



Cultural ecosystem services as a gateway for improving urban sustainability

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ABSTRACT

Quality of life in cities depends, among other things, on ecosystem services (ES) generated locally within the cities by multifunctional blue and green infrastructure. Successfully protecting green infrastructure in locations also attractive for urban development requires deliberate processes of planning and policy formulation as well as broad public support. We propose that cultural ecosystem services (CES) may serve as a useful gateway for addressing and managing nature in cities. CES can help embed multifunctional ecosystems and the services they generate in urban landscapes and in the minds of urbanites and planners, and thus serve an important role in addressing urban sustainability. In the city, CES may be more directly experienced, their benefits more readily appreciated, and the environment-to-benefit linkages more easily and intuitively understood by the beneficiaries relative to many material ES. Thus, we suggest that a focus on CES supply can be a good starting point for increasing the awareness among urban residents also of the importance of ES. Furthermore, CES are often generated inter-dependently with other critical ES and engaging people in the stewardship of CES could provide increased awareness of the benefits of a larger group of urban non-cultural ES.

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1. How do we secure long-term quality of life in cities?

The world is rapidly urbanising, and one of many major challenges is how we are to secure long-term quality of life for people in cities. Despite global trade and large ecological support areas, quality of life in cities depends also on ecosystem services (ES)¹ produced locally. To ensure the delivery of urban ES we need heterogeneous, multifunctional and accessible blue and green infrastructure throughout our cities (Gomez-Baggethun et al., 2013). Such “nature in cities” is bound to compete with other land-uses and infrastructure for resources and space. Successfully protecting green areas in attractive urban locations requires deliberate processes of planning and policy formulation as well as the engagement of committed stewards and broad public support based on awareness of, and insights into, the importance of these areas for human well-being.

We propose that one group of ES, cultural ecosystem services (CES)², may serve as a more useful entry point for managing nature in cities for multifunctionality. A focus on CES could potentially draw on already existing appreciation of nature to build awareness of the

broader suite of ES, and therefore help embed multifunctional ecosystems, and the services they generate, in urban landscapes and in the minds of urbanites, planners, managers and educators. Unlike many other ES, CES cannot be outsourced, and they provide multi-dimensional linkages between people and the environment they live in. The *Millennium Ecosystem Assessment* (2003) took a first important step by expressly stating that there are CES, and that they are directly connected to human health and well-being. CES have since been described as including dimensions such as recreational activities, sense of place, spiritual connections, health and aesthetical values (Crossman et al., 2013; Gomez-Baggethun et al., 2013; Kumar, 2010) and though studies have tended to focus primarily on recreation, tourism and health, there are tools for addressing and assessing also less tangible services (Daniel et al., 2012). Highlighting the latter, we here use the definition of CES from Russell et al. (2013, p. 475) as “ecosystem contributions to human well-being mediated through nonmaterial processes (e.g. the mind or culture)”, a definition where we expressly include the more direct experiences of nature where the benefits are understood through human cognitive perception.

In the following sections we first briefly outline the growing understanding of CES in urban systems and how people perceive and experience nature. We then continue by proposing how CES may serve as an entry point for addressing urban sustainability, and become a gateway for urban ES stewardship.

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¹ ES=Ecosystem services.

² CES=Cultural ecosystem services

2. Why do CES matter in the urban landscape?

2.1. Cities are truly interlinked social–ecological systems and social processes are important

Cities and urban areas, by virtue of their population and built infrastructural density, are commonly understood as social spaces, with a wide variety of social places (Vanclay, 2008). For over a decade studies of urban systems as social–ecological systems with dynamically interacting social and ecological components (*sensu* Berkes and Folke, 1998) underscore the importance of human activities, values, perceptions and norms, and how they interact with ecological processes to affect ecosystem structure, functioning, and services (e.g. Andersson et al., 2014, 2007; Grove et al., 2006; McPhearson et al., 2013; Pickett et al., 2011). Human decisions and preferences strongly shape urban space, and preferences are not necessarily primarily decided by knowledge (McNie, 2007). Urban systems approaches recognize that feedback linkages are key to system dynamics (e.g. Grimm et al., 2000). While many feedback connections between human well-being and ES are slow or require extensive knowledge to trace or interpret, the more immediate and more intuitive links people have to the CES may make environmental changes more cognitively accessible (Asah and Blahna, 2012). Since many urban CES are directly influenced by management, the time frames for change are at a scale that is easily recognized and understood by humans.

2.2. The relevance of CES for well-being can be directly appreciated

Most ecosystems and the services that sustain cities are generally distant and thus invisible to the inhabitants. The appreciation of many ES, such as carbon sequestration or air quality regulation, requires an advanced understanding of ecological processes (e.g. photosynthesis, gas exchanges at leaf surface) and how they impact human well-being (cf. Kumar and Kumar, 2008). In contrast, many CES are directly perceived and experienced locally. Daily or weekly experiences of CES through interactions with urban ecosystems make them meaningful to people in ways that other ES may not be, for example, by offering psychological restoration (Hartig et al., 2011) or indirectly inspiring recreational activities and exercise (Humpel et al., 2002). Thus, CES provide benefits that are directly and subjectively recognized by people, in the appreciation of beautiful scenery or a flower bed, or tranquility among trees in an urban park. These benefits can be experienced by anyone, irrespectively of ecological knowledge or measuring equipment (cf. Daniel et al., 2012; Gobster et al., 2007).

2.3. CES can combine with other ES and are usually interdependent

Chan et al. (2012b) argue that when disentangling the multi-layered concepts of services, benefits and values, an interlinked view of ecosystem services emerge, in which multiple benefits and values both material and nonmaterial can be produced simultaneously by the same system components. For example, more tangible services such as food production in an allotment garden (Barthel et al., 2013) or recreation are often associated with added benefits like feeling close to nature or self-fulfilment. Conceiving of the multiple kinds of services, perhaps especially CES, associated with a particular place enables more holistic understanding of the ways humans benefit from ES and how they can be synergistically managed. CES may also serve as alarm clocks signalling change in whole bundles: For example, although water bodies and waterways in urban areas offer multiple important ES such as local cooling and pollution filtration, it is changes in the CES, e.g. recreational, spiritual experience, sense of place and aesthetic services, that most people first register (cf. Gobster and Westphal, 1998).

2.4. Engagement and support from civic groups in stewardship of green and blue infrastructure are often based on perceptions of CES

Chawla (1999, 1998) suggested that taking an interest in learning about the environment, feeling concern for it, and acting to conserve it, are based on the experiences a person have with nature, and several studies indicate that engagement in pro-environment activities or stewardship is strongly affected by complex relations to nature and to CES (e.g. Kudryavtsev et al., 2012; Measham and Barnett, 2008; Tidball and Stedman, 2013). For example, an ecologically informed sense of place, including strong place attachment and ecological place meaning, has been shown to contribute to pro-environmental behaviours (Kudryavtsev et al., 2012). Aesthetic appreciation was shown to be the strongest motivator for retaining woodlots in rural Michigan, USA (Erickson et al., 2002) and research on voluntary environmental engagement suggest that important motivations are learning about nature (review in Ryan et al., 2001); all examples of CES.

3. Opportunities and needs

3.1. Further research is needed to explore when and how CES can be constructively used in the design of multifunctional landscapes

If articulated more clearly, CES could, we believe, promote a greater awareness of the many benefits people co-produce with the landscapes they live in. Greater awareness of the different interrelated factors that frame our experience and perception of nature could provide a basis for a more comprehensive dialogue about sustainability (Folke et al., 2011), not least in terms of ES and cities. However, urban ES studies have had little to say so far on the links between biodiversity, ecosystem structure and functioning, and how they impact people's experience of nature (with some exceptions, see e.g. Peschardt and Stigsdotter, 2013). Better articulation of these linkages is critically needed as management aimed at improving (or inadvertently degrading) CES often targets environmental features. Planners and managers need to know the ecological requirements of different CES, or multiple CES, and how changes in particular environmental features will affect the experience of specific CES and the receipt and appreciation of their benefits. For example, how might managing for bird diversity in Central Park, New York City contribute to increased spiritual experience, cognitive development, educational opportunity or all three? And what are the ecological requirements in terms of e.g. biodiversity, habitat quality and quantity, etc. needed to achieve these CES goals? A better understanding of how the functional attributes of urban ecosystems affect people's experiences should make addressing multifunctionality easier and open up for more informed design of blue and green infrastructure (see e.g. Gobster et al., 2007) (Fig. 1). We see a need for further research that explores (a) how experiences of nature are related to biodiversity and how levels of biodiversity itself are perceived, (b) the CES associated with complex and simplistic blue and green infrastructure, respectively, (c) if hotspots of non-cultural ES coincide with CES, and (d) which and how ecological structures and bundles of ES can be included in design and management.

3.2. A focus on CES may offer a gateway to ES stewardship through civic engagement and public support

Many CES are both elusive and highly contingent, e.g. spiritual experiences, aesthetics, and sense of place. These services cannot be understood simply as products of “natural” processes, and while they are analytically challenging as they require both multidisciplinary and deep knowledge, they also are an intuitive entry point for understanding social–ecological systems. The many different mediating factors (e.g. personal history, timing, ecological context) of CES

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