Building with Nature

Motivation – Concept - Program

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Brussels, November 2010

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Realization of maritime infrastructure in complex environmental settings

- Continuous market growth for maritime infrastructure
- Development of large-scale projects characterized by uncertainties and delays

Maasvlakte-2 (NL)

Realisation of maritime infrastructure in complex environmental settings

- Extensive Environmental Management Plans and monitoring requirements
- Sustainable development increasingly important

Port of Khalifa (UAE)

Port of Melbourne (AUS)

"Sustainable development offers opportunities to make a difference"

Innovation is needed to do things differently!

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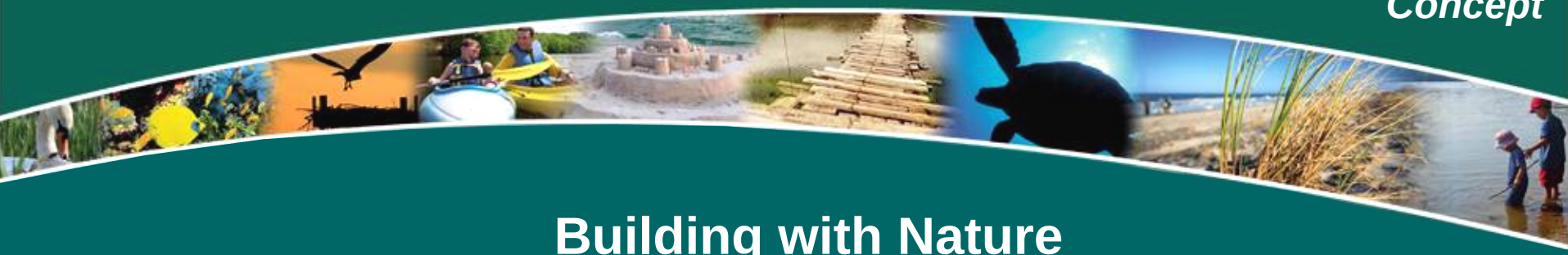

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- Integration of disciplines: Engineering, Ecology & Governance
- Dynamics of natural system as starting point for design and realisation of maritime infrastructure
  - Make optimal use of natural processes
  - Design fits with natural (eco-)system dynamics
  - Explore opportunities to promote nature development
- From defensive (minimize environmental impacts) to offensive approach (optimize full economic and environmental potential)

"Ecodynamic Development & Design"

Figure courtesy of G.M. Jansen

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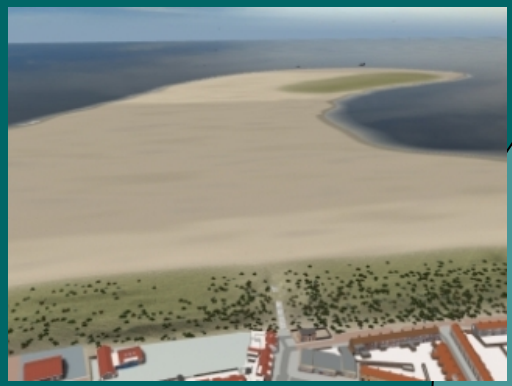
Building with Nature program

- Program duration 2008-2012
- Budget ca 30 mln euro (approx 40 mln $)
- Main outcome: Guidelines & Tools for Eco-dynamic Development & Design
- All Dutch key players involved!
  - Contractors (initiators): Boskalis, VanOord
  - Scientific Institutes: Deltares, Imares, NIOZ
  - Consultants: Witteveen + Bos, DHV, Haskoning, Arcadis
  - Industry: IHC Holland, Vereniging van Waterbouwers
  - Universities: Delft, Wageningen, Twente
  - Port authority: Harbour of Rotterdam
  - Government: RWS-DI, City of Dordrecht

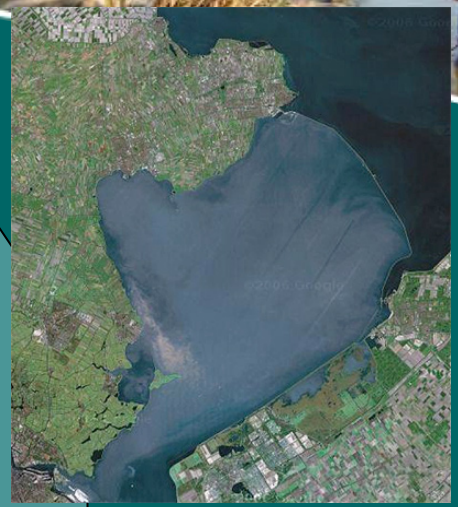
Building with Nature Program objectives:

1. Develop ecosystem knowledge enabling ‘Building with Nature (BwN)’
2. Establish how to bring the BwN-concept forward in society and make it happen
3. Develop scientifically sound design rules and norms
4. Develop expertise to apply the BwN-concept
5. Make the concept tangible using practical BwN-examples

Coastal Zone



BwN Cases



Fresh Water Lake

Estuary

Tropical Waters (Singapore)

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Case: Coast

mega-nourishment pilot ‘Sand Engine’

landscaping of sand borrow areas

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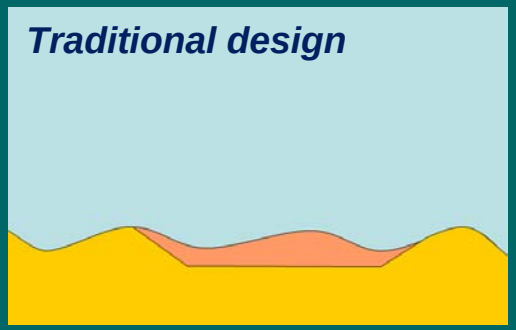
Mega nourishments

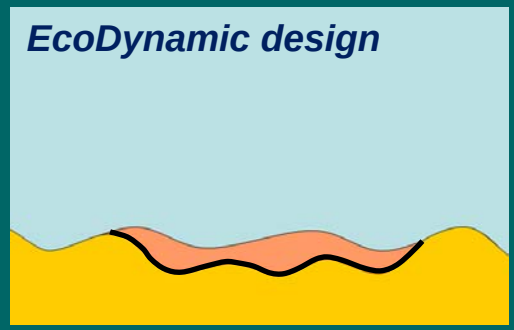
Pilot Sand Engine Delfland:
100-150 ha, 20 mln m3

- One Mega Nourishment vs long term annual nourishment schemes
- Minimum impacts on ecosystem
- Natural redistribution of sand along coastline
- Are we able to predict? Are we able to manage?
- Innovative, Integral approach

Artist impression of development – not based on science

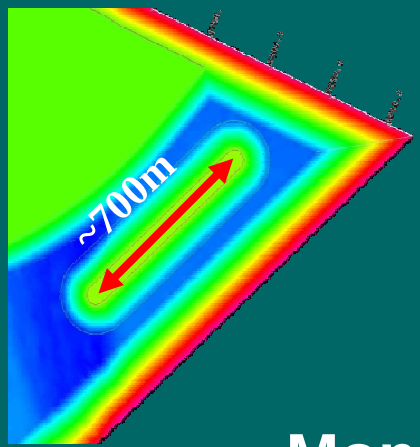
Sand mining: Ecological landscaping





Initiation & Design

Realization



Monitoring

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Case: Estuary

long-term regional development

sediment balance: stability of intertidal areas

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Estuary: shoal stabilization through BwN approaches

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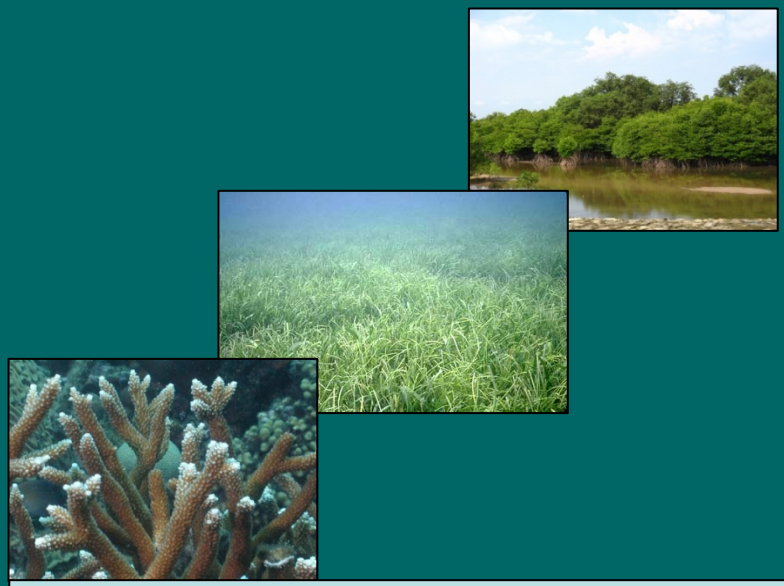
Case: Tropical waters - Singapore



Innovative coastal defence

decision making in different settings

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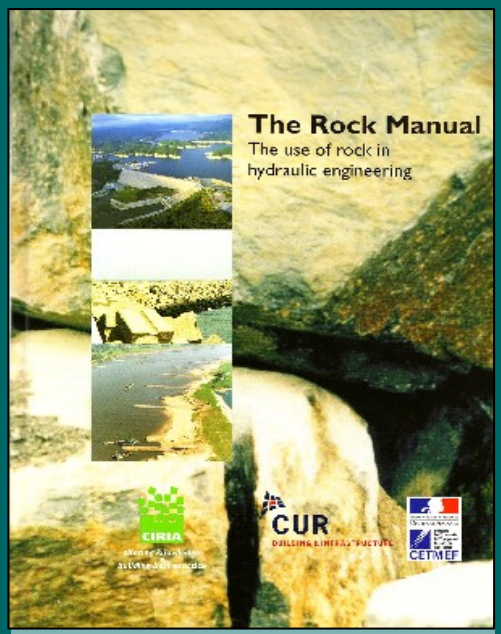
Governance (5 PhDs)

- GOV 5: Multi-level governance and regulation
- GOV 5: Realisation in local political arenas
- GOV 5: Dealing with uncertainty in BwN projects
- GOV 5: Role of knowledge in decision making
- GOV 5: BwN in different governance systems

Eco-dynamic Development & Design



Ecodynamic Design Manual

Design and Decision Support Tools

Lessons Learned: Case Studies!

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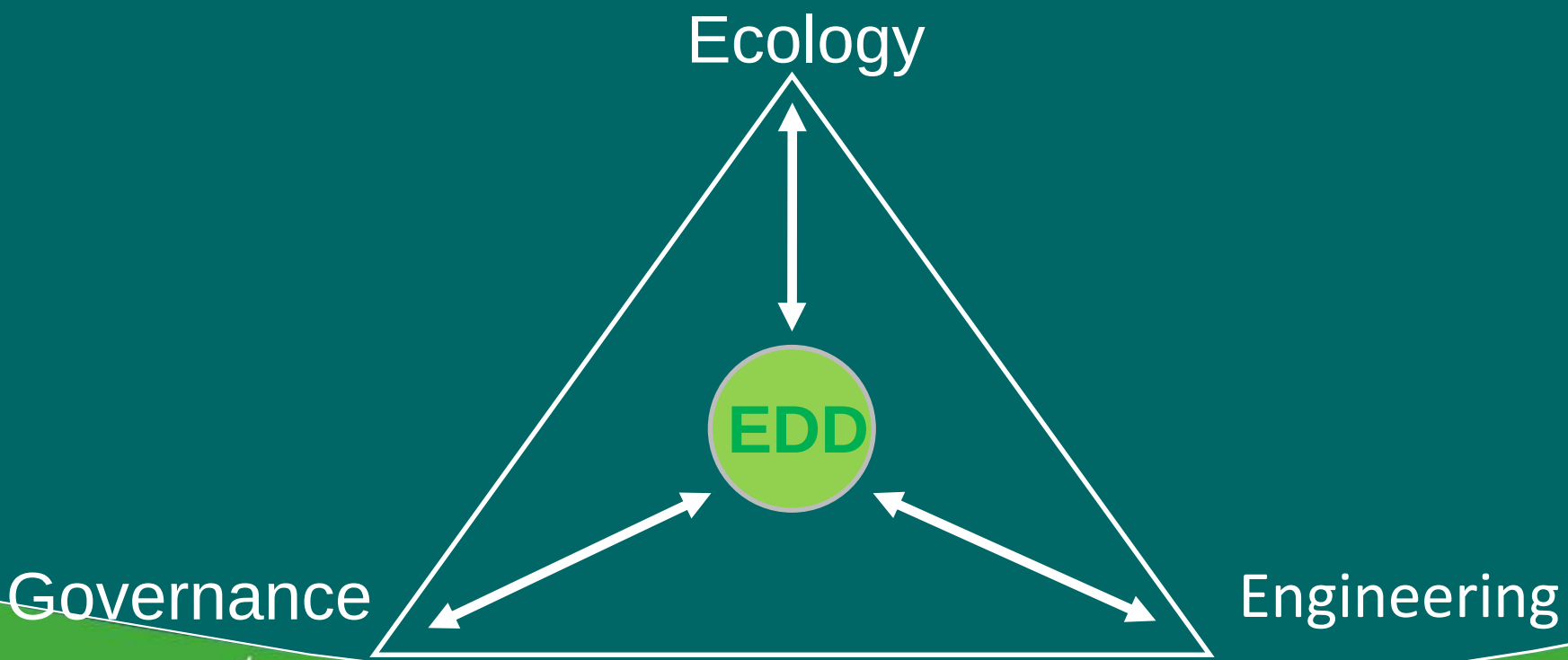
EDD Guideline

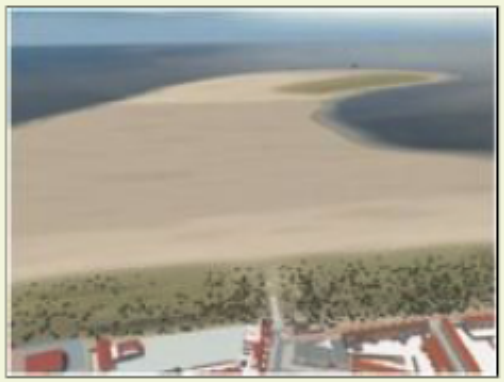
- Process guidelines vs engineering parameters



Traditional vs Eco-dynamic Design

Eco-dynamic Design

An ecodynamic design of a sand nourishment is characterized by:



- Design serves integral objectives: Guarantee coastal safety, create space for nature development and recreation
- Implementation of a large sand volume (10-20 mln m3 or more)
- Envisaged life span 20 years
- Incidental disturbance of ecosystem
- Use natural processes for distribution of sand. Gradual evolution, ecosystem capable of following morphological changes.

Traditional Design

A traditional design of a sand nourisment is characterized by:

- Primary objective: Shoreline maintenace. Other objectives of secondary importance
- Implementation of a medium sand volume (2-5 mln m3)
- Envisaged life span 5 years
- Frequent disturbance of ecosystem.

Products and timing

- Website www.ecoshape.nl being upgraded to present interim products – open for reactions.
- Conferences for knowledge exchange in Spring 2011 – Fall 2012
  (+ dedicated seminars with specific groups)
- EDD Guideline (peer reviewed) + (wiki) site for background information foreseen for Winter 2012/13
- International cooperation to be continued in next phase of program.