Nature-Based Solutions for Water Security

*a business opportunity*

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Netherlands

- 60% is vulnerable to flooding
- 60% of economic value is earned in lowest lying parts of the country
- 70% of fresh water comes from Germany (river Rhine)
- 98% of waterbodies are artificial or heavily modified
- Water Infrastructure is one of the pillars of the Dutch economy
areas in the Netherlands potentially flooded without proper water management
Dutch engineering solutions
Challenges

- Water safety
- Ecology
- Renovating Infrastructure
- Urban Integration (Healthy Cities)

*nature-based* WATER SECURITY
KEY CONCEPTS OF NATURE BASED SOLUTIONS FOR SUSTAINABLE DEVELOPMENT

Ellis Penning
Global challenges

- Climate change and biodiversity loss
- Governments and donors are increasingly applying NBS to reduce hazards, mitigate and adapt to effects of climate change and to improve water management and limit heat stress;
- Demand for sustainable, resilient and multi-benefit solutions;
- Trend toward integrated, multi-benefit (and multi-party) solutions;

- Clear trend toward *with nature*
- Many pilots, and trial projects.

→ Yet, uptake at project scale is still challenging
Exploring nature-based solutions: the role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards

“...instead of automatically defaulting to grey solutions like dikes and pipes for flooding, we first should look at restoring floodplains or wetlands. Rather than building sea walls, we need to think about conserving sand banks...Planners should compare green to grey and identify new opportunities for investing in nature, including a combination of green and grey approaches when nature-based solutions alone are insufficient. As planners explore how to accommodate infrastructure demands in the future, the lesson is clear: **think about green before investing in grey.**”

EEA Technical Report No 12/2015, Published September 2015
NBS Philosophy as an alternative

- Conventional infrastructure design solutions typically not meet (all) these challenges
- Starting point is the system (environment & people)
- Select resilient design solutions and strategies
- Sustain the natural system and its services
- Integrate multiple functions & stakeholders
Towards climate robuste catchments

https://www.stowa.nl/nieuws/

Sustainable agriculture
Natural functioning
Improved water quality and quantity
Urban resilience

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10/20
10 September 2020
Climate robust agriculture

- Reduce drainage capacity of land
- Create natural water retention areas
- Increase groundwater levels
- Increase organic content of soils
- Select climate robust crops

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10 September 2020
Climate Adaptive Cities

• Re-green paved areas where possible
• Decouple rainwater systems from sewer system
• Implement wadi’s and bioswales
• Create water storage in/below streets and public parks
• Stimulate green roofs
• Create green buffer strips close to urban streams (longitudinal parks)

https://clevercities.eu/milan/
Restoration of water quality and quantity

- Restore groundwater fluxes
- Use natural crop protection
- Stimulate wise soil management
- Restore stream profile
- Create vegetated buffer strips

https://tweedforum.org/our-work/projects/the-edleston-water-project/edleston-water-project-videos/
Restoration of the natural system

• Reforest where possible
• Close drainage channels
• Restore flood zones along streams
• Reforest streams for shading
• Stimulate meandering of streams
Nature Based Solutions in rivers

Room for the river

- Water safety
- Ecology
- Recreation
An example of including regrets in assessment technical flood defences measures versus nature based solutions

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<th>wave dampening forelands</th>
<th>top-up crest with wall</th>
<th>raise defence's crest</th>
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<th>add berm on outside</th>
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<th>concrete wall (hidden/covered)</th>
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Where do Nature Based Solutions fit?

NBFD in combination with other risk reduction measures
Platforms, projects and communities to share knowledge

- **The World Bank**

  Learn about nature-based projects

- **RECONECT**

  [http://www.reconnect.eu/](http://www.reconnect.eu/)

  Design guideline development

  **Deltare**

- **US Army Corps of Engineers**

  [www.think-nature.eu](http://www.think-nature.eu)

- **thinknature**

  [www.operandum-project.eu](http://www.operandum-project.eu)

- **EcoShape**

  Building with Nature


  [https://publicwiki.deltare.nl/display/BWN1/Guideline](https://publicwiki.deltare.nl/display/BWN1/Guideline)

- **PEDRR**

  Ecosystems for Adaptation and Disaster Risk Reduction

- **Building with Nature guidelines**


- **www.think-nature.eu**

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- **IAHR Webinar on Water Security**

  18/20

  10 September 2020
Future research needs to tackle uncertainties

- Testing extreme events
- Long-term monitoring to understand and evaluate uncertainty and dynamics over time
- Define Key Performance Indicators
- Enablers for implementing/mainstreaming large scale – basin wide strategy
- Limits to functionality must be better understood – part of larger DRR strategy

Photos – Robbert de Koning
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hydro-environment engineering & research playing a key role

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谢谢各位！

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Hosted by
Spain Water
and IWHR, China