



Nature's integration in cities'
hydrologies, ecologies and societies

M2.1 Co-designing the impact assessment and ES model

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1 Summary

NICHES advances scientific knowledge on restorative NBS through the application and testing of impact assessments, models and transitional governance models for improved urban drainage in five cases within and beyond Europe. **The project hypothesizes and aims to demonstrate that sustainable transformations of cities based on restorative NBS which enhance water retention capacities in urban areas could widely mitigate impacts from combined sewers on aquatic ecosystems.** As the urban catchment is part of a multi-owner landscape with associated stakeholder conflicts linked through teleconnections and multi-scale governance structures, the involvement of diverse stakeholders and their values from the NICHES core cities is vital to co-design the impact assessment and ES module design and to ensure maximal applicability. This milestone report describes the stakeholder engagement activity carried out in the Rotterdam case study. With representatives from the waterboard, the municipality and a drinking water company, the Nature Futures Framework of the IPBES (Pereira et al., 2020) was operationalized using the three horizons approach as described by Sharpe et al. (2016) during an interactive workshop. This allowed for identification of desired futures of the Rotterdam urban waterscape, including the use and functioning of the Rotterdam waters.

2 List of abbreviations

EU	European Union
IPBES	The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
NFF	Nature Futures Framework
HHSK	Hoogheemraadschap van Schieland en de Krimpenerwaard

3 Stakeholder engagement Rotterdam

Together with the Waterboard HHSK, NIOO organized a co-creation workshop on 13 March 2023 on the value of water in the city of Rotterdam. Approximately 20 workshop participants gather at the main office of HHSK, and included representatives from the waterboards, drinking water industry as well as the municipality. Prior to the workshop, participants were asked to bring a picture that characterized their perception of the value of water in Rotterdam.

At the start of the workshop, a brief introduction was given by HHSK on the “Alliantie Waterkracht”. This initiative translated roughly into the Power of Water Alliance. The

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municipalities of Rotterdam and Capelle aan den IJssel, the water boards of Delfland, Van Schieland and the Krimpenerwaard, the Hollandse Delta water board and Evides Waterbedrijf have joint forces under the name of Alliantie Waterkracht. They strive for a joint programming of projects and activities per area. To this end, the directors of the six parties signed the administrative agreement on Water & Climate.

After this introduction to the Alliantie Waterkracht, Lisette de Senerpont Domis gave a short introduction on the NFF framework and Future Thinking (Voros, 2017), and we asked the participants to identify the perspective of the picture as well as their own perspectives within the NFF framework using Mentimeter®. The majority of the participants selected the Nature for Nature perspective for their picture or the Nature for People perspective, or a combination of both (Fig. 1). Interestingly, their own perspective was most often reflected in the nature for nature perspective.

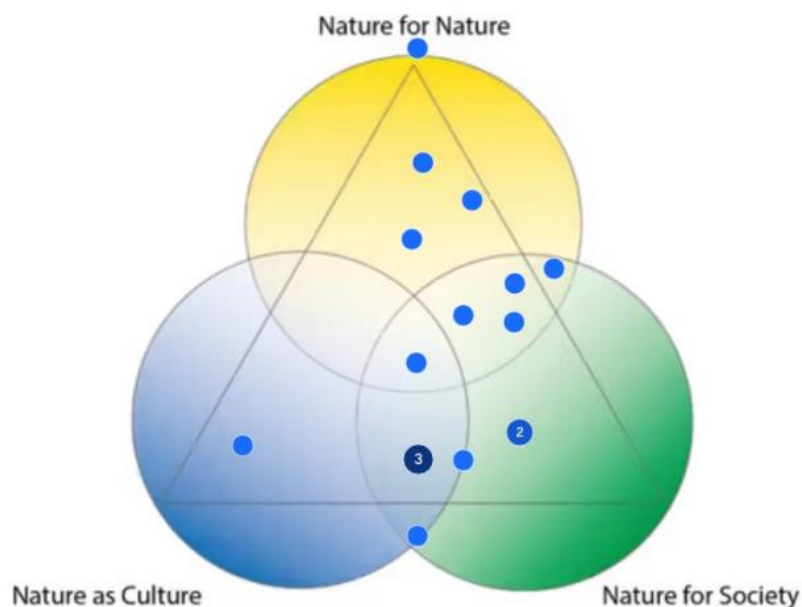


Figure 1: What perspective does your picture signify?

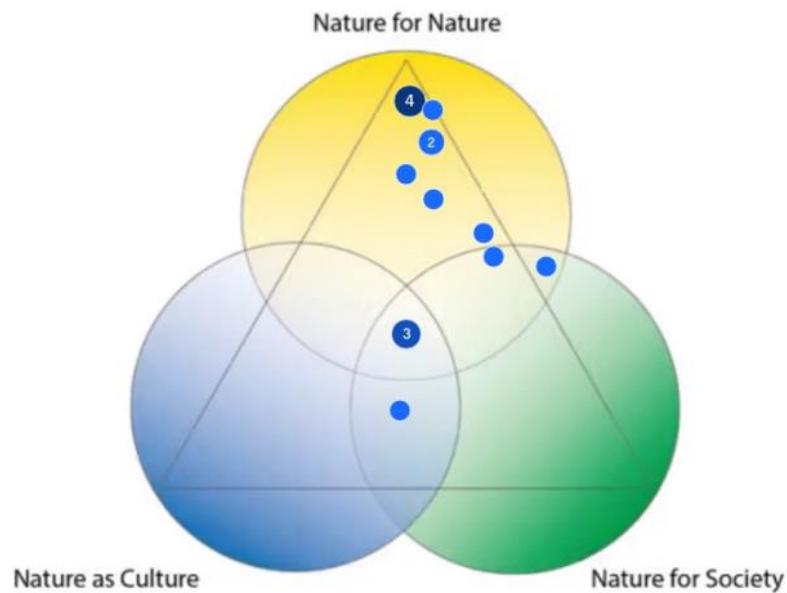


Figure 2: With which perspective do Rotterdam stakeholders identify most with regards to urban waters?

Next, we asked participants to identify the three most important threats to their urban water system (Fig. 3). Salinization, compaction of the built environment, flood risk, and loss of biodiversity were the most frequently mentioned threats.



Figure 3: What are the most important threats to the Rotterdam waterscape?

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We then introduced the SETS concept (Chang et al., 2021), and asked to what extent participants felt the current conditions were sustainable. Participants mentioned that certain aspects of the current conditions were no longer sustainable, including flood risk and lack of water retention capacity, loss of biodiversity and increase of invasive species, social inequality, drought risks, Heat stress, Water quality deterioration and a higher incidence of cyanobacterial blooms, Salinization, decrease of health and well-being.

We then asked people to think about solutions for the current and future problems from a sociological, ecological and technological perspective.

Solutions from a sociological perspective:

- Awareness raising
- Uniformity in approach between different urban governance bodies
- Public-Private-Citizen partnerships
- Visionary managers
- Education
- Joint ownership of the problem and its solutions through co-creation with citizens

Solutions from an ecological perspective

- Riparian zone restoration
- Reforestation
- Removal of tiles
- Restoring ecological and hydrological connectivity
- Increasing blue and green spaces
- No car zones
- Dynamic water level management
- Natural water retention basins
- Extensive management of water ways
- Green roofs
- Sediment sanitation
- Zonation management
- Stop of macrophyte mowing
- Water quality-oriented dredging
- Adaptive ecological management
- Helophyte filters
-

Solutions from a technological perspective

- Application of Phosphorus coagulants
- Building on water
- Investment in use of sustainable construction material
- Pervious asphalt
- In-house water retention basins
- Drainage Infiltration Transport Sewage system
- Improvement of Waste Water Treatment
- Solar and Wind energy in the Rotterdam harbour

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- Implementation of Artificial Intelligence for Problem solving
- Reverse osmosis of brackish waters
- Cloud seeding
- Ban on leaching construction materials
- Dry toilets

We then concluded the meeting with asking the participants, using sticky notes, to indicate where the above solutions lie in terms of the three horizons for change, i.e. business as usual, disruptive innovation, and transformative change (Fig. 4).

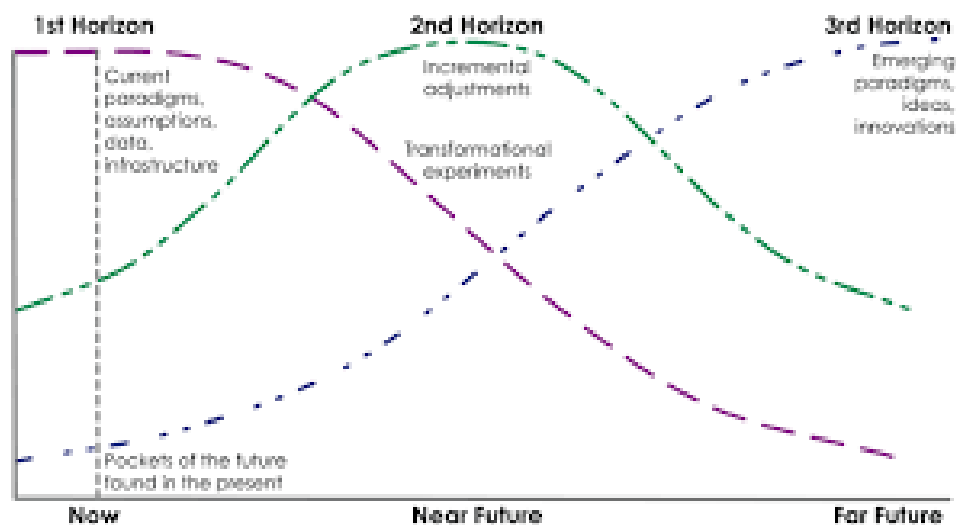


Figure 4: 3 horizons of framework (<https://training.itcilo.org/delta/Foresight/3-Horizons.pdf>)

4 Acknowledgements

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