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Nature-Based Solutions for Sustainable Water Management in the Peri-Urban: Towards a better understanding of opportunities and constraints in Stockholm County, Sweden

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INTRODUCTION



NATWIP is a EU-Cooperation project under Water-JPI call that aims to **contribute knowledge to closing the water cycle gap** in peri-urban areas by exploring the potentials offered by NBS

Under this general aim, in Sweden **two case studies** were carried out within Stockholm County that apply varied types of NBS interventions at different scales to deal with different kinds of water challenges

The presentation aims to **highlight the key findings of the Swedish study** and **conclude on general lessons** regarding opportunities and constraints for sustainable up-take of NBS measures



CASE STUDY OVERVIEWS

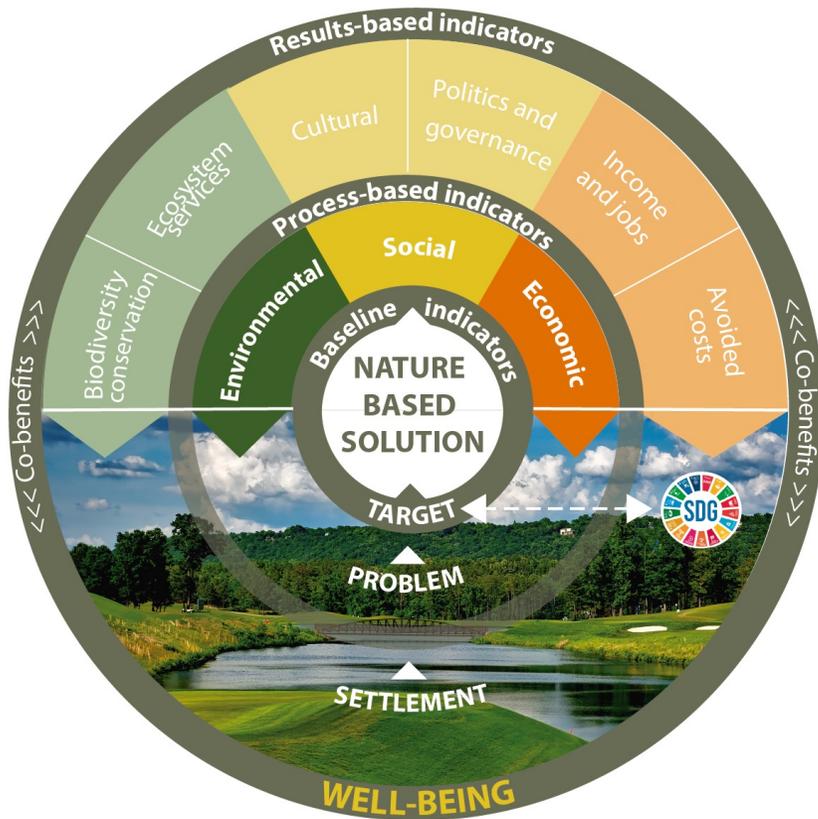
Årstafältet

- Developing a peri-urban into urban area
- Integrating spatially ambitious NBS in the form of blue-green structures for counteracting the negative impacts of urbanization
- Safeguarding/improving water quality, counteracting negative water-related impacts of urbanizing the area in terms of water quality, quantity and flow, and climate change impacts considering 100-years perspective
- Biotopes and sociotopes

Norrtälje

- Municipality in Stockholm Archipelago, with largest number of holiday homes (peri-urban), with several lying outside municipal network
- With many holiday homes transformed into permanent housing and climate change impacts, water availability decreases in summers
- Also increased wastewater production which is insufficiently treated onsite - in turn degrading ground- and surface water quality
- The study explores NBS application at decentralized scale as a means for improving greywater treatment and management

FRAMEWORK FOR ANALYSING NBS PROJECTS



- Context
 - Policy and regulatory framework
- Processes
 - Nature-based interventions
 - Planning, governance and learning
- Sustainability potentials / outcomes
 - Social
 - Environmental
 - Economic

CONTEXT - Policy framework

Årstafältet

- Strategic policy support but regulations are incoherent at operational level in supporting NBS (The Water Services Act, the Planning and Building Act and the Environmental Code)

Norrtälje

- Strategic policy support at European and national level (EU WFD, BSAP, Environmental Code), but emphasis on NBS missing



PROCESSES – Nature-based interventions

Årstafältet

SCALE: Municipal, Urban District, Top-bottom



Norrtälje

SCALE: Decentralized, individual property/neighborhood



Infiltration Facility



Bio-module



Bio-treatment plant



*Greywater Dam
(wetland)*

PROCESSES – Planning, governance and learning

Årstafältet

- Top-bottom, driven and influenced by political decisions
- Municipal administrations and private consultants (key actors), but late involvement of SWSC
- Complicated maintenance organization and longtime financing issues
- Reflexive, deliberative and collaborative but dynamic, long-term, and sometimes locked in because of communications
- Different budgets with different goals and responsibilities, creating challenges for collaborative governance
- The design of NBS is challenged by technical uncertainties
- Technical learning by doing but hard to standardize, as NBS are place specific and thus unique (geological, hydrological, soil, and climate conditions)
- Evaluation and learning from NBS projects are often deprioritized due to workload but acts as a reference and a soft way of knowledge transfer

Norrtälje

- Decentralized planning and governance
- Multi-actor individualized projects - property owner, municipality, private company & entrepreneur
- Self-financed by property owner
- Institutional weaknesses - national agency can give only guidance to municipalities (not order), lack of active municipal role, complicated permit application procedure
- Insufficient of technical awareness and related education –hinders the ability to transition towards new types of solutions and NBS
- Social & technical learning is decentralized and doesn't seem to feed into strengthening the necessary institutional setup



RESULTS – Social, Environmental and Economic

Årstafältet (Anticipated)

Social

- Aesthetics and recreational “sociotopes”
- Creating a unique cultural and environmental identity
- Provide informal learning and awareness of stormwater management and water-related issues
- Improve health and well-being
- Reduce risk of floods

Environmental

- Water infiltration, purification and improving the surface and ground water quality
- Restoration of natural water flows and water cycle
- Biodiversity
- Regulating water flow and thus reduce the risk of erosion

Economic

- Not significant/spoken out

Norrtälje

Social

- Empowerment through participation in sustainable environmental stewardship
- Help maintain physical and mental health, directly and indirectly
- Some systems are aesthetically designed

Environmental

- NBS technology filters out harmful chemicals, microbes, and some even pharmaceutical residues
- Eco-friendly solutions promoting water sustainability – at local and BSR scales
- Maintain soil permeability

Economic

- Reuse of greywater promotes cost savings
- Potential to increase property value



Opportunities and constraints for sustainable NBS

Årstafältet

Opportunities

- (Updated &) supporting policy framework , municipal receptive contexts for responding to water challenges and climate change impacts
- In principle, there is a deliberative, reflexive, and public-private planning culture

Constraints

- Spatially demanding
- Existing governance structure support traditional engineering systems and cannot accommodate NBS
- Lack of joint-monitoring schemes for evaluating the performance of NBS
- Difficulty to assess cost effectiveness of NBS as an input/output
- Technical performance uncertainties (vegetation, management of water flow, soil) within the context of uncertain rainfalls throughout the seasons and years
- NBS entails long-time planning and multi-actors' collaborative governance processes – thus challenging

Norrtälje

Opportunities

- Supporting policy framework
- Availability of several NBS technology options in market
- Technology easy to install, maintain and manage at household level

Constraints

- Affordability - an issue especially with older house owners
- Lack of adequate municipal support
- Lack of awareness and education on NBS prospects

CONCLUDING REMARKS

- A politically receptive context for dealing with various water challenges and supporting NBS, but existing governance structures and lack of operational tools constraint the uptake of the new solutions
- Technical, social and (in some cases) economic uncertainties within a changing environment
- A lot of soft learning, yet systematic learning and institutionalization lacking
- Lack of appropriate communication and coordination between different concerned agencies/ actors vertically and horizontally
- A holistic approach to manage the water flow is yet lacking



Thank You!

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