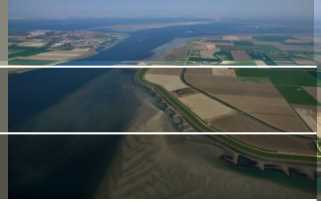
Deltares

Enabling Delta Life

The eco-dynamic design principles and practical steps

What to do?

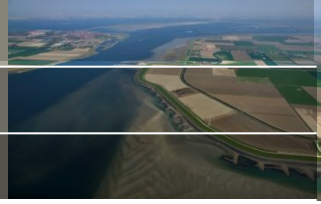


We want you to select cases where a difference can be made and write a project proposal

We challenge you to design a case using BwN principles, based on the EDD process.

Today: Refresher on EDD and Workshop

Planning



Case selection: 25/11

Each Thursday after lectures possibility for interaction with lecturers

Finalization of case selection december 2

Deadline december 16: ecosystem, challenges, ambitions, stakeholders in English outline of 2 A4

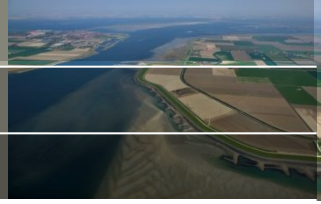
Deadline January 6, per group: now workshop to refine product

Deadline Januari 20, complete draft presentation

Deadline February 3: Presentation to stakeholder in nice location, completion of product

Deltares

MINDSET: Think differently



Man-made projects are an intricate part of the environment. They provide a unique opportunity to induce positive change!

Start with the system in mind, not the intervention. (system includes: physical (biotic & a-biotic), socio-economical and political system)

- *Know important aspects of each system and processes that influence these negatively but also positively (again includes: physical (biotic & a-biotic), socio-economical and political system)*

Go for win-win solutions (open attitude, daring use of creativity and transdisciplinary approach)

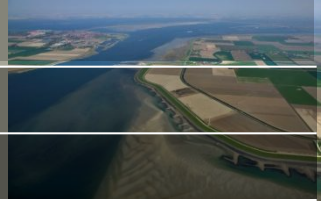
- *To realise such solutions generating support is crucial (governance)*
- *Also nature valuation is important*
- *Handle uncertainties*

Rather than just problem solving be opportunity seizing

- *Opportunities in any project phase, however, potential impact larger in early stages*

Deltares

MINDSET: Act differently



Natural processes can be used and stimulated to achieve an optimal and sustainable fit of a man-made project in its environment!

Act multi functional

Work with dynamics

- *Ask what the system can do for you and what you can do for the system*
- *Value other aspects than just statics*

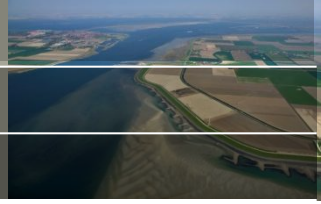
Allow for adaptive approach

- *Rather than eliminating uncertainties handle them*
- *A flexible approach allows for handling residual uncertainty*
- *GAMSI Go Ahead and Mitigate Significant Impact*

Take a life cycle approach

- *This helps to bring forward potentially more efficient solutions*

MINDSET: Interact differently



Realisation of Building with Nature projects cannot be achieved without early and active stakeholder involvement!

Operate

- *Cross sectoral*
- *Trans disciplinary*

Involve stakeholders early

- *Make use of local knowledge*
- *Seek out local optimal solutions (take stakeholder interests into account)*

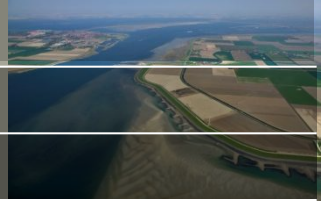
Pay due attention to governance

Go for adequate contracting

Communicate, tell the story

Deltares

Overall approach

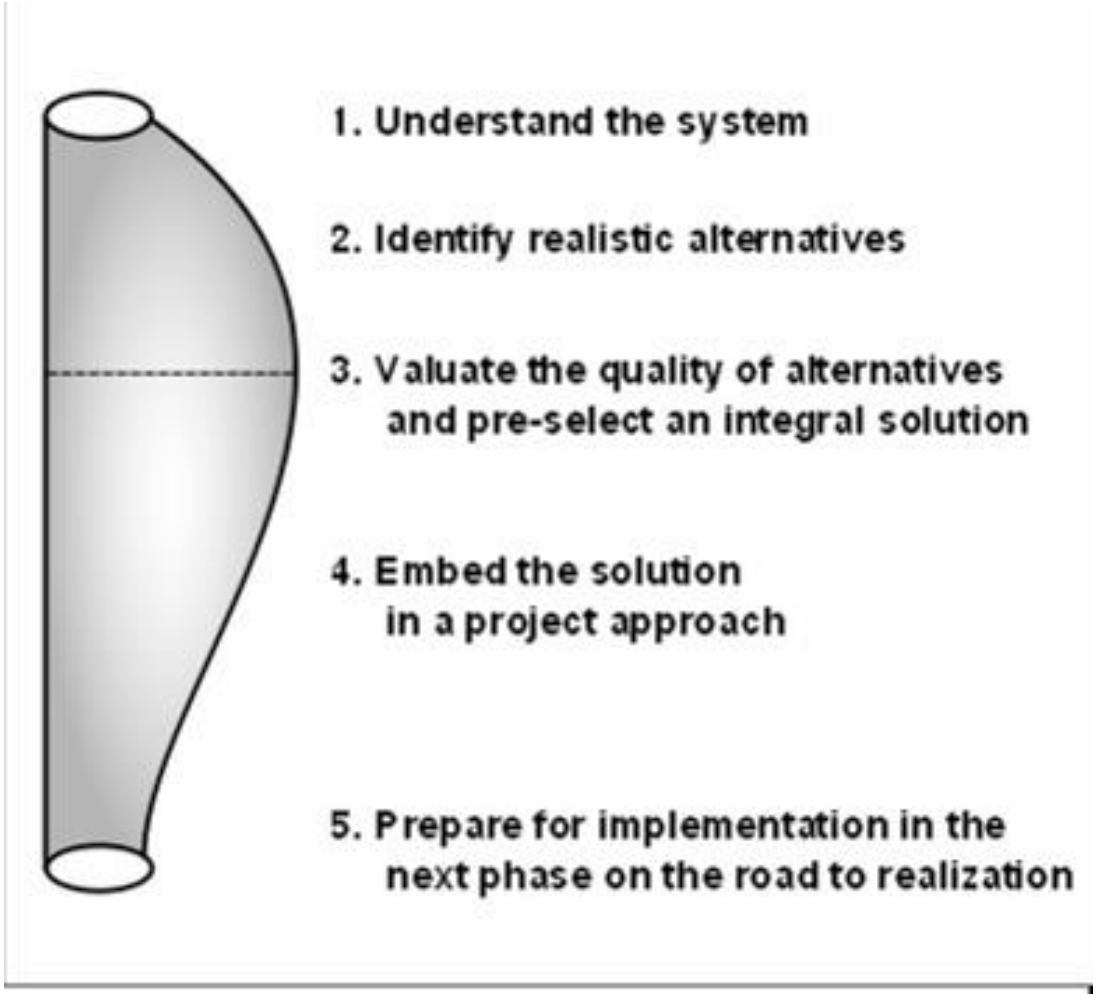


We should balance long-term costs and benefits, in monetary and non-monetary terms. The term **Ecodynamic Development and Design** is used to refer to this alternative ecosystem-based design approach.

In the approach, the best choices are not necessarily the ones that fit best to the individual project phases (early project planning, design, construction, post-construction).

We execute five steps per phase. Today project design phase

EXECUTE: Five steps for generating Eco-dynamic Design ideas repeated in each project phase



Deltares

Step 1. Understand the system (physical, socio-economical and governance)

Acquire a better understanding of the system in which a project is planned. In depth knowledge of the physical system (biotic as well as a-biotic), the socio-economic system as well as the governance context is crucial to identify potential win-win solutions.

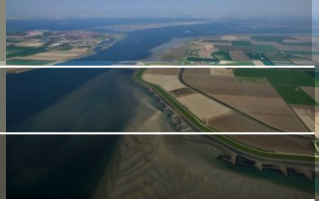
Your system is determined by your objectives: Be clear about your primary objectives and realise that finding win-win solutions creates room for flexibility in catering for secondary objectives. Your primary objective leads to a limited definition of the relevant system to consider. Adding secondary objectives force consideration of other system characteristics: other parameters, other time and spatial scales etc.

Information about your system can be derived from various sources: It is important to realise is that acquiring knowledge about a system is not a pre-requisite of scientists. Valuable information can be found everywhere!

- Don't be afraid to talk to people with local knowledge (fishermen, harbourmasters, waiters, etc)
- Don't be afraid to dive into historical records to better understand the evolution of the system as a whole and to think of approaches that build on historically available expertise

Think transdisciplinary: Remember to look at potential user functions that lie outside the primary objective for which a project is initiated.

Step 2. Identify realistic alternatives



Identify realistic alternatives that provide true win-win solutions providing services beyond mitigation and compensation maximising system potential (physical, socio-economical and governance) while safeguarding sustainability.

Eco-dynamic Designs use an inverted methodology: The most exciting Eco-dynamic Designs involve real eye-openers. Reverse a traditional reactive point of view into an exciting proactive point of view (problems are opportunities). One way to come up with such innovative 'reversing' ideas is to answer a number of basic questions:

- ***Providing services to the ecosystem:*** How can we strengthen the functioning of the receiving system - ecology, recreation, landscape?
  - > Larger scale: how can a project deliver benefits to the overall system in which it resides?
  - > Smaller scale: how can the project (with small adaptations) be more eco-friendly to local flora and fauna?
- ***Utilizing services provided by the ecosystem:*** How can better use be made of locally active (natural) resources: tide, waves, gradients, sediment availability, flora, fauna, economy, cultural values, etc?
  - > Can available resources be utilized to lower construction and maintenance cost (more flexible solutions)?
  - > Can available resources be utilized to come to more sustainable solutions (PPP solutions: less energy, less material, multi functional)?
  - > Can system dynamics be used as a positive rather than a negative aspect (use expected change as an opportunity to achieve objectives, use available time to achieve necessary change gradually rather than at once with associated over-engineering)?

Solutions are of transdisciplinary character from the get go: Bring together academic experts, field practitioners, community members, business owners, decision makers and other stakeholders to formulate alternatives.

- Involve relevant other disciplines in the design process as soon as possible (which disciplines should collaborate given the system at hand, how should they collaborate in order to be most innovative/effective)
- Look for an open minded rationality that is open for the unknown, the unexpected and the unforeseeable while rejecting dogmatism, ideology and intolerance (see also Wikipedia: Transdisciplinary studies).

Deltares

Step 3. Valuate the qualities of alternatives and pre-select an integral solution

Assess the inherent qualities of the alternatives and combine them into one optimal integral solution. Valuate the EDD alternatives against a traditional design.

More value does not imply higher construction cost: When you look for win-win situations often small adjustments can be made to existing designs in order to produce more value for less or equal money.

- More for less is possible! Try to get great value gain with little investment.

Daring use must be made of creativity: Don't be afraid to embrace innovative ideas. Dare to try and show it in practical examples!

- Tell the story of heroic implementation of creativity

Uncertainties must be identified and handled: Building with Nature solutions by definition involve dynamics and inherent uncertainties. Handling these uncertainties is an normal part of the Eco-dynamic Design process.

- Remember that although a solution as a whole may be innovative, its components may be based on traditional know how.

Involve stakeholders in the valuation and selection process: From Negative to Positive, from NIMBY (not in my back yard) to PIMBY (please in my backyard)!

Perform a cost-benefit analysis: Take into consideration construction costs, maintenance costs as well as benefits for primary and secondary objectives. Compare the new solution with a traditional non-BwN solution (usually single objective).

Step 4. Embed the solution in a project approach.

Embed the integral solution in a project context considering practical restrictions and governance context.

Consider the conditions/restrictions provided by the project: Make sure that an innovative idea is optimized so that it may actually be constructed.

- Take execution aspects into account (workmethods, availability of equipment, etc)
- Identify important timing aspects (growing seasons, closed seasons, time for ecological components to evolve to desired state, etc.)
- Help the project to tell the story. If you have proceeded to implement an innovative idea make sure that you tell your story to the project team, the stakeholders and the public. Think of access routes to a project, guided excursions, information panels, press releases etc.

Implementation of solutions require involvement of entire network: networks and connections need to be established between all organizations involved

- Effectively involve stakeholders in the design and realisation process
- Use existing examples that people can use as inspiration, as building blocks for future projects. Solutions should be of an 'open source' nature. In networks ideas should/can not be protected. They should be open for use by others. Share costs, expertise and ideas. Don't be possessive.

Step 5. Prepare the solution for implementation in the next phase on the road to realization

Handle the practical bottlenecks to get the solution included in the next phase on the road to realisation: inclusion in request for proposals, inclusion in the detailed design, inclusion in the project delivery, inclusion in maintenance and monitoring scheme.

Translate solution to a technical design: What would you need to actually implement the proposed solution (lacking knowledge, available materials, sustainability criteria etc.).

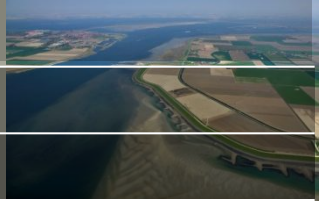
Translate solution to request for proposals or contract: How to reformulate the request for proposals (TOR) so that the innovative solution will be proposed or constructed.

Organise required funding: Try to involve stakeholders in the search for additional funding if required.

Identify permitting requirements: Identify as soon as possible potential bottlenecks in terms of permitting and organise necessary input (required knowledge, required support by stakeholders).

Prepare risk analysis and contingency plans: Building with Nature is dynamic almost by definition. Make sure the project takes this aspect into consideration (adaptive execution, adaptive management)

Groups and cases



1. Anne, Pim, Joost
    1. Lake Grevelingen, nutrient problem
    2. Recreation, Agriculture, Nature, Safety
2. Stephanie, Jasper, Rik
    1. South West Walcheren, Vliss-Zoutelande, safety and spatial quality
    2. weak links, recreation, shipping, erosion
3. Joao, Eva, Wessel
    1. Weak link Zws-Vlaanderen, construction of sand banks offshore.
    2. Aquaculture, safety, land reclamation, recreation

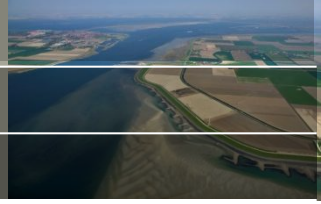
4. Tao, Jan-Kees, Martijn
    1. Haringvliet, closed barrier, ecosystem problem
    2. nature (fish migration) vs agriculture (fresh water)

5. Michael, Fabian, Lotte
    1. BoZ at sea. Poor water quality, livability, ecology
    2. tidal influence, fresh water runoff, natura 2000, pollution, sluices
6. Babette, Bas, Bob
    1. Flooding Hedwige polder
    2. nature compensation, politics

7. Benjamin, Daan,Vera
    1. Rich harbour Sloegebied, low biodiversity
    2. benefit for regional ecosystem
    3. hard structures, soft structures
8. Jan, Marijn, Raymon
    1. Cadzand, Sand Starvation, erosion, safety, ecosystem
    2. creative beach nourishment,
    3. Eva, Martijn, Rik, Anne afwezig op 215 december

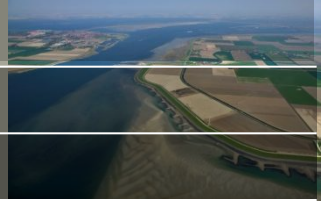
Deltares

Workshop



1. Each group works with its own project
2. You will discuss the project using the 5 steps of EDD
3. 10.00 Half our: steps 1-3
4. Plenary discussion, based on summary report per group
5. 11.00 Half our: steps 3-4
6. Plenary discussion, based on summary report per group
7. 12.00 Plenary discussion of step 5 with input of each group

Product

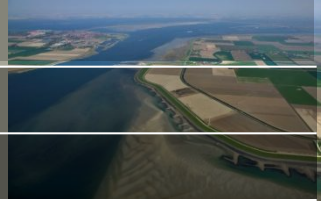


We want you to write a project proposal minimum 10 A4, excluding introductory pages (title, summary, index) and closing pages (literature, annexes)

We want you to be creative and use all means of presentation that you can. You have to sell the product to the stakeholders. Use of powerpoint or equal is discouraged

Best ideas could be implemented in Ecoshape WIKI

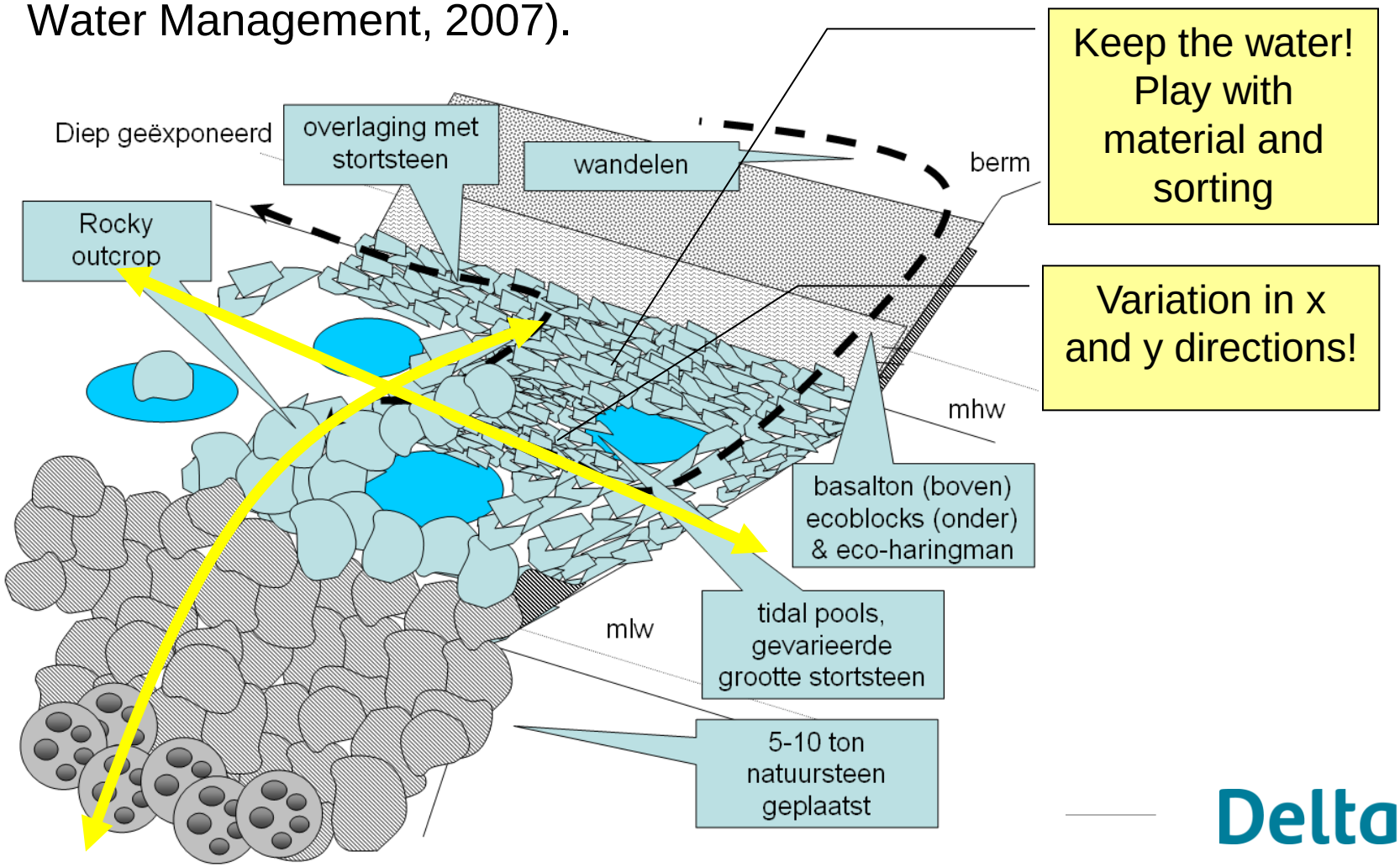
Content of project proposal



- Select a case
- Describe the problems and challenges
- Describe current situation of ecosystem, economy, socio cultural
- Describe local and regional ambitions > Veilig, Veerkrachtig, Vitaal, People-Planet-Profit
- Identify and describe stakeholders
- Describe possible solutions to challenges for selected case
- Describe (long term) costs and benefits,
- Describe win-win situations
- Describe how we can select the best solution
- Select best solution. We could involve Prov, RWS, Ecoshape
- Describe possible alliances of parties
- Make a pre-design and do costing and benefit
- Look for funding sources, such as OP-Zuid
- Present the result by telling the story in an attractive manner.

2006 Rijke Dijken idee, concept ontwikkeling

NL national government aims to translate these concepts in new designs of coastal defenses (Ministry of Transport, Public Works and Water Management, 2007).



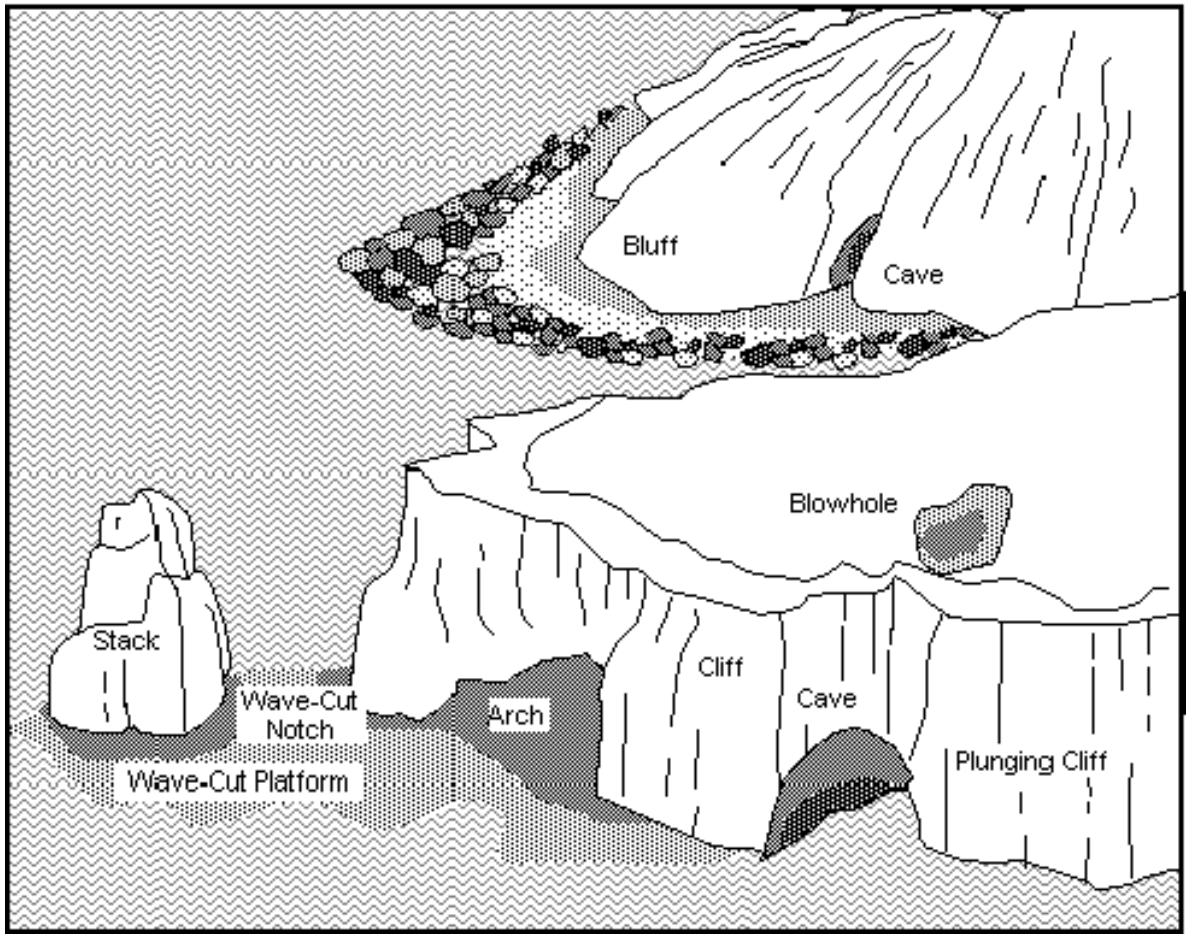
Keep the water! Play with material and sorting

Variation in x and y directions!

Deltares

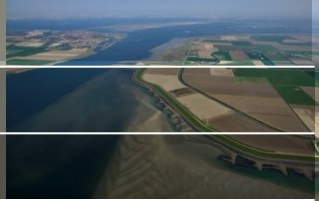
Meerdimensionaal

Denk in 3D



Deltares

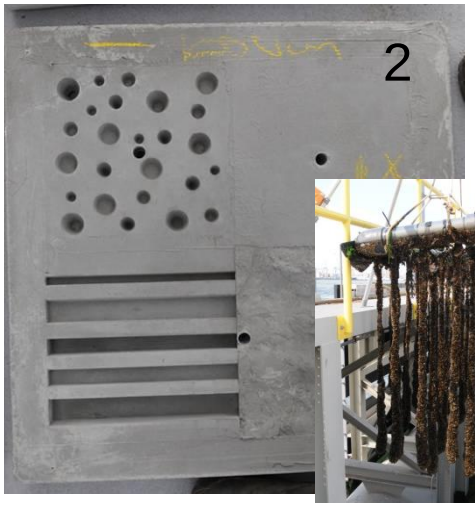
Ontwerpkeuzen



- bredere stortsteen kreukelbermen
- toepassen van grotere, zachtere en poreuze steen
- toepassen van brede sorteringen (veel grote en kleine stenen)
- ecologisch optimale hoogte en breedte van de kreukelberm
- andere toepassingen dan stortsteen
- optimalisatie toplaag van bekledingen benedentalud naar ecologie
- optimalisatie afmetingen blokken (dwarsafmetingen) van benedentalud

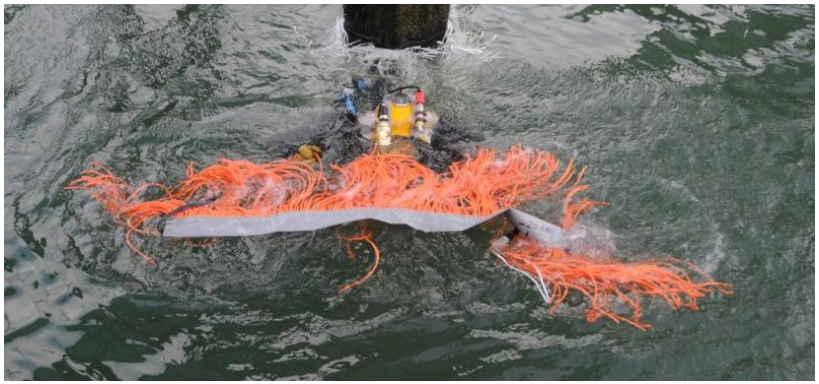
2007-2009 pilots

1. IJmuiden
2. Haven van Rotterdam
3. Oosterschelde
4. Westerschelde



Deltares

Hula's in the harbour of Rotterdam (Deltares, HbR, EcoConsult)



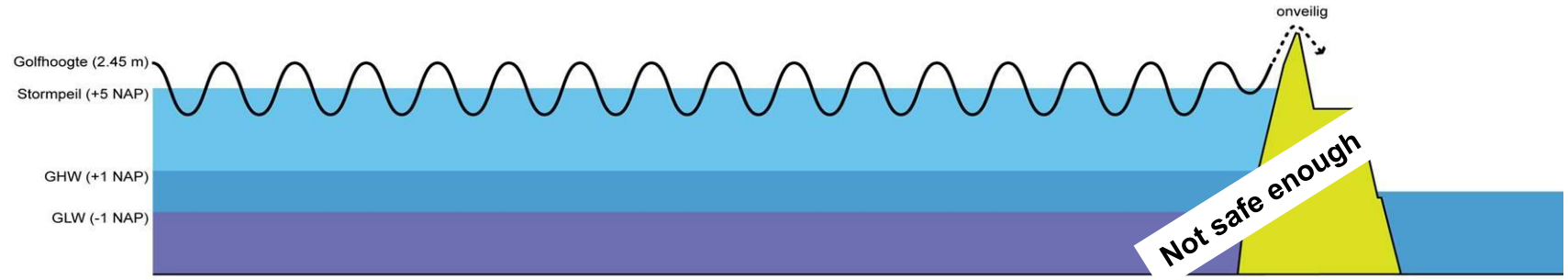
Monitoring shows that biomass en biodiversity is enhanced a lot when compared to smooth structures.
Wave action in a harbour can be a problem that is reduced by using the hanging hula structures.

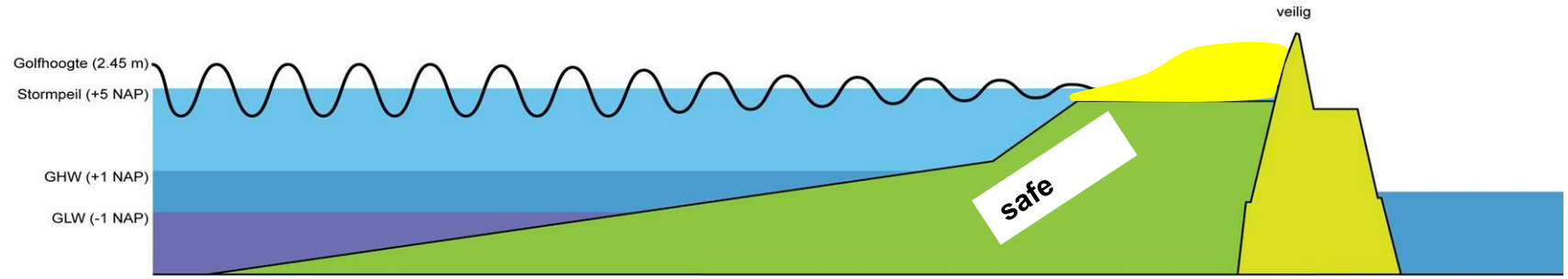
Deltares

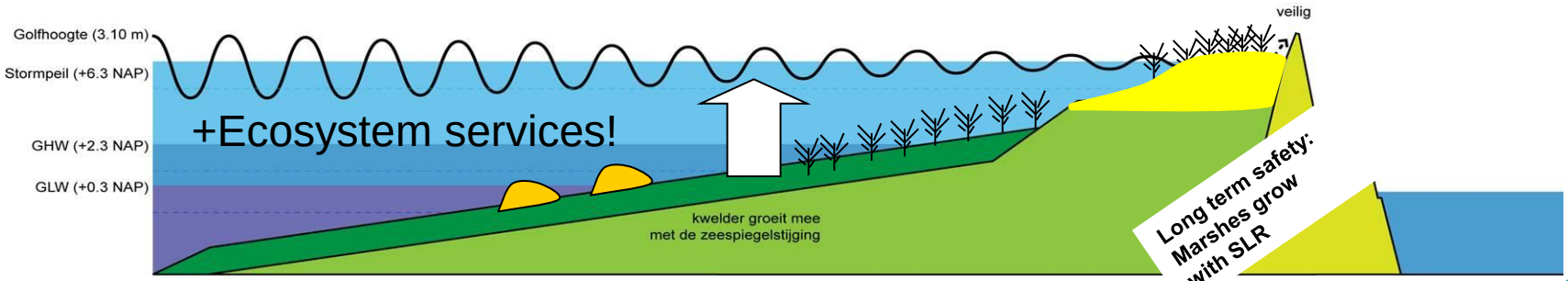
Artist Impression ‘Palenbos’ (RWS-DZH)

Deltares

Building with nature by marsh and reef creation

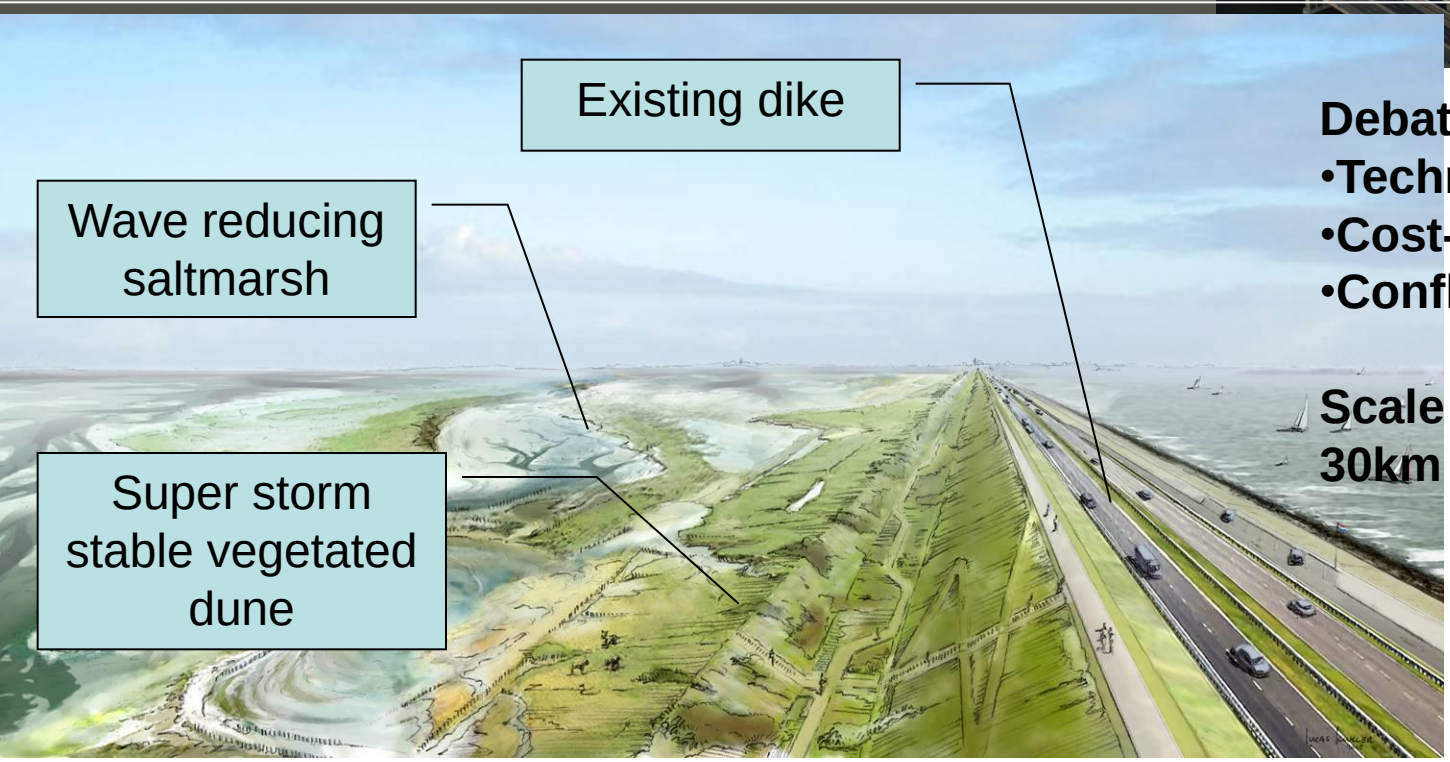






Situatie bij een superstorm, 1x per 10.000 jaar

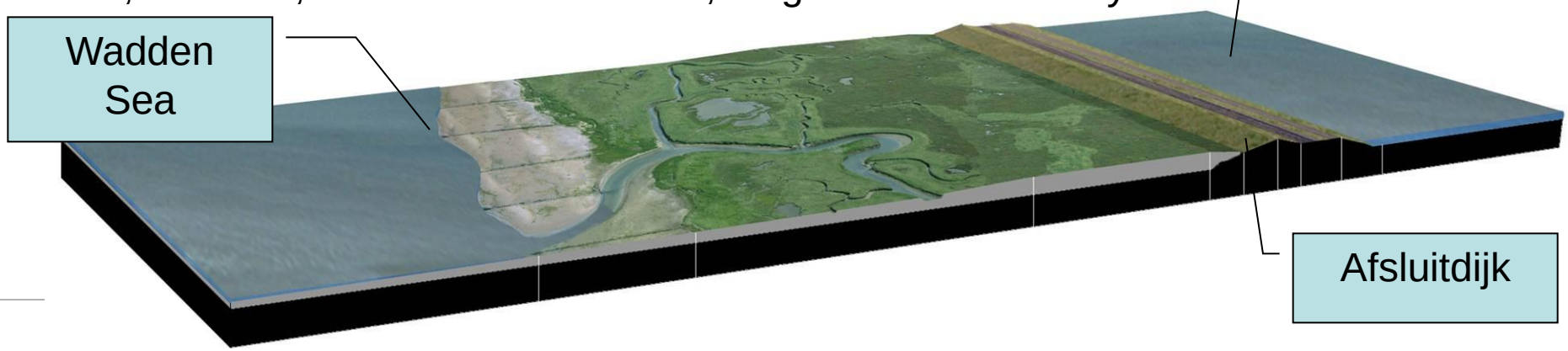
Wadden Sea Soft Safe Dike: saltmarsh/dune/dike hybrid



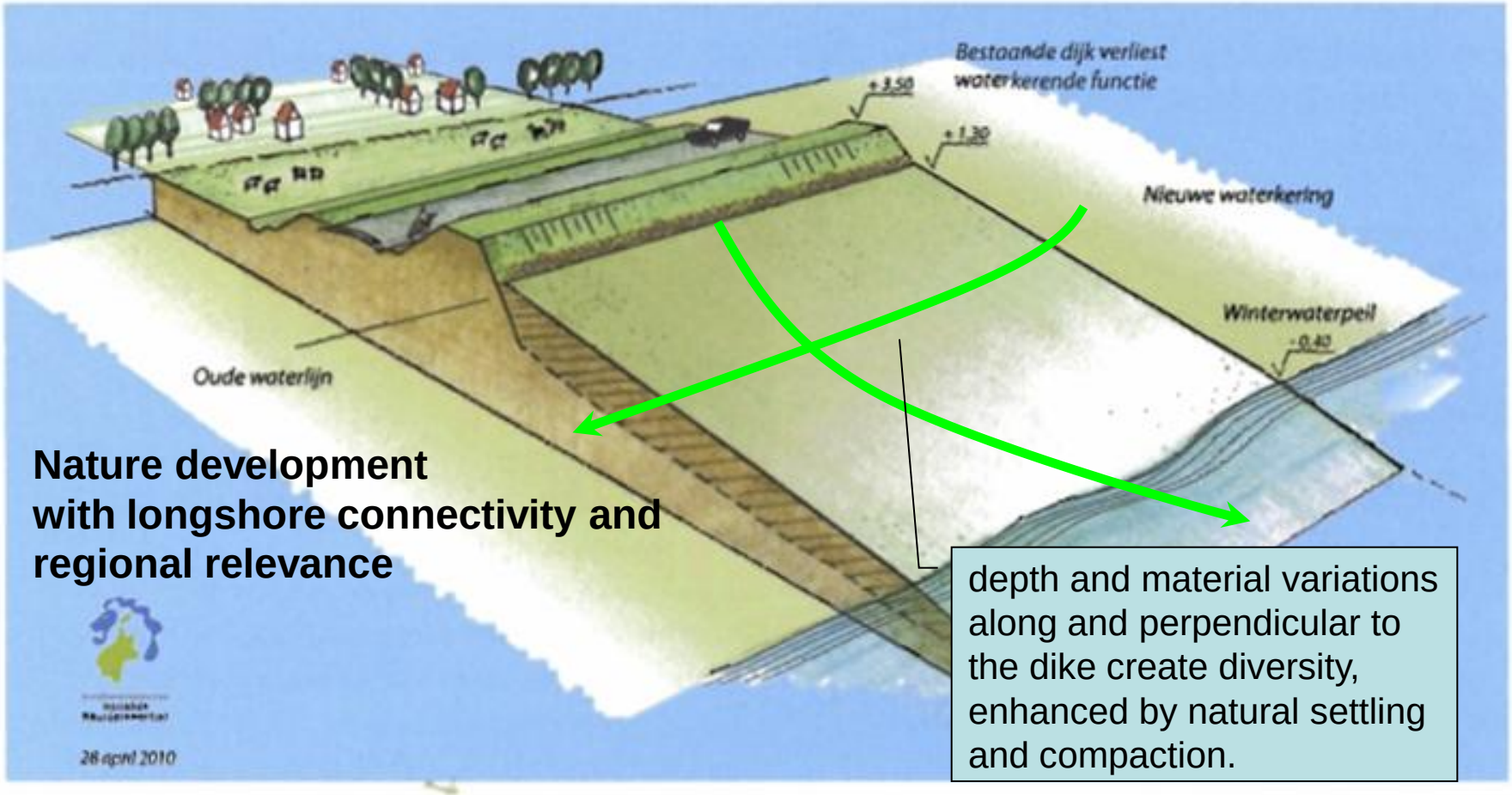
Debate:
- **Technical feasibility**
- **Cost-benefit**
- **Conflict with Natura 2000**

Scale 500m wide
30km long

Saltmarsh grows with sea level and maintains stability and safety
Flexible, low tech, low maintenance cost, longshore connectivity



‘bankdike’, soft safe green flexible dike



Nature development with longshore connectivity and regional relevance

depth and material variations along and perpendicular to the dike create diversity, enhanced by natural settling and compaction.

50m wide, many km, large wave reduction, along lake shore, under discussion

Deltares

Application River dike : wavereducing hybrid dike ‘fort Steurgat’ (RVR Noordwaard), BwN in construction!

Clay dike
will be lower than
traditional design

Wave reducing
willow-tree plantations
Low cost low tech

Deltares concept and design
has now been officially accepted
to achieve required 1/2000 safety
standards and is integrated in this
300 million euro project

Application: Floating wavereducing marsh, Houtrib sinking marsh for Zeeburg, EVZ (NMIJ, gem Amsterdam)

We need an improved floating design!