Operationalising the insurance value of nature based solutions. An Urban living lab approach

Copenhagen, Rotterdam and Lodz

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Session ‘A2 – Brokering new partnerships and stimulating private sector engagement for resilience, 26.04.2018
Aim: to demonstrate the insurance value of ecosystems = role ecosystems can play in reducing water related risks (e.g. extreme events) as “Natural Assurance Schemes” (NAS)

Strategic Goals:
1. Develop NAS Assessment frame
2. Test NAS in 9 DEMOS
3. Make NAS results accessible and useful to different stakeholders (policy makers, insurers, water users, etc)
4. Develop business models for NBS, PPP, financing NBS through Green Bonds and other models
9 DEMOs Sites in Europe

UK
High resolution mapping of water storage areas
Run-off and floods
Peri-urban area

The Netherlands
Micro-urban wetland areas
Floods and droughts
Urban area

Denmark
Green/blue infrastructures
Floods, groundwater rising
Urban area

Poland
Retention basin
Low-water, heat waves, stormy floods
Rural and urban area

Romania
Green infrastructures
Floods, erosion and sedimentation, water pollution
Rural and urban area

Slovenia
Green infrastructures
Floods, water pollution and overexploitation
Rural and urban area

Spain
Wetlands compensations
Floods, water pollution, droughts
Rural area

France (Lozère)
Active management of a karst aquifer
Floods and low-water
Urban area

France (Braguè)
Forests (incl. Riparian ones)
Torrential floods
Peri-urban area
Economic analysis

BAU - 2050

Environmental values

Productive market values

Damages

NAS strategy 2050

Environmental values

Productive market values

Implementation costs

Damages

Cost-benefit assessment of NAS vs. BAU

Here with Benefits > Costs

Co-benefits

Insurance value

Implementation costs

Opportunity costs

Costs

Benefits

Avoided damages

Opportunity cost

Co-benefits
Cloudburst event in Copenhagen Aug 2011

Copenhagen Climate Adaptation Plan
Adopted in 2011

Cloudburst management plan
Adopted in 2012

NBS to mitigate pluvial flooding in the city of Copenhagen
NBS (co)benefit assessment by means of embedded model approach: street level city and Surrounding catchment at spatial resolution compatibel with Policy Support System
Stakeholder workshop to identify effects and co-benefits of NBS in Copenhagen

**Stakeholders:**
- Municipality of Copenhagen
- Regional authorities
- Water companies

**Identified (co)benefits of NBS:**
- Reduced risk for pluvial flooding
- Improved living environment
- Increased public health
- Recreation
- Green jobs
- Export opportunities
- Learning (awareness)
DEMO Rotterdam

(1) Reducing the risk of pluvial flooding and (2) saving drinking water by reusing rainwater
DEMO Rotterdam

- Stakeholders workshop: defining co-benefits of the NBS
DEMO Rotterdam

Stakeholders involved:

- Municipality of Rotterdam: discharge runoff
- Water board: Increase retention capacity
- Water Utility: exploiting a new source of freshwater
- Private sector: design, build and maintain NBS

End-users:

- Sparta Stadion, reliable use of freshwater
- inhabitants: more green and spatial quality betterment
## DEMO Rotterdam

- **Co-benefits identified**

<table>
<thead>
<tr>
<th>Reduce costs</th>
<th>Increase water awareness</th>
<th>Improve (ground) water quality</th>
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<tbody>
<tr>
<td>Stormwater re-use</td>
<td>Increase green</td>
<td>Reduction risk of damage</td>
</tr>
<tr>
<td>Spatial quality betterment</td>
<td>Economic benefit of reduction of stormwater to be treated in public sewerage system</td>
<td>Temperature reduction (cooling)</td>
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</table>
• From singular approach to finance water management towards an integral investment case for multiple stakeholders and partnerships (public + private)

• Make explicit the ‘co-benefits’ for each stakeholder and partnerships to tailor new business cases
Demo Rotterdam

Stakeholder structure for Rotterdam Demo

National Government

Evides
- Drink water company
- Exploitation of the NBS as a source of fresh water
- Supplies Sparta Stadium with the re-usable water

BE De Lier
- Private Company
- Are responsible for the subsoil installation of the aquifer
- Have a separate contract with Evides for the maintenance of the system.

KWR Watercycle Institute
- Knowledge institute on water, with a focus on bridging science and practice.
- KWR will operate as the main contractor for this project.
- KWR normally not a contractor, but since it is a pilot, KWR is responsible for project management and definition

Sparta (End user)
- Sportsclub
- End-user of water supply from NBS
- In 2011 Sparta BV bought back the shares in the Sparta Stadium "Het Kasteel" from the municipality. Sparta BV pay Evides for the supply of fresh water

Municipality of Rotterdam (Client)
- Municipality
- Are responsible for the redevelopment of the square next to the Sparta stadium.
- Main investor in the project.

Province

Citizens
- Beneficiaries of the project
- Receive better protection from pluvial water hazards
- Receive improvements of their living environment due to additional greenspaces

Delfland
- Waterboard
- The new system impacts the ground and surface water in the region which is their responsibility
- One of the investors in the NBS, in order to explore new opportunities for water management

Field Factors
- Private Company
- Design and develop the water buffer, retention and filtering system.
- Filters the water so it can be re-used for the irrigation of the Sparta stadium soccer field.
DEMO Łódź

Urban flooding  Urban drought

Water quality and health issue a big problem
DEMO Łódź

Defining and operationalizing natural capital of 18 rivers of Lodz and restore ESS

Pluvial flooding and green areas
Heat island effect and green areas
DEMO Łódź

Restoration of ESS in the Sokolówka river valley

Pluvial flooding and green areas
Heat island effect and green areas

Source: SWITCH project
The general legal framework for recognizing co-benefits of NBS in the area of water sustainability is from (1) Plans of Urban Adaptation to Climate Change and the (2) new Water Law.

Climate Change Urban Adaptation Plans (ongoing) – refer to cities with more than 100,000 inhabitants in Poland, they define vulnerable sectors and link them to exposure to hazards, and provide a basis for local regulations. The action involves several projects analysing the local conditions, people preferences for blue-green spaces, options for mitigation of carbon and water footprint.

2. Water Law – the first time ever imposes the fees for release of rain water into the stormwater system, and indicates the importance of local infiltration.
Establishing Learning Alliance as a platform for developing city vision & water strategy

**Partners and LA members involved**

The Łódź Learning Alliance (LA) was launched in May 2006. The group of members is constantly growing and the LA has now a wide representation of stakeholders from the national, regional and local levels. The key partners on the City level are:

**Authorities:**
- City of Łódź Office
- Łódź Infrastructure Company (LSI)

**Researchers:**
- University of Łódź
- European Regional Centre for Ecohydrology u/a of UNESCO, PAS
- Łódź Technical University: Department of Environmental Engineering
- Nofer Institute of Occupational Medicine in Łódź

**Service Providers:**
- Waterworks and Sewage Systems Company (ZWIK)
- Waste Water Treatment Plant (GOS)
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<tr>
<th>NAIAD Demo (NBS)</th>
<th>Main public / private partnerships</th>
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| Rotterdam (Urban Water Buffer)           | **Public**: Municipality of Rotterdam, Delfland Water Board  
**Private**: water utility company, companies that design, install and maintain NBS Urban Buffer components, end user (football stadion) |
| Copenhagen (Green / Blue infrastructure) | **Public**: Municipality of Copenhagen, Greater Copenhagen Region  
**Private**: water utility companies, real estate financing companies that support NBS projects, foundations for financing CCA projects, home owners |
| Lodz (River Restauration / Green / Blue infrastructure) | **Public**: City of Lodz, Lodz infrastructure, knowledge providers (universities etc.), NGO’s  
**Private**: water utility companies, insurance companies, brokers, asset managers |