



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



Old Foredune

Valley

New FD

Sea

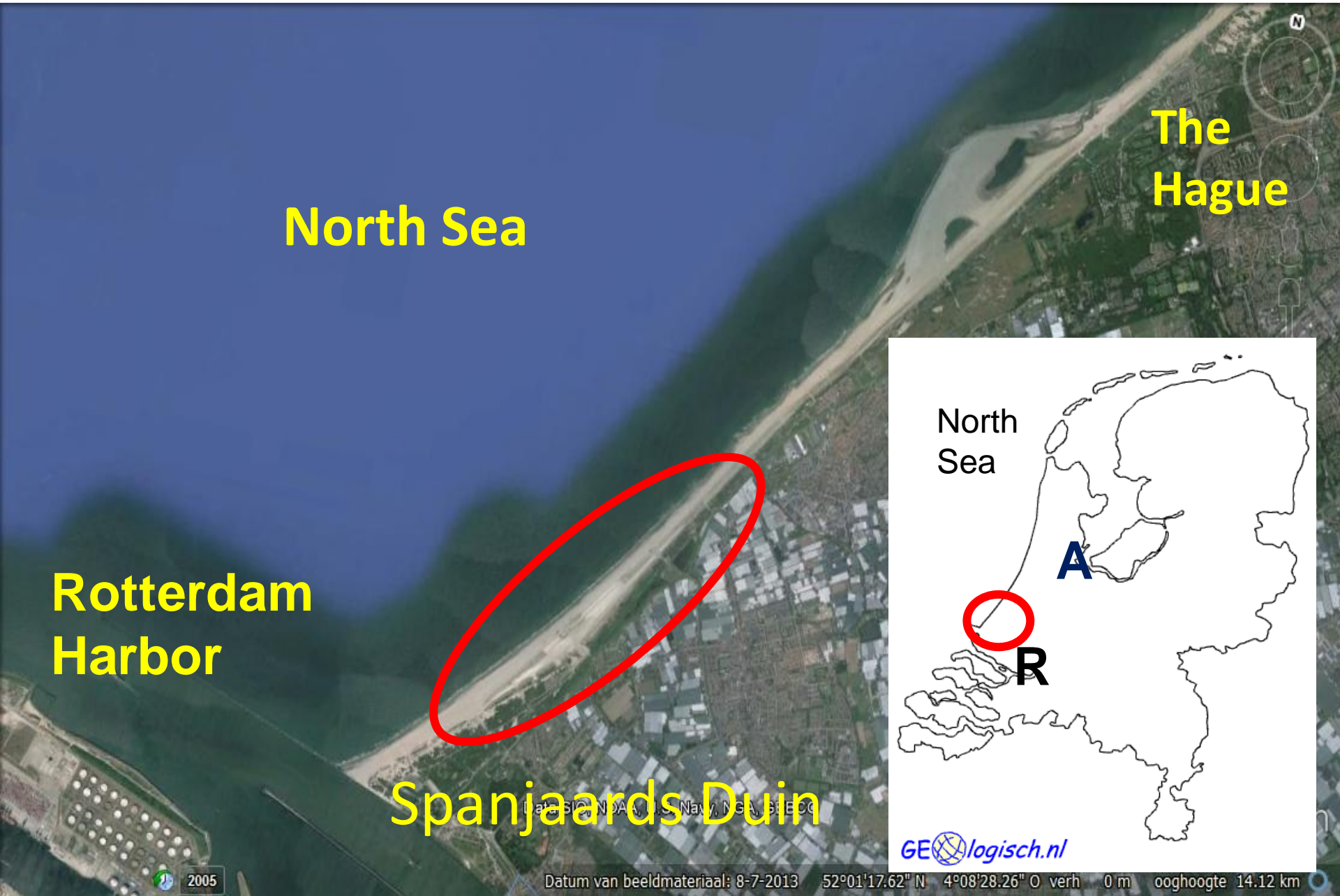
Our philosophy: building with nature...., OK

But how successful?

If not, what next?

Lessons for us all

Location



North Sea

The Hague

Rotterdam Harbor

Spanjaards Duin



North Sea

A

R

GElogisch.nl

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 35 ha



- 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

Biotic

new beach
new dune valley
new dry dune

Vlugtenburg

(Stuifenszand)

Rechtestraat

Waterwegcentrum

1km

existing dune

Bron: Natuurbeheerplan
Duincompensatie Delflandse
Kust (2007)
DHV/H + N + S/Alterra
Veeken, ter Hoeyen, Fiselier



->Grey dune, dry soil



->Dune marsh, moist soil
locally: interesting seed bank

2017

**After 8
years**

**Two
terrain
types in
the valley**



Potential habitat types 2016 (hectares)

Present Target

Dune marsh	2-5	6,1
Grey dune	12	9,8

**Changes in
(potential**



Sept 2013

**the valley
dune marsh)**



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?

Stakeholders Interests differ

Port of Rotterdam

Quick success; waited long enough

Technical interference

Govt & Nature Organisations

More patience, give nature time

Building with nature priority

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

Maasvlakte 2

- Damage to Natura 2000 habitats and spp expected

- EU regulations: compensation required

- Marine compensation and dune compensation

