Green Blue Cities – Green/Blue Infrastructure for Sustainable, Attractive Cities

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Summary of results

The main objective of this project was to develop knowledge and tools required to seize the opportunities arising from future challenges to manage urban storm water in a way that facilitates robust, synergistic and multi-functional green infrastructures that will address today's and tomorrow's climate and other changes in dynamic urban areas. This project has been conducted in an international urban living lab in Kuruna, Sweden, combined with the national urban living labs (so-called city-hubs) Zwolle in The Netherlands and Innsbruck in Austria. In these, citizens, practitioners, decision makers and researchers have been brought together to jointly develop innovative solutions. The urban living labs functioned as the core structure for the identification, description and selection of objectives, constraints and opportunities for the design and modelling of green/blue infrastructures.

An integrative framework was developed using spatial, ecological and material qualities in combination with climate and socio-economic scenarios as input parameters for the modeling of a hybrid infrastructure that combines landscape design and sustainable stormwater management practices.

The city of Kiruna was used for developing the complete framework in which urban water is managed through a hybrid network system of connected green spaces at multiple spatial scales. The new urban masterplan layout, designed for the city's relocation, was used as a base for modelling the network systems of green/blue open spaces (spatial modelling). The subarctic climate, in addition to the gradual relocation of the city's fabric, posed the question of how to design a green/blue infrastructure (GBI) that is capable to accommodate future uncertainties and perform in an extreme cold climate. To answer this question, three complementary set of modelling parameters and design principles for GBI were identified based on (1) an overview of smart GBI schemes (spatial strategies) and their affordances for different objectives; (2) the performance of vegetation and urban water systems (considering snowmelt runoff) in Kiruna's ambient conditions; and (3) the benefits in terms of ecosystem service values. To further explore the impact of future uncertainties in urban area development, the city of Zwolle was used for the integration of climate and socioeconomic scenarios into the planning and design process. These were discussed with stakeholders for the tailoring of the most robust responses to drivers of change and delivery of long-term values. The leading question was how certain negative and positive externalities of the scenarios can

modelling).

The essential finding was that an integral, transcalar and iterative design can enhance adaptation of urban areas to flood risk, restore biophysical processes and enhance spatial quality. Developed design principles supports the delivery of 'nature' in cities at a range of scales to utilise the wider opportunities 'natural systems' can bring to create and sustain better places for people and ecosystems. The final outcome was an advanced decision model and framework for GBI Design combining both spatial and temporal decision tress. The additional value that GBI provides to the quality of urban living was discussed and advanced in terms of the required innovation practices and as a crucial leverage point for the mainstreaming of GBI planning and implementation actions.

Video on the research question

- https://youtu.be/RKfFKl9jOrU

Another video

- https://youtu.be/FKyc1QIpuQM