Building with Nature
Concept, Principles & Program
Governance

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Motivation & Concept
EDD Principles
Research Program
Guideline
Governance
Status and Future
Realisation of maritime infrastructure in complex environmental settings

Continuous growth of market 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 for clients

Port of Melbourne (AUS)

Port of Khalifa (UAE)
“Sustainable development offers opportunities to make the difference”

Innovation is needed to do things differently!

Building with Nature
Building **with Nature**

**Definition**

Utilizing natural processes (Building *by* Nature)

Ecological system optimization (Building *of* Nature)

- Nature Instrumental
- No BwN
- Nature Integrated
- Full BwN
Building with Nature

- **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)
- **Integration** of disciplines: Engineering, Ecology & Governance

"Eco-dynamic Development & Design"
• Process guidelines vs engineering parameters
### Traditional vs Eco-dynamic Design

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<tr>
<th>Eco-dynamic Design</th>
<th>Traditional Design</th>
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**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.

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A traditional design of a sand nourishment is characterized by:

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

• Paradigm shift required
• 4 aspects all require different approach
EDD principles

• Think differently
  – Think innovative – think sustainable
  – Understand the dynamic system
  – Seek for integration of disciplines, balances
  – Be able to handle uncertainty

• Behave differently
  – Be open to other opinions
  – Seek engagement
  – Strive for win-win
EDD principles

- **Act differently**
  - Include natural dynamics
  - Integrate EDD in all phases, life cycle approach
  - Manage uncertainties – apply adaptive management
  - Valuate ecology with economy and social aspects

- **Interact differently**
  - Inform and involve all stakeholders
  - Work interdisciplinary – integrate flexibility
  - Use transparent processes
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Case 1: Coastal Zone

**Mega-nourishment pilot**

‘Sand Engine’

**Landscaping of sand borrow areas**

Plateau (ca. -33m)

North Sea (ca. -25m)

Sand waves

10m

70-100m
Case 2: Estuary

long-term regional development

sediment balance: stability of intertidal areas
Case 3: Fresh Water Lake

degradation
Lake Marken

adaptation of lake coast to rising water level

BwN approaches in process of being implemented
• soft natural shorelines
• enhancing natural recovery of water quality
Case 4: Tropical waters - Singapore

Innovative coastal defence

decision making in different settings
Other Research Output

- **Generic research – natural sciences** (14 PhD’s)
  - Dynamics marine / estuarine / coastal ecosystems
  - Interaction between of ecosystem and engineering
- **Lessons learned from**
  - Previous projects by partners
  - Study of external cases and research programs
  - International cooperation and information exchange
- **Development of specific tools**
  - Design & decision support
  - Monitoring
  - Data management
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EDD guideline

- Guideline as future ‘reference book’ / standards for good BwN / EDD project
  - How to EDD?
  - Lessons from cases (BwN + historic) / pilots / studies
  - Recommendation for tools to be used
  - Links to reports
  - Hard-copy book on “principles and concepts” plus underlying website(wiki) with design rules, standards etc.
Who will use the Guideline?

People responsible for project initiation, organization, design and implementation

- **Reader group (1):** Project owners / Proponents, Ecologists, Consultants, Wet Infrastructure Contractors with a **stake or responsibility** in project design processes

- **Reader group (2):** Authorities, Policy Makers, Politicians, Administrators, Standards Institutes, NGO's, Financers that can **potentially influence** the design criteria and thus the challenges posed to the first reader group.
Guideline Delivery

- Drafting / data collection in progress.
- Review process by Review Board starting 1st half 2011
- ‘deadline’ for new input: mid 2012
- Second half of 2012 for final editing, proof reading
- Publication end 2012 – exact format still to be decided
- Launching event??
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Governance is ....

the exercise of political, economic and administrative authority to manage a nation's affairs. It is the complex mechanisms, processes, relationships and institutions through which citizens and groups articulate their interests, exercise their rights and obligations and mediate their differences (source: Unifem)
Governance in relation to BwN approaches?

Law and Order

rather than

Embracing opportunities

⇒ Generic Governance Research (5 PhD’s)
Observed ‘issues’

• Differences in local arenas: international – regional – local
• No coordination at ecosystem level
• Different levels of knowledge: to be integrated?
• Dealing with uncertainties at various timescales, not a hobby of politicians
Conditions for success of BwN approach

- Communicate with/between all stakeholders, in early stages of project.
- Understanding each other’s interests.
- Tune regulations between various Governance levels.
- Be aware that society is a dynamic system.
- Use available knowledge in defining project boundaries.
- Be able to handle uncertainties: precautionary on the negative – ‘benefit of the doubt’ on the positive.
- Be honest, transparent and open, at all levels.
EcoShape, Building with Nature

- Organization up and running
- Research program established
- All funding in place
- All projects well underway
- Program to be completed by end 2012
- Continuation of program being discussed (internationalization)
Products and timing

- Website [www.ecoshape.nl](http://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.