affected by natural morphological dynamics?

Ecological parameters
What kind of ecological habitats can exist in these situations based on certain key ecological indicators (benthos / fish)?

Technical Content

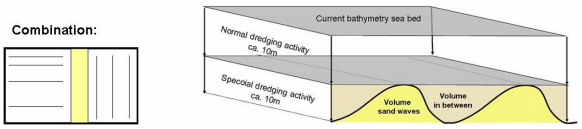
Design parameters (morphology):

Landscaping patterns:



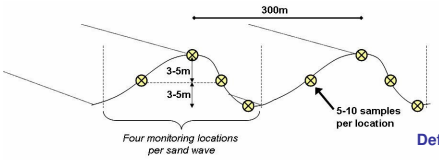
Sand waves in line with main currents | **Sand waves perpendicular to currents** | **Mounds or plateaus** | **Varying shapes based on sand availability**

Combination:



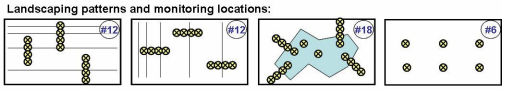
Technical Content

Monitoring in cooperation with Port of Rotterdam (MV2)



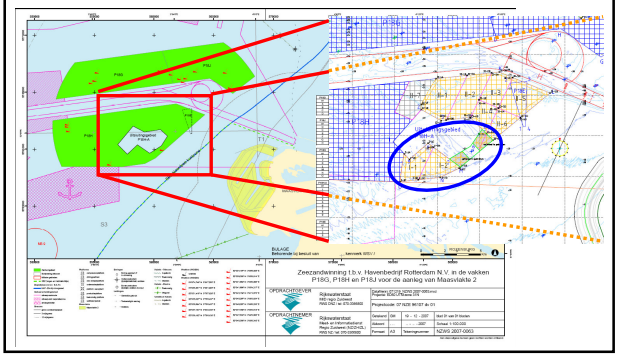
Location of points
Define aim of monitoring (statistical variation)

Landscaping patterns and monitoring locations:



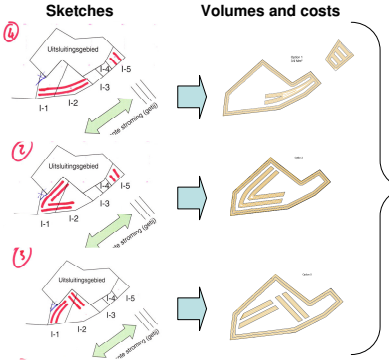
Sand waves in line with main currents | **Sand waves perpendicular to currents** | **Exclusion zone** | **Reference area in extraction site**

Pilot Site



Pilot Site

Sketches | **Volumes and costs**



Evaluation and discussions with:
- Project team
- Port of Rotterdam
- PUMA
- RWS DNZ

FINAL DESIGN

Next Steps

2008-2009 : Research and opportunities
Design parameters and pilot site

2009-2010 : Organize and plan Pilot Site

2010-2012 : Monitoring Pilot Site
Translate design parameters into BwN design criteria
Recommendations future research