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Bottom-up thinking—Identifying socio-cultural values of ecosystem services in local blue–green infrastructure planning in Helsinki, Finland☆

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ABSTRACT

Sustainable urban storm-water management is a key policy of the European Union. Increasing populations, densification and global climate change cause major challenges for the management of urban run-off waters. Small urban aquatic ecosystems (ponds, brooks, wetlands) are important, because they support human health and well-being through water regulation, mitigating urban run-off waters and providing recreational benefits. Ecosystem functions, which arise from interactions between biotic and abiotic processes and which benefit society, are called ecosystem services. The ecosystem service concept can be useful in estimating the impacts of land-use and resource management on ecosystem functions, and to support decision-making. However, many researchers claim that measuring or valuing ecosystem services in land-use planning may fail to recognize intangible or non-monetary values. We studied a local environmental conflict related to a storm-water management plan in Helsinki, Finland. By using integrated value mapping of ecosystem services, we assigned socio-cultural values of local blue-green infrastructure, and evaluated how these values could be taken into account at the early stage in green area planning. Stakeholders (locals, managers and politicians) expressed a total of 47 perceived values related to the urban brook and the public park. We divided these values into four types: (1) use and experience, (2) existence, (3) symbolic, and (4) bequest and moral. We show great differences between the meanings and values of locals, managers and politicians. Managers expressed negative values towards the park, while locals more commonly expressed symbolic values. Exhaustive value mapping could help to identify mutual values and understand disagreements between stakeholders. We introduced a model for a transdisciplinary adaptive planning by using integrated value mapping within ecosystem service concept. Often local protests towards development projects or the management of green areas are seen in a negative light by considering them as NIMBY. Instead of dismissing plurality of meanings and values that emerge from strong place identity, we call for the sustainable management of place-attached values as part of a techno-economic planning strategy of urban ecosystems.

1. Introduction

Urban ecosystems, i.e., green and blue infrastructure, provide many benefits for urban residents. Contributions of ecosystems, which arise from interactions between biotic and abiotic processes and which benefit society, are called ecosystem services (Haines-Young and Potschin 2010; Kareiva et al., 2011). Urban water ecosystems are especially important, because they can support residents' quality of life by water purification, mitigating urban run-off waters and provide psychological and social services (Chiesura 2004; Gómez-Baggethun and Barton, 2013). Small water bodies, e.g., ponds and brooks, are an important part of the urban socio-ecological system (SES). They are natural components of the hydrological cycle, provide habitats for species and are highly valued by citizens for offering specific places for recreation, restoration, relaxing and for nature enjoyment or education (Niemelä et al., 2004; Brauman et al., 2007; Bryan et al., 2010; Everard and Moggridge 2012; Lehtoranta et al., 2012; Plieninger et al., 2013). Processes of ecological and social systems have an influence on SES's adaptive capacity, vulnerability and resilience (Gallopin 2006).

☆ The internet-based map for the research area associated with this article can be found online at: http://kartta.hel.fi/link/2kT4jP.

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There are more than 25 streams in the city of Helsinki, Finland (Tarvainen et al., 2005). They have faced many biophysical changes through densification and construction of the city. Streams have been closed and directed into water pipelines, channels have been straightened, and natural streamside vegetation has been removed. Only a few streams have natural channel fragments remaining (Lehtoranta et al., 2012). In recent years, the city of Helsinki has put much effort into water-management to improve the hydrological conditions of brooks and in managing urban storm-waters (Helsinki Public Works Department, 2007, 2008). However, the water-management processes commonly adopt a techno-ecological approach, i.e., values are defined by engineers and experts, who fail to recognize the plurality of meanings and values associated with the allocation, use or conservation of water (Ioris 2012). This can lead to disputes between citizens, managers and other stakeholders associated with water bodies.

The rise of local conflicts is usually a result of long-lasting perceived social injustice or environmental degradation that finally 'explodes' (Boone and Modarres 2006; p. 134–159). Very often social systems change ecosystem processes unintentionally and indirectly (exogenous drivers, e.g. housing policy, social policy, national security). These drivers can have a significant impact on potential services that society derive from nature or supply needs of future generations. The ecosystem service (ES) approach can help us to identify how the social system is interlinked with the ecological system, and how they are value based on their 'importance' to social system (e.g., Gómez-Baggethun et al., 2014). However, many authors claim that intangible and non-monetary values are often underestimated or remain absent in assessment of ecosystem services (Kumar and Kumar 2008; Chan et al., 2012; Lele et al., 2013).

In this paper, we studied environmental conflict related to the urban brook ecosystem in Helsinki, Finland. Our aim is not to study the conflict per se, but to examine the local socio-ecological system (SES) by using an analytical framework for value mapping of ecosystem services (e.g., de Groot 2002; Hein et al., 2006). We believe that the conflict arose because the Kumpulanpuro storm-water management plan, which is one of the first artificial storm-water pond projects in the city of Helsinki, failed to identify and manage the plurality of socio-cultural meanings and values by residents towards the specific place.

We constructed analytical framework for value mapping to our research (Fig. 1). The framework helps us to categorize different values, which values are included (and which not), and to choose proper method to collect data from various sources (Faehnle et al., 2011; Gómez-Baggethun et al., 2014). Ecological values refer to quantitative measures to estimate ecosystem processes and structures by biophysical proxies (e.g., amount of permeable surface). Socio-cultural values refer to perceived meanings and values that individuals, social groups and communities have towards nature and ecosystems (de Groot et al., 2002; Lele et al., 2013). Here, meaning is understood as thoughts, feelings, memories and motivations associated with a specific place (Stokols and Shumaker, 1981, p. 483; Schroeder, 1991, p. 232), and it is synonymous to socio-cultural values. Economic values refer to the cost-efficiency of derived benefits that can be measured in monetary or non-monetary terms (de Groot et al., 2002). We will focus on socio-cultural and ecological values adding a technological scope in them. More specifically, our objectives were as follows. First, we specified relevant boundaries for the socio-ecological system and main ecological characteristics related to the Kumpulanpuro brook and the Vallilanlaakso public park (supply side of SES). Second, we studied socio-cultural values of key stakeholders towards the brook and the surrounding green area to identify whether there are differences in values among stakeholders (demand side of SES).

2. Materials and methods

2.1. The brook Kumpulanpuro and the planning area

The techno-ecological values of the brook were identified from official planning documents, publications and archives of the city of Helsinki. The brook runs partly in an open channel in the public green area Vallilanlaakso, which is located in a densely populated area in central Helsinki (Fig. 2). The brook runs into the Baltic Sea. The geomorphological history of the valley is fairly short as after the ice age the area was covered by seawater until about 1000 years ago. The soil is, generally, a more than 15 m thick clay layer and the topography of the valley is fairly flat. Land-use started in the 15th century when the area was cleared for agriculture (Ruth and Tikkanen 2007).

The green area Vallilanlaakso is a 4.3 ha public park with open lawns, garden trees and spontaneous vegetation. The green area has an official status in the politically-approved local master plan of the city of Helsinki (23.12.2004) as "*a city park area that has important landscape and historical values and will be developed as a multifunctional park and natural area*". The park is used for, e.g., picnicking, football, jogging and other recreational use. It is a greenway for pedestrians and cyclists.

After the green area Vallilanlaakso and before reaching the Baltic Sea, the brook runs in a concrete channel through the allotment garden of Vallila (10 ha). The allotment garden has suffered from severe storm-water flooding in recent years (2005, 2007, 2010 and 2011), which was the main reason the city produced the disputed storm-water management plan for the brook.

The storm-water management plan was prepared by the environmental consultant company SITO, together with authorities of the Public Works Department of Helsinki. Expert-oriented planning was started before the first public meeting in May 2012. The storm-water management plan is a techno-ecological document with detailed information about hydrological, topographical, soil, and vegetation conditions of the catchment area of the brook Kumpulanpuro and the park Vallilanlaakso. The aim of the plan was to prevent storm-water flooding into the allotment garden with the help of two constructed storm-water ponds in the park Vallilanlaakso upstream from the allotment garden. These ponds would have been planted with wetland vegetation that would capture pollutants and heavy metals. Due to heavy loads of additional nutrients, particles and heavy metals, pond sediment should have been removed annually. In addition, planners suggested that the partly-polluted leftover soil from the construction of the ponds should be used in the park by filling the last original open channel section and by guiding the brook to run in a pipeline. This suggestion followed the principle of a closed recycling system of soil within the storm-water management plan.

2.2. Interview design

Data for analyzing socio-cultural values were collected by using narrative research methods. The advantage of an exhaustive in-depth interview is that it identifies intangible values and meanings, by supporting people in addressing controversial and sensitive topics in their own words (Chan et al., 2012). Semi-structured, thematic interviews with open-ended questions were chosen as a method to collect narrative data (Flick 1998; p. 76–95). Interviews were carried out between April and September 2013. Snowball sampling was used in collecting interview data to cover all key persons related to the management plan and ongoing conflict (Tuomi and Sarajärvi, 2002; p. 88). A total of 14 people were interviewed. The interview covered questions about opinions regarding the ongoing storm-water management plan, ecology of the area, and perceived values and meanings towards the brook Kumpulanpuro and the