Building with nature in Coastal Dune Management The Netherlands

Learning by doing

Frank vd Meulen, Bert vd Valk, Stephanie IJff

Deltares, Delft, Netherlands

Medcoast 2017 Malta
Story of new dune area 2009-2017
Compensation for nature damage due to harbor extension of Rotterdam

Our philosophy: building with nature....., OK
But how successful?
If not, what next?
Lessons for us all
Engineered (traditional) vs nature management in world soft coasts

Engineered designs ---→ Nature based designs

- Alien material
  - hard structures
- Armored shores
- Decrease of dynamics
- Destroy ecosystems
- Decline biodiversity
- Unsustainable adaptation

- Intrinsic material
  - soft structures
- Natural shores
- Room for dynamics
- Room for ecosystems
- Develop biodiversity
- Sustainable adaptation
• A new dune as compensation for nature losses (Natura 2000 sites) due to harbour extension of Rotterdam
• A unique chance to build with nature on a 1:1 scale, using elements and forces of nature: sand, wind, rain
• Compensation targets

Dry short dune grass
Grey dune
H2130

Dune marsh
H2190
Design Spanjaards Duin

Phase 1: foundation by nourishment
*special sediment grain size*

Phase 2: sand transport by wind

Phase 3: groundwater development in dune body, rainfall

Phase 4: vegetation & soil development

Abiotic

- new beach
- new dune valley
- new dry dune

Biotic

DHV/H + N + S/Alterra
Veeken, ter Hoeven, Fiselier

35 ha
2017
After 8 years

Two terrain types in the valley:

- Grey dune, dry soil
- Dune marsh, moist soil

locally: interesting seed bank
Potential habitat types 2016 (hectares)

Present Target

Dune marsh 2-5 6,1
Grey dune 12 9,8
Changes in the valley (potential dune marsh)

Sept 2013

Aug 2014

Aug 2016

May 2017
Why this development?

- Design height of floor was not deep enough
- Moist floor does not erode deeper towards groundwater lens
- Groundwater lens more or less stable
- Marram germinates in moist soil
- Tufts trap sand and form hummock dunes
- Irreversible process in unwanted direction

30-40 cm
Change of management practice in discussion: Building with nature..., OK, but if not successful, what next?

<table>
<thead>
<tr>
<th>Stakeholders Interests differ</th>
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<tbody>
<tr>
<td><strong>Port of Rotterdam</strong></td>
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<td>Quick success; waited long enough</td>
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<td>Technical interference</td>
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**Decision for potential dune marsh area**
- Remove hummock dunes
- Lower valley floor by mechanical digging in 2018
- Except small area with interesting seed bank
- Create new start for dune marsh
Lessons learned
Relevance for worldwide management

Building with nature, priority but....

- Time consuming
- Expertise in multi disciplines
- Monitor and evaluate -> decisions
- Involve stakeholders
- What - if scenarios, alternatives
- You don’t learn if you don’t dare and do
Mechanical lowering valley floor in 2018

Present Target

Dune marsh 2-5 6,1

Grey dune 12 9,8
Thank you

What would you do in your country?
Maasvlakte 2 Damage and compensation

NOx deposition (nutrients) is main impact on dune ecosystem

- EIA 2007: use of MV2 (>2013) air quality effects nearby existing dunes (NOx deposition)
- Part of sea is reclaimed
- Damage to Natura 2000 habitats and spp expected
- EU regulations: compensation required
- Marine compensation and dune compensation