NordForsk

SMARTer Greener Cities

Make your solutions do more – connecting smart technology to nature-based solutions

Project Leader Erik Andersson

Stockholm University, Stockholm Resilience Centre

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship

Stockholm University

UNIVERSITY OF COPENHAGEN

HELSUS
HELSINKI INSTITUTE OF SUSTAINABILITY SCIENCE

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

SYKE
Finnish Environment Institute

THE NEW SCHOOL
URBAN SYSTEMS LAB

Rationale

- Much discussion about SMART Cities across the Nordic region and how to scale-up existing climate solutions
  - Strong emphasis on digital solutions and energy efficiency
- OR Green cities and the role and use of Nature-based Solutions

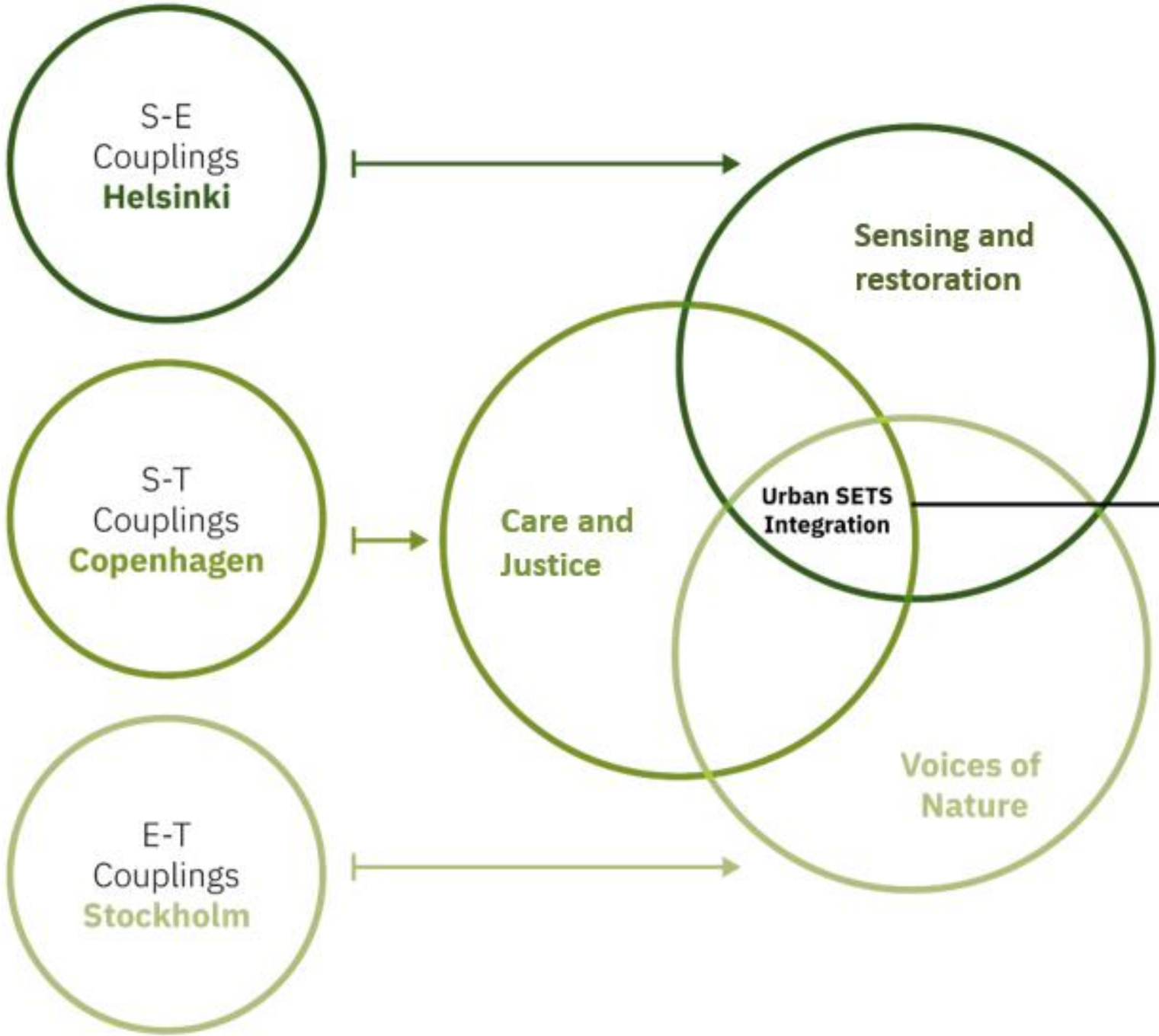
- But how do we make cities SMARTer by integrating digital and nature-based solutions?

Project objectives

SMARTer Greener Cities

- **Develop an urban systems science for sustainability** by linking the Smart and Green city agendas through SETS
- **Conceptualize and engage with** challenges and solutions for sustainable cities
- **Explore SETS framing in 3 case sites**:
  - Social-Ecological – Helsinki
  - Social-Technological – Copenhagen
  - Ecological-Technological – Stockholm
- **Share knowledge and learning** across Nordic cases and actor communities

SMARTer Greener Cities



Governance
Institutional Transformation

Resilience
Ecosystems,
People, Infrastructure

Awareness
Consequences, options
and oppotunities

Learning
Reimagining the city
and smart citizens

Shifts
Baselines of smart cities

Smart Futures
Tensions and trade-offs

Helsinki

- **Challenge:** how smart technologies and NbS can enhance (or hinder) the potential of different types of urban green spaces to promote psychological restoration
- **Objective:**
  - Map the social-ecological structure and the distribution of remnant, hybrid and novel NbS in two rapidly changing areas (Kalasatama and Kuninkaantammi)
  - Develop new methods to better understand how citizens perceive and experience their everyday living environment through different senses (using PPGIS surveys and multisensory walks)

Examples from Helsinki's SMART neighbourhood - Kalasatama

GIS bio-physical mapping

PPGIS landscape and soundscape mapping

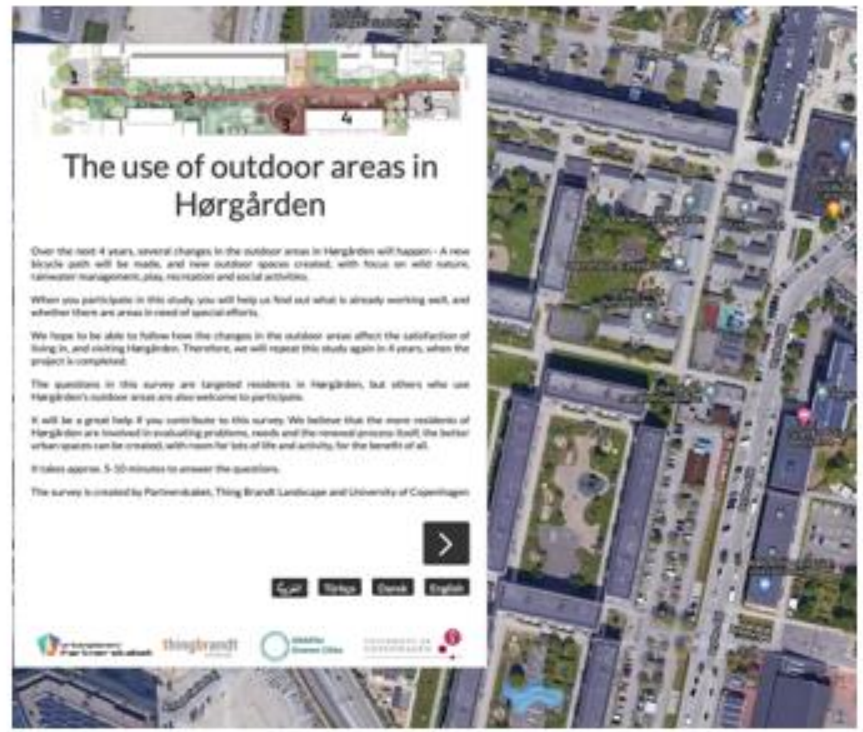
In-situ multisensory mapping in relation objective and subjective restoration

Copenhagen

- **Challenge:** How to design and manage just, safe and secure cities through SMARTer technology?
- **Objective:** to better design and manage inclusive, greener, and more equitable cities
- Technology, justice, and care in focus

Copenhagen case area, ‘Hørgården’

- Re-authoring of Hørgården
- Improved basis for care-full justice-based transformative change
- Investigate if new voices in caring for urban green are empowered by online participatory mapping of the outdoor areas



Focus in Stockholm

Use IoT sensors to capture “voices” of urban nature

- Measure the performance of NbS and their resilience against environmental stressors
- Improve climate resilience by updating and continuously informing management strategies and managers themselves

The weather station measures locally and in-real time

- Temperature
- Humidity
- Pressure
- Wind
- Rainfall
- Solar Radiance
- Soil moisture*

THE NEW SCHOOL URBAN SYSTEMS LAB

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship

Stockholm University

On the ground in the Royal Seaport, Stockholm

Experimental design
with 18 weather stations

Spatial and temporal variability

- See the map, reading every 10 min

Varied 5 types + reference site

- Old courtyards, lawns, forest parks, raingarden, green roofs

Outputs in Stockholm

- **Know-how knowledge** on implementing smart IoT infrastructure at a district scale
- **Local and real-time data** on the performance of specific green infrastructure over time (weekly, seasonal, annual) - comparative to circumstances and stressors such as prolonged droughts and extreme heat waves
- **Data visualization** potential in 3D, open access data availability
- **Synthesized results** e.g. heat projections, effectiveness of NBS
- **Measure to manage** green spaces
- Creating capacities for **stewardship and empowering wellbeing**

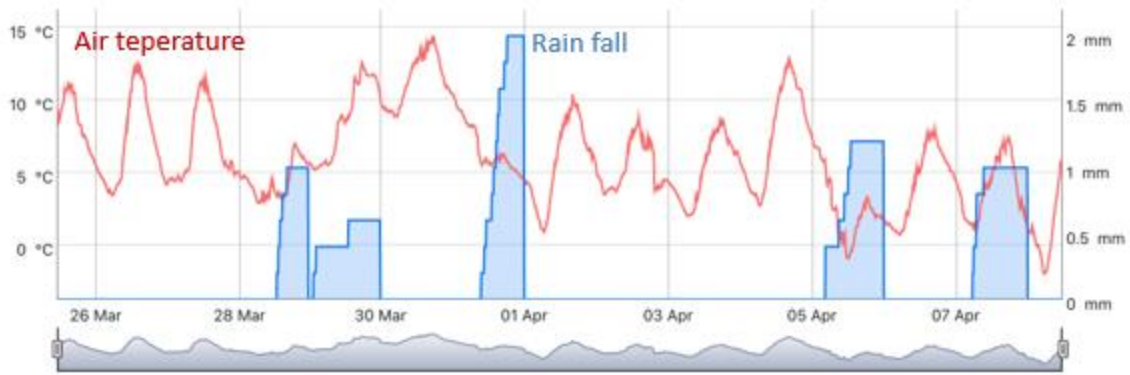


Photo by Manish Chandra on Unsplash

NordForsk

www.smartergreenercities.com

SMARTer
Greener Cities