

Building with Nature

Infrastructure seminar EU Development Corporation

Brussels – 3 December 2019

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Lead Engineer Environmental & Program Manager EcoShape

Building with Nature

Let's introduce myself

- Environmental Engineer @ Van Oord
  - 2007: MSc in Env. Fluid Mechanics from Delft University of Technology
  - Over 12 years of experience @ Van Oord
  - Projects world-wide (Australia, Ireland, Kuwait, The Netherlands)
- Program Manager @ EcoShape
  - Steering development of Building with Nature
- @ Home
  - Living close to Delft together with girlfriend Ellen, son Ruben and daughter Josefien
  - Hobby's: swimming, travelling



Building with Nature

Agenda

- Introducing Building with Nature
  - Background & philophy BwN
  - EcoShape
- Example cases
- Take-home messages



Constructing marine infrastructure

EcoShape
building with nature

Van Oord
Marine ingenuity





Side effects of ‘fighting against water’?

EcoShape
building with nature

Van Oord
Marine ingenuity



Global increase of environmental awareness





Building with Nature – background & philosophy

Main question

What if we are so focused on minimizing negative effects that we miss opportunities to maximize positive effects?



Building with Nature – background & philosophy

EcoShape - mission

Get the Building with Nature concept:

- Implemented in practice
- Tested in pilot projects
- Supported with knowledge
- Translated to practical design guidelines
- Developed in a collaborative network



Building with Nature – background & philosophy

Heart of the Matter

A design process aiming to work with natural processes and providing opportunities for nature as part of the infrastructure development process

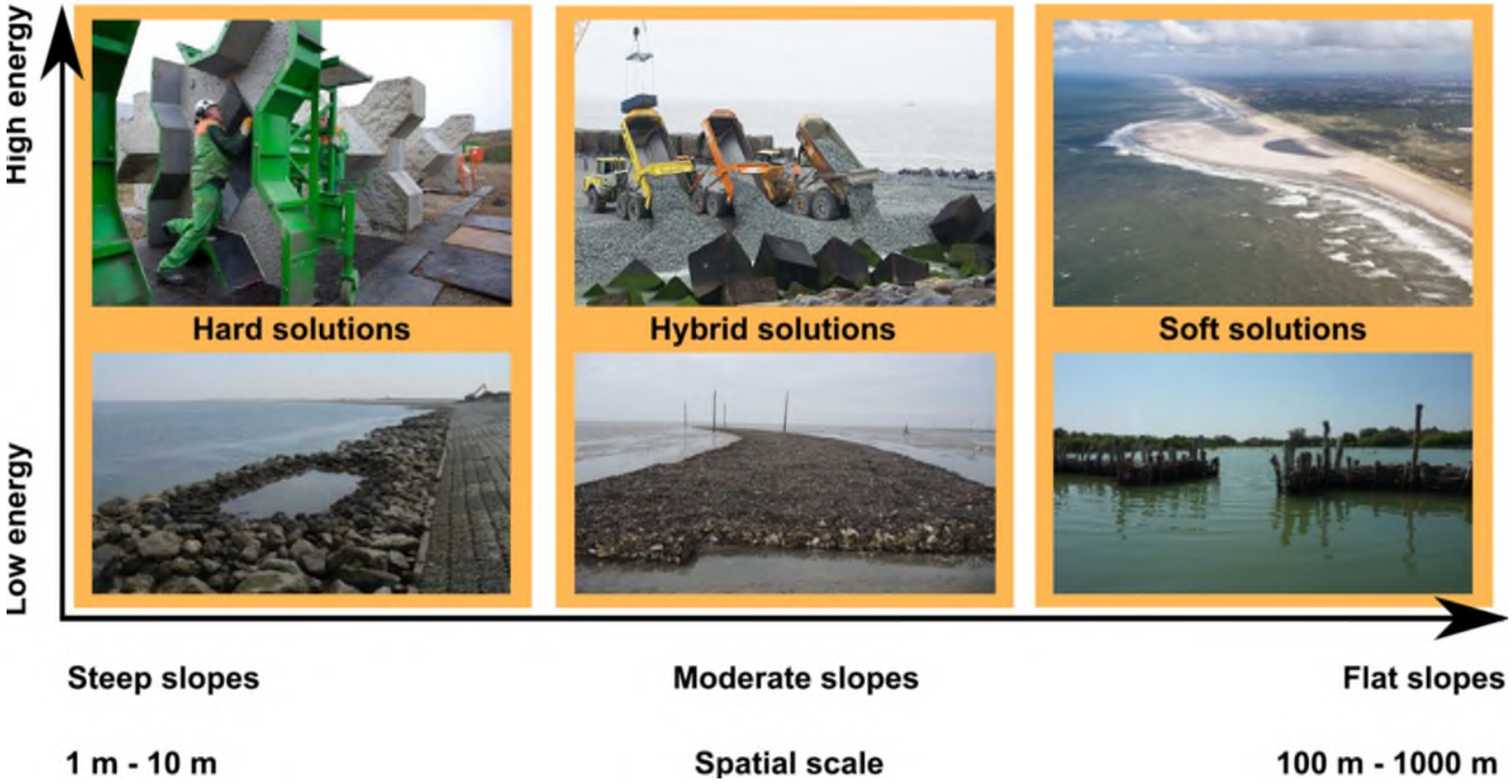




Building with Nature – background & philosophy

Where to implement Building with Nature?

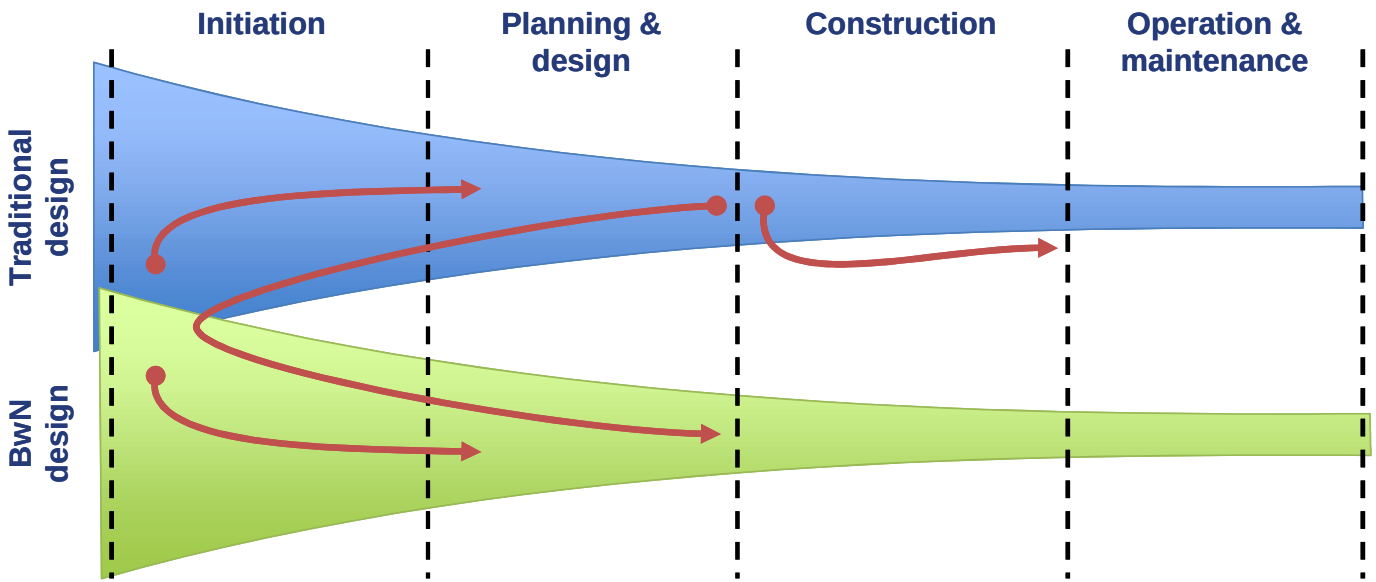
De Vriend et al. Journal of Hydro-environment Research 9 (2015) 159-171



Building with Nature - background & philosophy

When to implement Building with Nature?





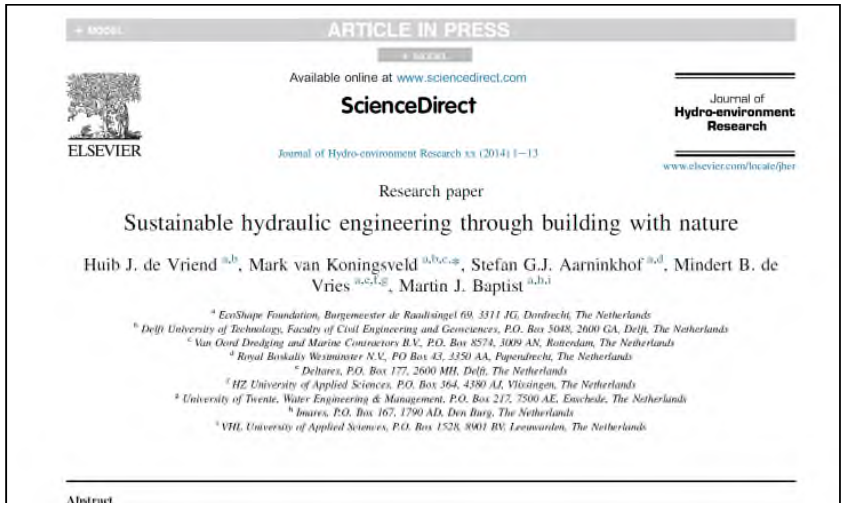
Building with Nature – background & philosophy

Conceptual design

"Create landscape designs that serve multiple objectives on a conceptual level."

Integral approach that starts from the system and its dynamics

Focus on forces to be used and opportunities to be created



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Available online at www.sciencedirect.com

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Journal of Hydro-environment Research

Journal of Hydro-environment Research xx (2014) 1–13

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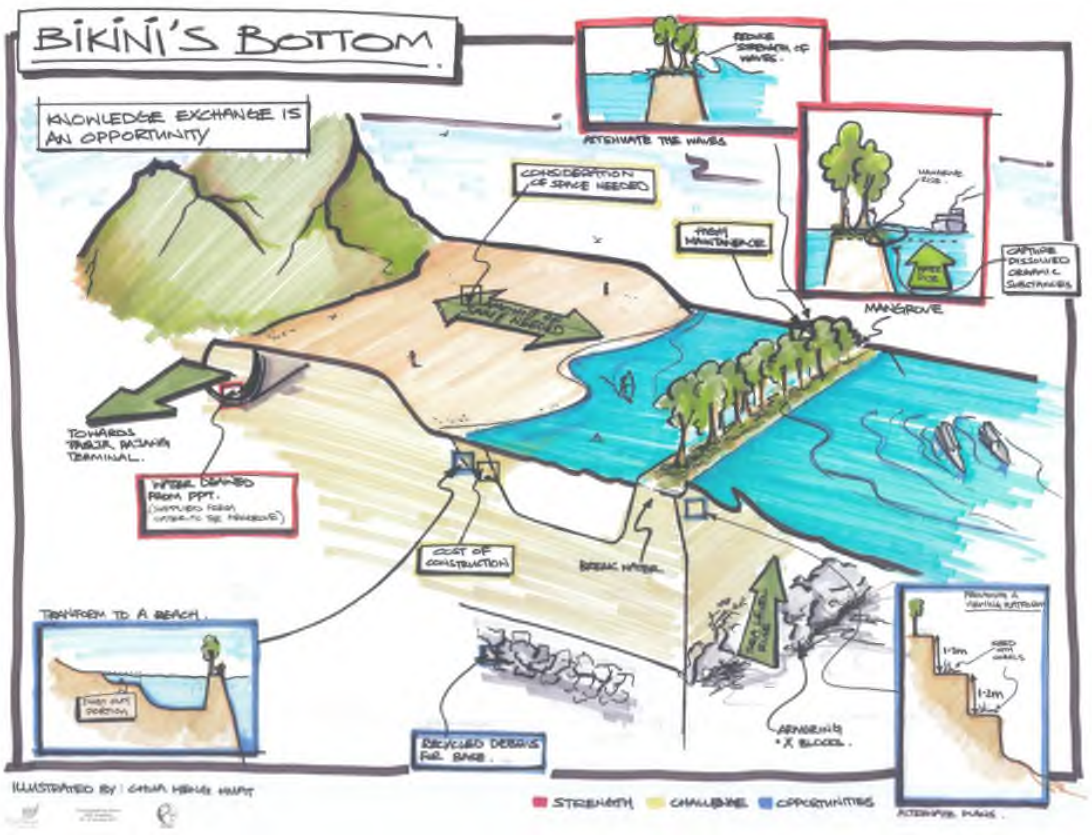
Research paper

Sustainable hydraulic engineering through building with nature

Huib J. de Vriend [a,b], Mark van Koningsveld [a,b,c,*], Stefan G.J. Aarninkhof [a,d], Mindert B. de Vries [a,e,f,g], Martin J. Baptist [a,h,i]

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[b] Delft University of Technology, Faculty of Civil Engineering and Geosciences, P.O. Box 5048, 2600 GA, Delft, The Netherlands
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[e] Deltares, P.O. Box 177, 2600 MH, Delft, The Netherlands
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[g] University of Twente, Water Engineering & Management, P.O. Box 217, 7500 AE, Enschede, The Netherlands
[h] Imares, P.O. Box 167, 1790 AD, Den Burg, The Netherlands
[i] VHL University of Applied Sciences, P.O. Box 1528, 8901 BV, Leeuwarden, The Netherlands

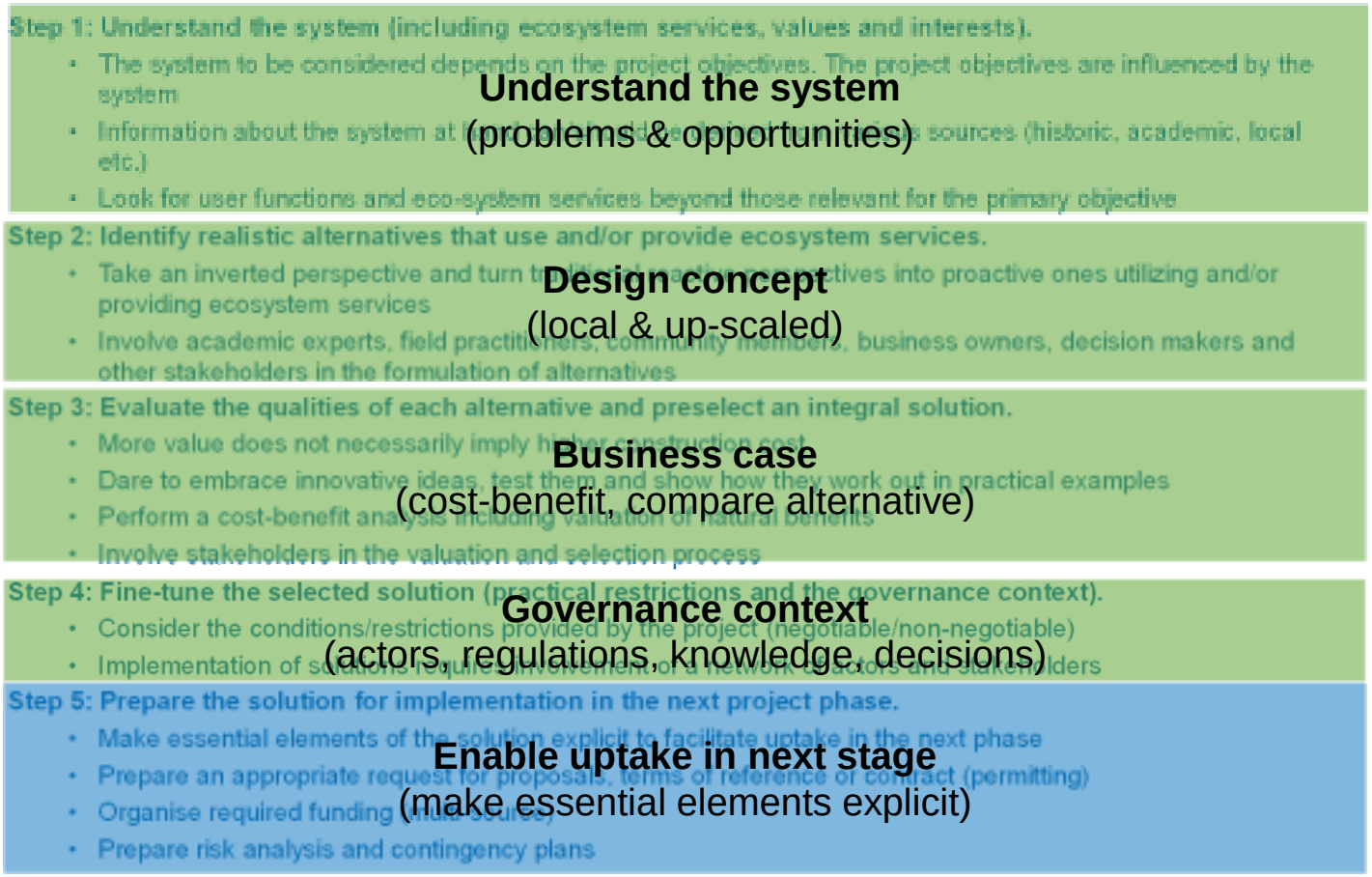
Abstract



Building with Nature – background & philosophy

BwN design process

Five steps in BwN design process



De Vriend et al.
Journal of Hydro-environment Research 9 (2015) 159-171

Typical features of the BwN approach

Characteristics of BwN projects

Focus on integral, multidisciplinary solutions

Focus on creation of added values:

- Creation of nature & landscape value in shore protection works
- Building materials in ecosystem recovery projects
- Nature restoration/development in harbour development projects

Involvement of multiple stakeholders

Complexity increases









EcoShape

EcoShape consortium

Public Sector

Private Sector



Knowledge Institutions

NGO's

EcoShape
building with nature

Boskalis · Van Oord Marine ingenuity · Witteveen+Bos · Deltares · Wageningen University & Research · ARCADIS · Royal HaskoningDHV · HKV Lijn in Water · Wetlands International · IHC · Vereniging van Waterbouwers · Rijkswaterstaat

EcoShape

EcoShape consortium – roles & responsibilities

Precompetitive collaboration to initiate/maintain:

- focus on opportunity's for Building with Nature,
- participation in innovative projects,
- a knowledge and expert agenda for Building with Nature,
- gathering, generation and dissemination of knowledge and expertise,
- development of (pilot) applications,
- conception and execution of (additional) monitoring programs,
- sufficient funding for above described activities.

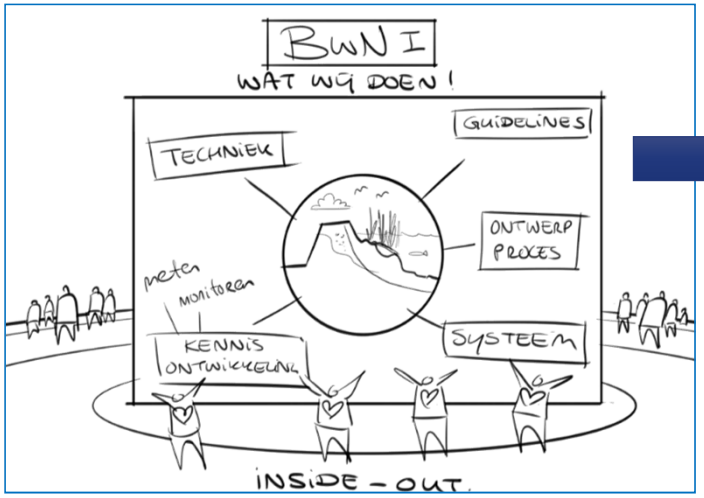
Collaboration (public-private-knowledge-NGO's) unique to the world

… on a concept applicable world wide

EcoShape

EcoShape programs

2008



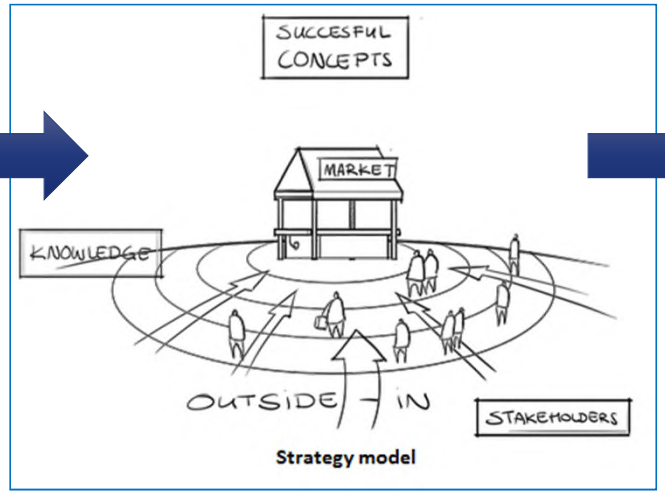
Show that it works

30mln€ research program

Pre-defined at beginning of program

Contributions from EcoShape-partners, Dutch government and European subsidy

2013



Make it happen!

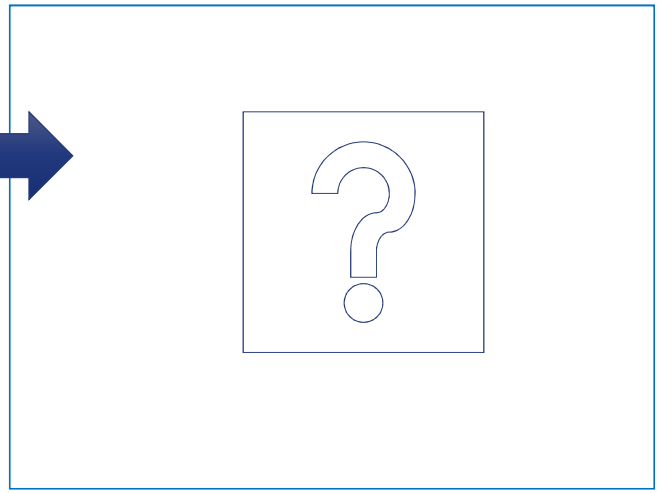
47mln€ program (current)

Developed bottom-up (project by project)

Various partners and financers per project

2020

2021 - ??



Building with Nature

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- Example cases
- Take-home messages

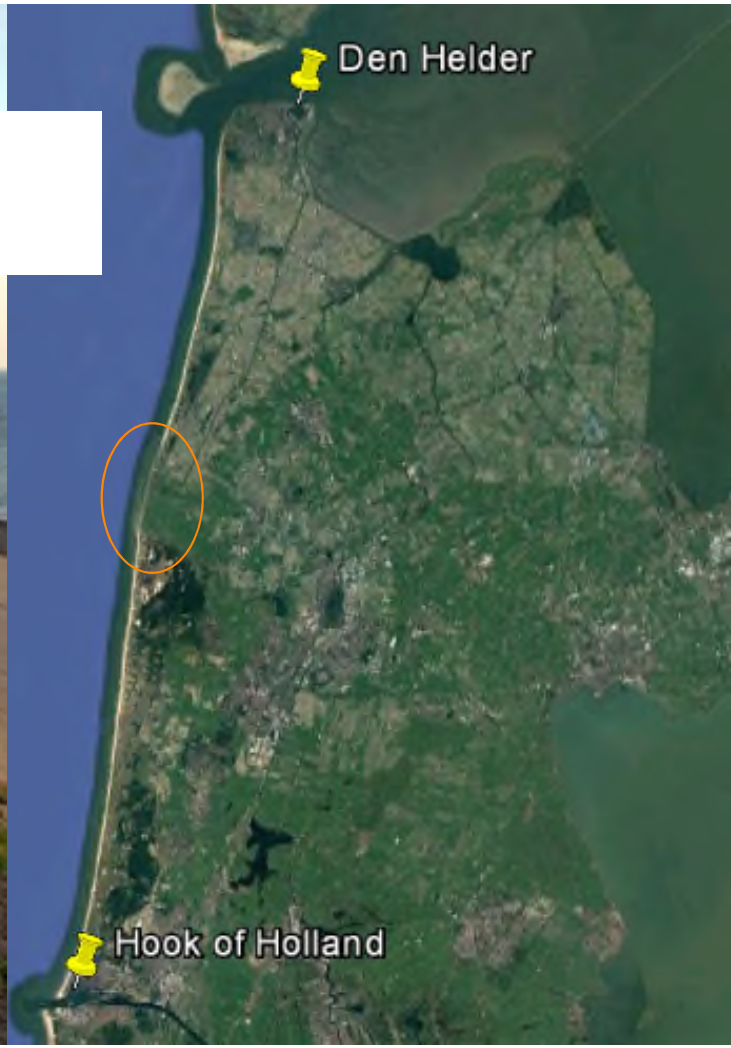


Building with Nature – Example cases

Problem: Coastal safety & sea level rise, The Netherlands

Last hard defence structure between Hook of Holland and Den Helder

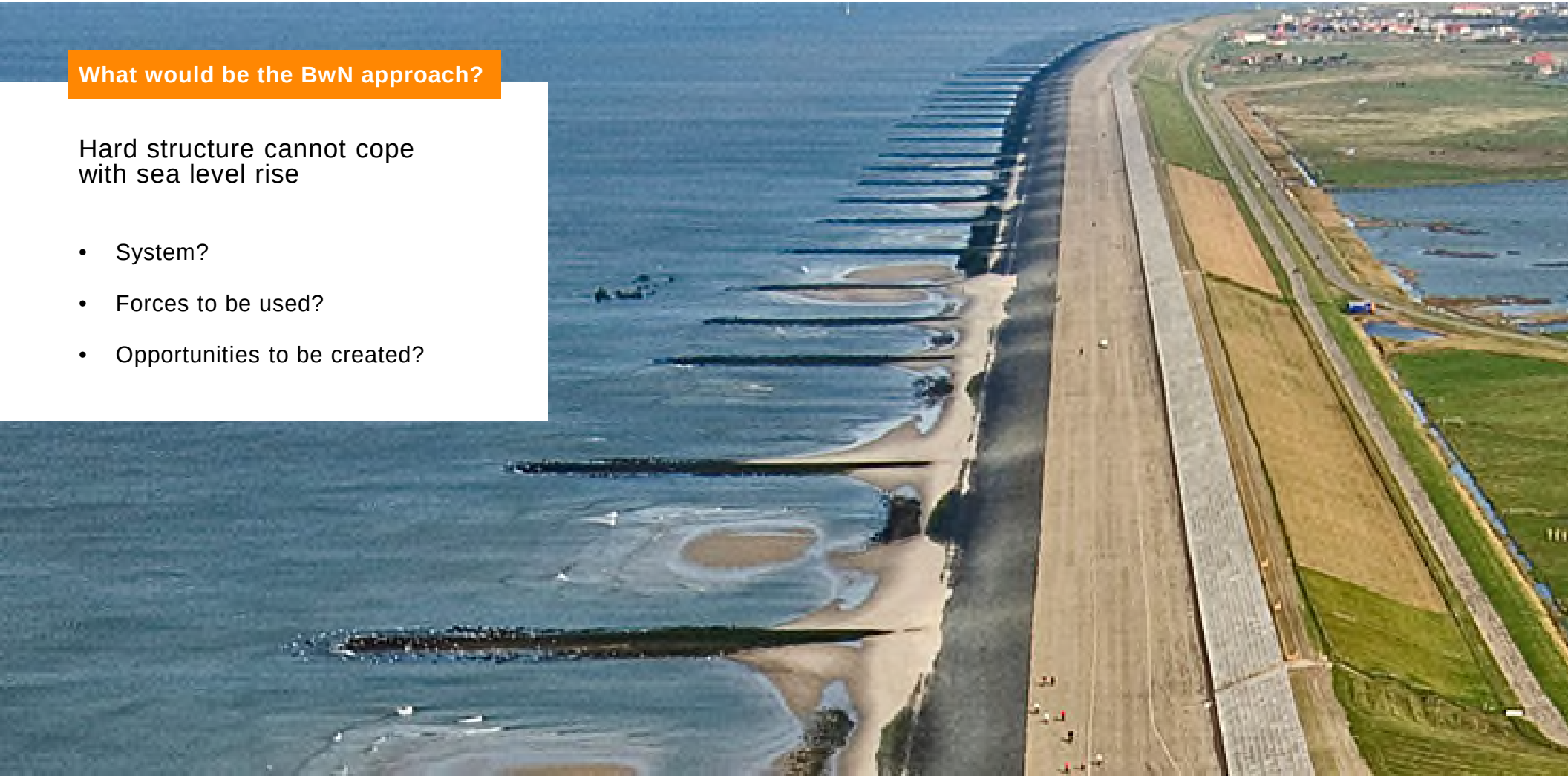




Building with Nature – Example cases

EcoShape
building with nature

Van Oord
Marine ingenuity



What would be the BwN approach?

Hard structure cannot cope with sea level rise

- System?
- Forces to be used?
- Opportunities to be created?

Building with Nature – Example cases

BwN solution

Soft sediment: flexible and natural

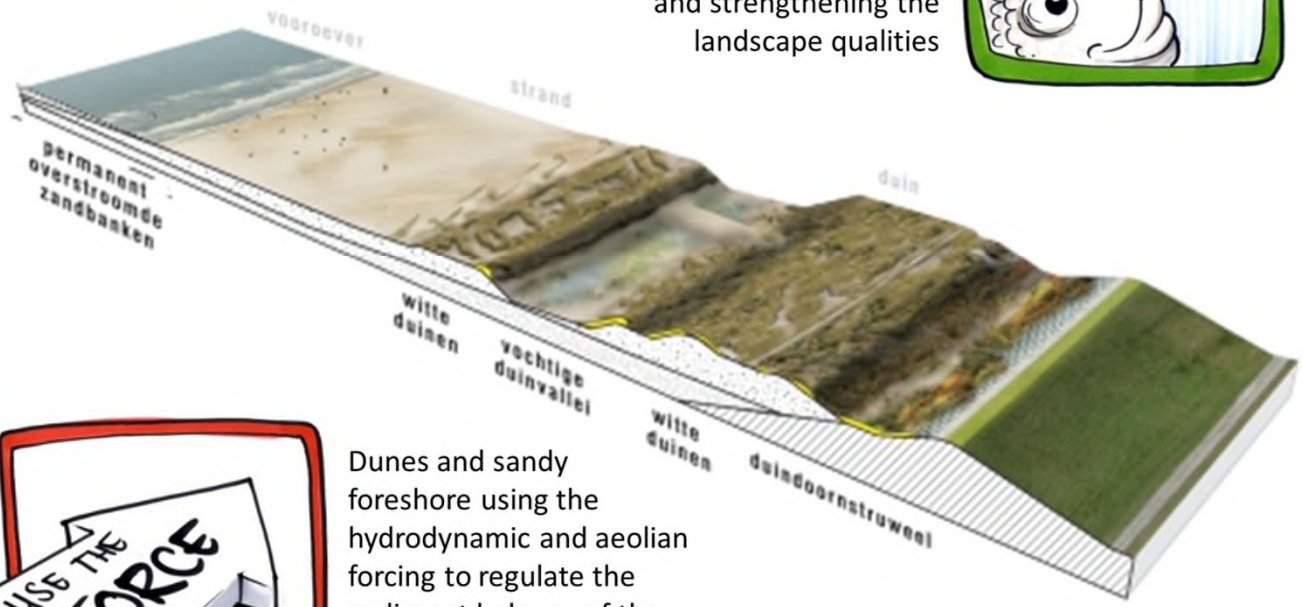


Building with Nature – Example cases

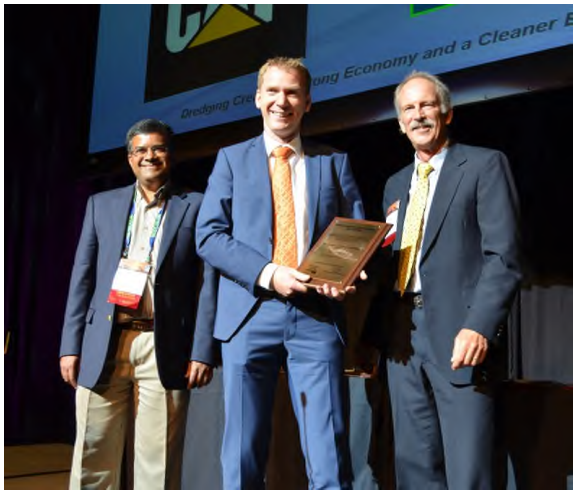
BwN solution: how does it work?

Dunes and sandy foreshore providing opportunities for nature development and strengthening the landscape qualities





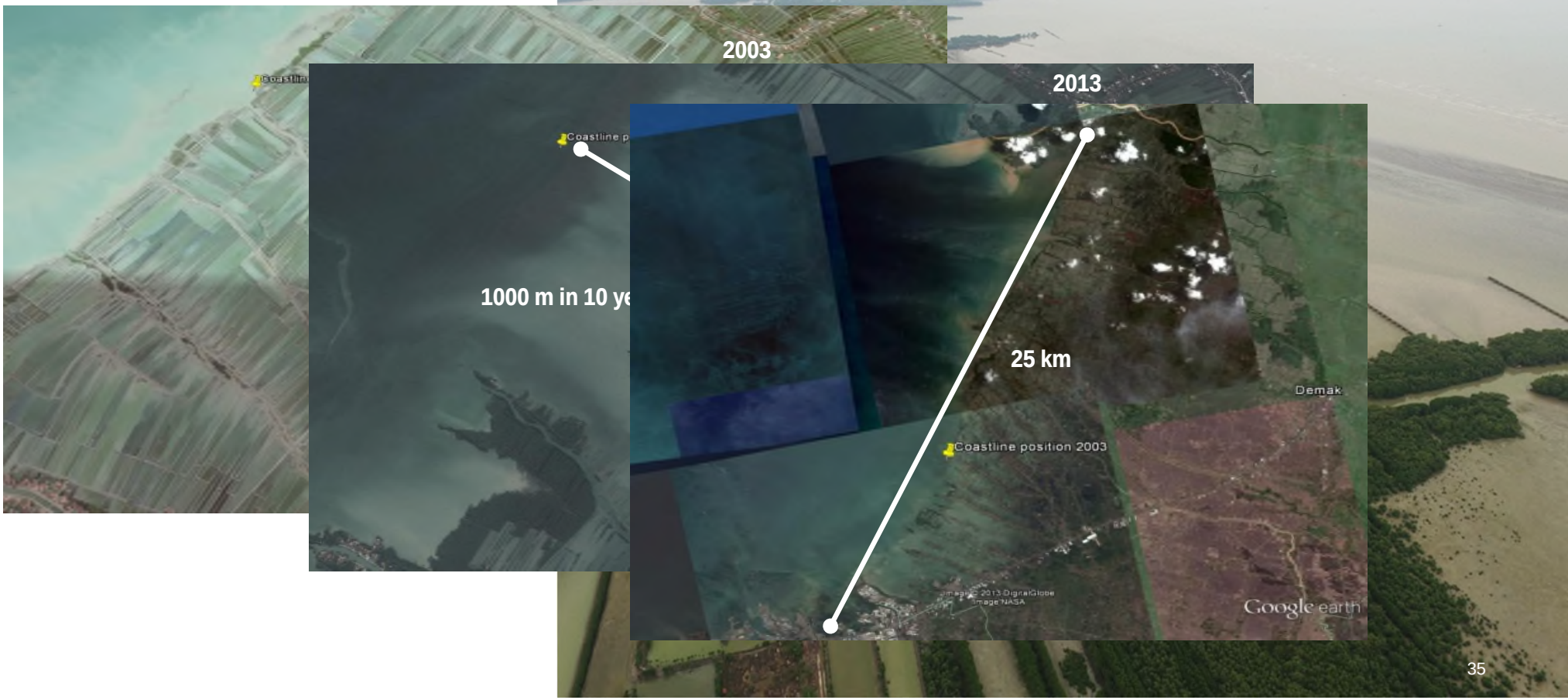
Dunes and sandy foreshore using the hydrodynamic and aeolian forcing to regulate the sediment balance of the shallow coastal zone



Project won Silver Environmental Excellence award at WODCON 2016, Miami

Building with Nature – mangrove example

Problem: Coastal erosion Demak, Indonesia



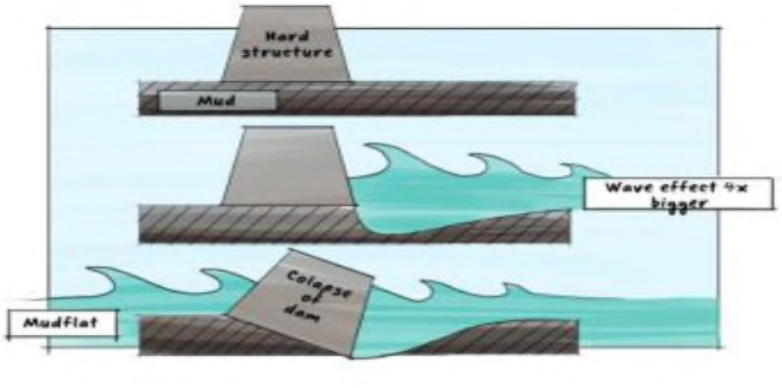
Building with Nature – mangrove example

Problem: Coastal erosion Demak, Indonesia

Solutions?







Building with Nature – mangrove example

What would be the BwN approach?

System?

Forces to be used?

Opportunities to be created?



Building with Nature – mangrove example

BwN solution: desirable end result

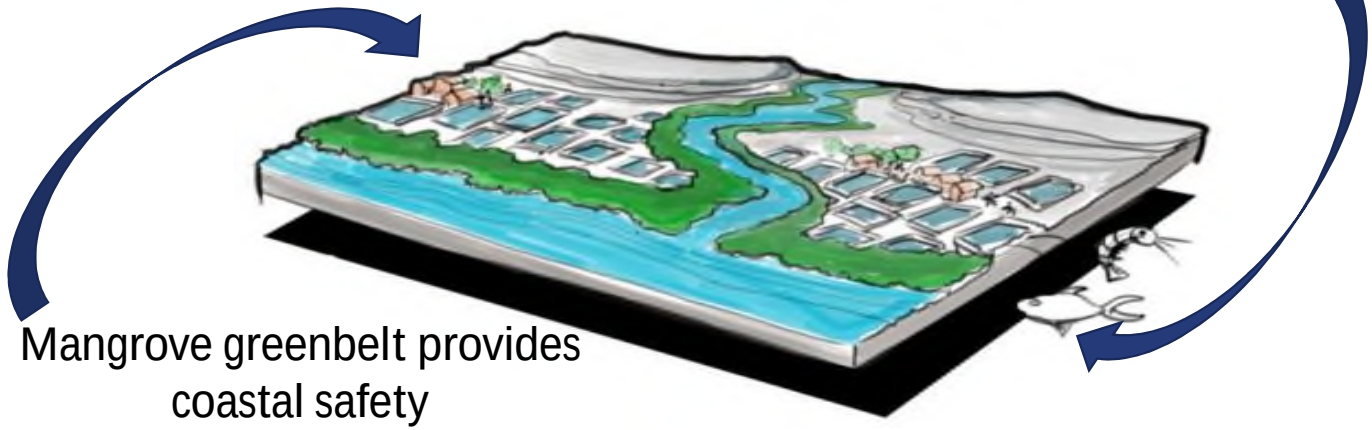
Mangrove belt recovered

Sustainable aquaculture as socio-economic system to maintain and interact with mangrove belt system





A prosperous local economy enables maintenance of mangrove greenbelt



Mangrove greenbelt provides coastal safety enabling economy to prosper

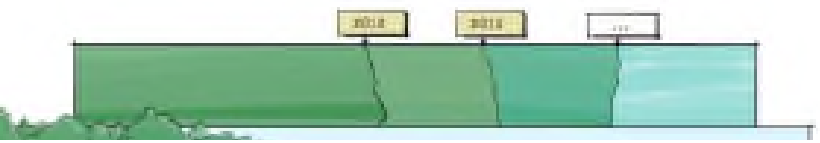


Building with Nature – mangrove example

BwN solution: start system recovery

Sediment trapping artificially enhanced to assure mangrove belt recovers

Using temporary structures



Revitalization of aquaculture

Implementation of LEISA techniques => increase of income 3-9 times

Voluntary replicated >100 ha





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Building with Nature

Take-home messages

Understand the system

Focus on integral, multidisciplinary solutions

Focus on creation of added values

… and ensure appreciation/valuation of those

Involvement of multiple perspectives and stakeholders

Anticipate complexity increase





Building with Nature

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Erik van Eekelen Msc
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