Storm water management in Tampere

City of Tampere

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European Commission | Horizon 2020 European Union funding for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 | ***Topic**: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions*

Tampere
Topics Agenda

- Introduction: description of the studied area and of the water related challenges that had to be faced
- Description of the different water related NBS adopted
- Successful stories that inspired the water related NBS implemented
- Conclusions: suggestions related to the previous reported experiences that could be helpful to the other cities

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Water in Tampere

50
Nature Based storm water management Solutions

29
public beaches

160
lakes

100%
urban wastewaters treated

UnaLab demos in Tampere
2 case areas:

brownfield Hiedanranta

greenfield Vuores

Case area Hiedanranta

- A planning phase brownfield area
- Aim 25 000 residents to the area
- Dense area with only a little space for NBS
- Contaminated soils

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UnaLab demos in Hiedanranta

Biofilter demo 2018 for leakage waters from contaminated site

Hiedanranta
NBS: Storm Water Management

NBS 1: Biofilter for leakage from contaminated soil	
Objectives	Preventing pollutant and nutrient load to Lake Näsijärvi, preventing odors, increasing biodiversity, measurement of water quantity and quality and other relevant parameters, replicable in many sites
Description	Filtration area 100 m2. Bacteria and microorganisms are located on a filter medium (biofilm), which consists of peat, sand, biochar and Leca gravel. The biofilm degrades nutrients and pollutants (heavy metals, PAHs) in the leakage that is piped through the filter material.
Relation with grey infrastructures	Completes grey infrastructure, qualitative treatment
Actors involved	Storm water planners, landscape architects, Ramboll, construction department, builders, environmental authorities, NGOs, citizen society, SMEs
Role of the community	Active participation in co-creation workshops that have been part of a planning process. Stakeholdes opinions have been taken into account in planning e.g. in choosing plants. Initiative for treatment has risen from citizen feedback of odors.

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Hiedanranta
NBS: Storm Water Management

NBS 1: Biofilter for treating leakage from contaminated soil	
Technical & legislative pre-conditions	The existing structures of old landfill and underdrain levels had to be taken into account in planning, nutrient load and odors/gases were the main issues to prevent.
Cost & financing	Construction and materials estimated cost 39 000 €, financing from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Limited space because of avoiding the disturbation of contaminated soil. Performance during cold months.

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Hiedanranta
NBS: Storm Water Management

NBS 2: Green roof	
Objectives	Increase rainfall interception, enhance C storage (climate regulation); reduce albedo; reduce heat stress, increase biodiversity, looking for optimal solution (feasible), testing different solutions in changing Nordic winter conditions, recreational and social space.
Description	Ca. 800 m2 green roofs in Hiedanranta to manage water flows, with particular focus on their performance during cold seasons, suitable growth media, plants (biodiversity) and maintenance needs.
Relation with grey infrastructures	Retention capacity, resource recycling?
Actors involved	Storm water planners, landscape architects, research institutions, city units, construction companies, green infra builders, SME's, NGO's, citizen society
Role of the community	Active participation in co-creation workshops. Stakeholders opinions are taken into account in planning. Co-creation will continue (SOME, on site "additional value to residents").

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Hiedanranta
NBS: Storm Water Management

NBS 2: Green roof	
Technical & legislative pre-conditions	Strict legislative orders regarding building and fireproofing that must be considered. Choosing suitable vegetation in order to resist in the sub-arctic climate with changing freezing-melting cycle and snow load as well as to support native species and enhance biodiversity. Retention capacity vs. building requirements.
Cost & financing	Construction and materials estimated cost 100 000 €, financed from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Suspicions about possible effects on roof structures and health. Performance concerns during cold seasons and in changing climate, unclear maintenance needs during summer. Avoiding nutrient leakage, which has been identified as a challenge in earlier research.

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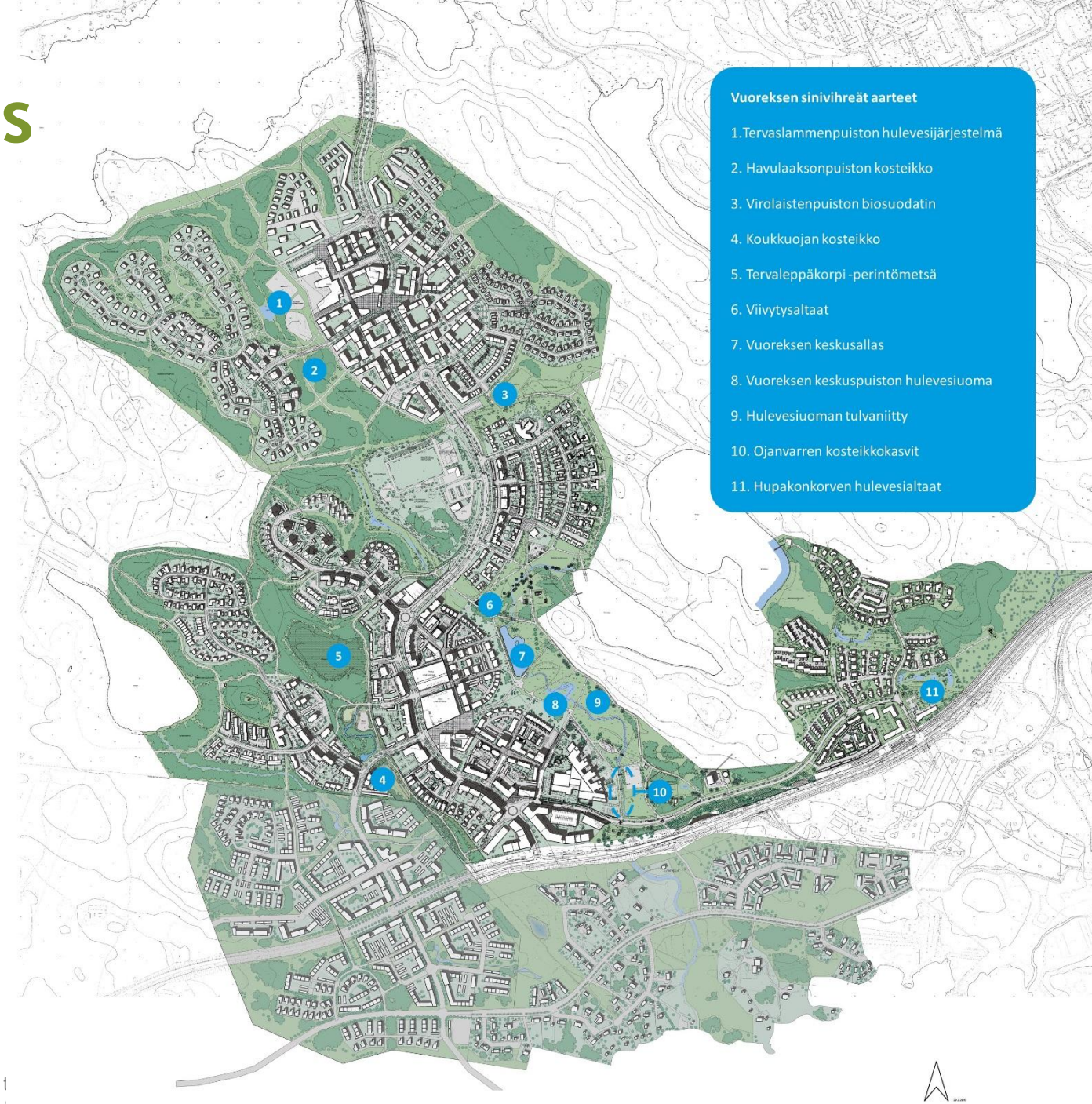
Case area Vuores

- A construction phase green district in the middle of natural waterbodies.
- Aim 13 000 residents to the area.
- 3000-5000 jobs
- To be completed in 2030
- NBS located in parks and surrounded by blocks



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Demos in Vuores

Accessibility and education

Novel multi-funtional NBS (biofilters, floating wetlands) to complement existing NBS

Innovation vouchers for local housing co-operatives and other communities to improve plot-scale NBS

Monitoring of nature based storm water management system.

UnaLab demos in Vuores
NBS: Storm Water Management

NBS 1: Biofilter, retention basin and alluvial meadows	
Objectives	Prevent solids and nutrient load to waterways, handle the first flush, prevent urban floods, retain and increase biodiversity, regulate flow rates to the pre-construction level by drainage area, recreational values of blue-green network
Description	Biofilter in Virolaisten Park (area of biofilter ca. 650 m2) and retention/infiltration basin with alluvial meadows in Tervaslammen Park (area of retention basin and alluvial meadows ca. 700 m2).
Relation with grey infrastructures	Complements and replaces grey infrastructure. Qualitative treatment to protect natural water bodies.
Actors involved	Storm water planners, landscape architects, Ramboll, construction department, builders, NGOs, citizen society, pupils
Role of the community	Active participation in co-creation workshops. Online survey. Different viewpoints are taken into account in planning.

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UnaLab demos in Vuores
NBS: Storm Water Management

NBS 1: Biofilter, retention basin and alluvial meadows	
Technical & legislative pre-conditions	Nature protection laws have to be considered. In Virolaistenpuisto park the trees have to be saved for the bats. Public pressure to sustainable development.
Cost & financing	Construction and materials estimated cost 100 000 €, financing from UNaLab-project. Planning from Ramboll (UnaLab partner).
Barriers	Environmental laws regarding endangered species. Changing Nordic climate. Lack of knowledge regarding the NBS among the residents. Maintenance challenges of multifunctional NBS.

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Unalab demos in Vuores
NBS: Storm Water Management

NBS 2: Plot scale NBS	
Objectives	Increase rainfall infiltration, prevent solids and nutrient load to waterways, prevent urban floods, combine recreation, food production and/or biodiversity preservation and social connectivity targets
Description	Rain gardens, green roofs and/or similar plot-scale solutions
Relation with grey infrastructures	Complements and replaces grey infrastructure, decentralized storm water management should start from plots and support public NBS
Actors involved	Landscape planners, housing companies, residents, green infrastructure builders, Vuores service company
Role of the community	The NBS will be co-created and residents have a chance to participate the planning process. Responsibility to maintain the NBS.

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UnaLab demos in Vuores
NBS: Storm Water Management

NBS 2: Plot scale NBS	
Technical & legislative pre-conditions	Small space, plenty of functions, existing storm water system.
Cost & financing	Funded via innovation vouchers 30 000 € from UnaLab, 10 000 €/housing company.
Barriers	New yards, interest to renovate? Own funding, maintenance costs, storm water fee.

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Advanced online monitoring

- **6 online monitoring stations**
- **Monitoring** NBS performance (water quality and flow)

Water quality monitoring station

Kids monitoring Vuores NBS

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Vuores Storm Water Management
Successful Study Case

- Tampere's main NBS demonstration site is Largest in Nordic countries
- Central park storm water system is designed by a famed German design office Atelier Dreiseitl.
- Developed further in UnaLab via co-creation process
- Built on greenfield area and a lot of emphasis has been put on storm water management especially during massive excavation work.
- 4 bioswales, 10 retention ponds, 3 wetlands, willow treatment, 2 alluvial meadows and a biofilter.
- Visually aestethic blue green areas for people to recreate
- NBS are surrounded by walking baths, areas to rest and picnic areas.
- Many endangered animals like flying squirrel, bats, and certain water insects.

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Helpful suggestions

- A will to make the area environment friendly
- Co-operation with city's different units and other stakeholders from planning to building and maintenance
- Measurement of the quality of soil and bedrock in land use planning phase
- Treatment of the waters from the construction work areas (e.g. retention and filtration). Treatment in plots and in public areas. Detailed guidelines!
- Educating people of urbanization and climate change related challenges and also how the problems can be solved with NBS
- UnaLab co-creation process with different stakeholders helps in mapping different viewpoints for further development of existing NBS
- Detailed guidelines for maintenance
- Storm water fee (from 2018) 5,6 million €/year supports the implementation of NBS also in old areas

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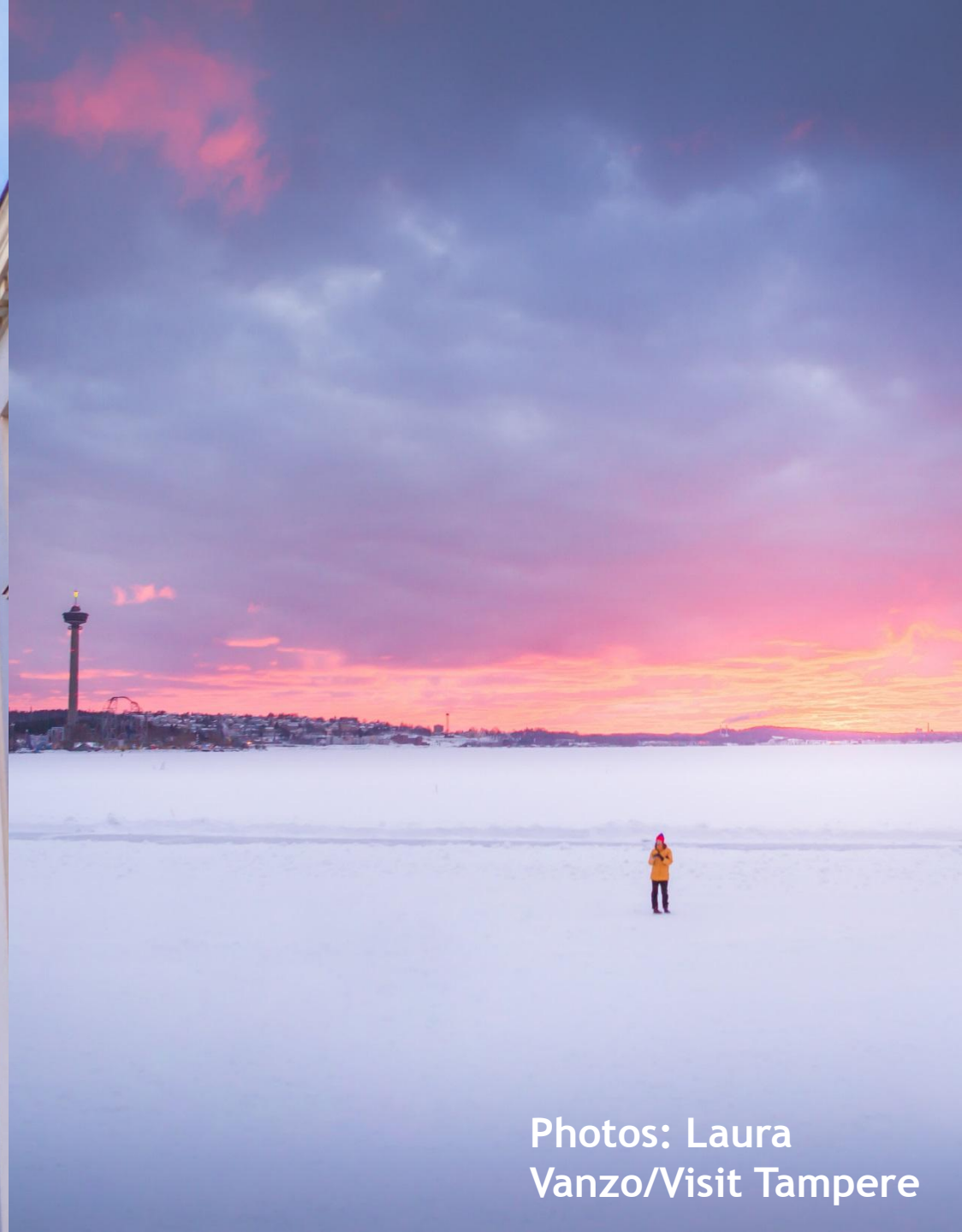
Kiitos!
Thank You!



Photos: Laura Vanzo/Visit Tampere