

STRONGLY SUSTAINABLE SOCIETIES

Organising Human Activities
on a Hot and Full Earth

*Edited by Karl Johan Bonnedahl
and Pasi Heikkurinen*

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URBAN ECOSYSTEM SERVICES AND STAKEHOLDERS

Towards a sustainable capability approach

*Anna Heikkinen, Hannele Mäkelä, Johanna Kujala,
Jere Nieminen, Ari Jokinen and Hanna Rekola*

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Introduction

This chapter argues that the discussion of urban sustainability is in urgent need of new understanding of how ecosystem services are generated in places where human and non-human stakeholders interact within the urban landscape. More than half of the world's population currently lives in urban areas, and the rate of urbanisation is estimated to increase rapidly in the next three decades (United Nations, 2014). This scale of urbanisation strains both urban and rural ecosystems, which are required to provide nutrition, clean water, fresh air, recreational opportunities, wellbeing and other life-supporting and life-enhancing opportunities to urban dwellers (Chiesura and de Groot, 2003; Fischer and Eastwood, 2016; Standish, Hobbs, and Miller, 2013). Amidst such challenges as rapid urbanisation and abrupt climatic changes, ecosystem services are needed to provide the material and non-material benefits required to keep ever-growing cities liveable (Alberti, 2016; Andersson et al., 2014; Finco and Nijkamp, 2001; Rees and Wackernagel, 1996). However, the current understanding of ecosystem services is inadequate, and the extant research has been criticised for both its anthropocentric bias and its focus on instrumental and monetary valuations of ecosystem services (Pelenc and Ballet, 2015; Schröter et al., 2014). Moreover, the lack of a detailed elaboration of the socio-ecological interface of ecosystem services has resulted in the continued segregation of human and non-human processes in ecosystem service generation (Andersson, Barthel, and Ahrné, 2007; Fischer and Eastwood, 2016; Maes et al., 2012).

We adopt a strong sustainability standpoint that emphasises the need to protect non-substitutable natural capital and achieve socio-ecological balance within the society (Ekins, 2014; Holland, 1997; Landrum, 2017; Neumayer, 2003, 2012). The development and maintenance of social and ecological wellbeing are critical for ensuring liveable and strongly sustainable societies (Bonnedahl and Eriksson, 2007;

Heikkurinen, 2017; Hopwood, Mellor, and O'Brien, 2005). Therefore, we need to address the problem of urban areas becoming hotter and fuller by considering human and non-human encounters in urban environments. We acknowledge that cities are increasingly dependent on external ecosystems in rural areas and remote places. Urban growth widely deteriorates these ecosystems, but the people who make impactful individual choices in cities struggle to see the connection. However, we view urban ecosystems as opportunities to reconnect people in cities to the biosphere (Andersson et al., 2014). New approaches are needed for understanding urban ecosystem services and transforming 'the existing governance models into sustainable ones that recognise the complexity of relations between the human and non-human worlds' (Farah, 2017, p. xvi). Ever-changing interactive places allowing for and ensuing from human and non-human stakeholder interaction are critical for increasing urban resilience and sustainability (Pearson, Newton, and Roberts, 2014).

To address the issue of strong sustainability in urban areas, we develop a novel sustainable capability approach. Specifically, we consider human and non-human stakeholder engagement in the generation of urban ecosystem services by combining the capability approach (Sen, 1999, 2009), notions of stakeholder engagement (Maak, 2007), and radical democracy (Bond, 2011; Brown and Dillard, 2013; Mouffe, 1993, 2000, 2005). We build on the capability approach (Nussbaum, 2000, 2003; Sen, 1999, 2009), which was originally developed as a framework for addressing human wellbeing, justice and development in terms of human capabilities and suggest that this approach is useful for transcending the current monetary and opulence-based framings of ecosystem services (e.g., Polishchuk and Rauschmayer, 2012; Robeyns, 2005). Although recent research has advanced the rapprochement of the capability approach and sustainable development, the capability approach remains largely anthropocentric, focusing primarily on humans and human wellbeing (Pelenc and Ballet, 2015; Pelenc, Lompo, Ballet, and Dubois, 2013; Rauschmayer, Bauler, and Schöpke, 2015).

Previous literature has acknowledged that stakeholder engagement is vital to the generation of urban ecosystem services (Hauck, Görg, Varjopuro, Ratamäki, and Jax, 2013; Menzel and Teng, 2010). We utilise an issue-based understanding of who and what constitutes a stakeholder, which we define as any individual or group that can affect or is affected by a focal issue (Roloff, 2008; cf. Freeman, 1984). Stakeholder engagement refers to the various forms of stakeholder interactions (Maak, 2007). We confer stakeholder status not only to human stakeholders, such as citizens, activists, civil servants, and entrepreneurs, but also to non-humans, such as animals, plants and the natural environment (Driscoll and Starik, 2004; Haigh and Griffiths, 2009; Waddock, 2011). Speaking theoretically, we use the term 'nature as a stakeholder', but empirical specification is needed. In cities, nature is intrinsically 'human-natural', because it is always born from various interactions of human and ecological processes (Alberti, 2016). Finally, to advance the capability approach, we use radical democracy (Bond, 2011; Brown and Dillard, 2013; Mouffe, 1993, 2000, 2005) to consider the pluralism of values and indeterminacy in the processes of

ecosystem service generation (Pascual et al., 2017). Radical democracy may facilitate the inclusion of non-human stakeholders through highlighting the openness of democratic processes (Latour, 2004; Vinnari and Dillard, 2016).

In this chapter, we contribute to earlier research in at least three ways. First, we contribute to the discussion exploring the links among the capability approach, ecosystem services, and strong sustainability (Ballet, Koffi, and Pelenc, 2013; Pelenc and Ballet, 2015; Polishchuk and Rauschmayer, 2012; Rauschmayer et al., 2015; Scholtes, 2010) by introducing radical democracy and explicitly considering both human and non-human stakeholder engagement. We maintain that the conventional consensus-seeking processes that rely on predetermined procedural norms are not sufficient to achieve a societal transition to strong sustainability. Instead, the full richness, complexity and conflict inherent in the democratic interactions must be allowed between human and non-human stakeholders. Such a radical approach may facilitate an ongoing and evolving, collaborative and transformative process that may be valuable not only in preserving sustainable democracy but also in understanding the individual, collective, societal and economic elements of wellbeing and sustainability.

As a second contribution, we suggest that understanding the encounters between humans and non-humans in the generation of urban ecosystem services is critical for advancing urban sustainability and wellbeing. To understand urban ecosystem services, social and ecological processes and their linkages need to be recognised. These linkages help in understanding the ethical dimensions of interrelations between humans and non-humans (Nygren and Jokinen, 2013) and question the human-centred view of the social dimension of sustainability (Hiedanpää, Jokinen, and Jokinen, 2012).

Third, we argue that the suggested sustainable capability approach is more in line with the basic premise of strong sustainability in rethinking the intertwined roles of human and non-human stakeholders and their engagement in urban ecosystem services (Heikkurinen, 2017; Rauschmayer et al., 2015). We believe that the suggested sustainable capability approach will produce long-lasting results with regard to promoting strong sustainability.

Strong sustainability and urban ecosystem services

Strong sustainability and ecosystem services build on the notion of natural capital (Ekins, 2014; Neumayer, 2003). Neumayer (2003) defined natural capital as the ‘totality of nature [. . .] capable of providing human beings with material and non-material utility’ (p. 9). The strong sustainability approach distinguishes between natural and manufactured capital, positing that natural capital is irreversible and non-substitutable with manufactured or other forms of capital (Ekins, 2014; Holland, 1997; Neumayer, 2003, 2012). More recently, Arias-Maldonado (2013) questioned the usefulness of the term natural capital, suggesting that ‘its usage should reflect the fact that naturalness is not an absolute category and should take into account the general process of hybridisation between society and nature’

(p. 437). Therefore, it is expedient to accept that, in the Anthropocene, the idea of 'original' nature untouched by humans is mostly utopian. We maintain that natural processes do not need to remain untouched in order to function and provide ecological and social benefits to various stakeholders (Arias-Maldonado, 2013).

The notion of ecosystem services suggests that the functionality of ecosystems provides goods and services for humans; however, these goods and services are only realised if somebody actively or passively requires, demands, or uses them (Church et al., 2014; Fischer and Eastwood, 2016; Millenium Ecosystem Assessment, 2005). Ecosystem services have been classified into four categories: 1) the provisioning of goods and products (e.g., wood, fibres, freshwater, food, or genetic resources), 2) regulation services (e.g., climate regulation or pollination), 3) cultural services (e.g., recreation or tourism), and 4) supporting services (e.g., water or nutrient cycling) (Millenium Ecosystem Assessment, 2005). Ecosystems provide diverse goods and benefits, which can include both material and non-material elements. For example, cultural ecosystem services provide many non-material benefits, such as opportunities for mediation, recreation and pedagogy (Gómez-Baggethun and Barton, 2013). Moreover, urban ecosystem services directly impact human health and security in areas such as air purification, noise reduction, urban cooling, and run-off mitigation (Gómez-Baggethun et al., 2013).

The concept of ecosystem services has been the subject of animated debates and critiques (Schröter et al., 2014). A focal critique is the concept's anthropocentric nature (Pelenc and Ballet, 2015; Polishchuk and Rauschmayer, 2012), which implies that the importance of ecosystems is measured in terms of the contributions of ecosystem services to humans and human wellbeing (Fischer and Eastwood, 2016; Schröter et al., 2014). For example, many evaluations have utilised land use and land-cover classes as proxies for urban ecosystem services. However, this approach is problematic, as these evaluations may neglect the changes and heterogeneity of the urban landscape, as well as the diverse ways in which people actually interact with this landscape (Kremer et al., 2016).

Moreover, the ecosystem service concept has been criticised for its association with the monetary valuation of nature, whereby ecosystems are seen to provide economic and social benefits to humans (Ballet et al., 2013; Polishchuk and Rauschmayer, 2012). The concept of ecosystem services was originally developed to support environmental conservation by creating a link between natural sciences and economics (Braat and de Groot, 2012; Daily, 1997). Since the introduction of the concept, monetary valuations of nature have been widely integrated into governmental and business decision-making. For instance, The Economics of Ecosystems and Biodiversity (TEEB) initiative focuses on making 'nature's values visible' by assigning values to the various benefits of ecosystems and biodiversity (The Economics of Ecosystems and Biodiversity [TEEB], 2010, p. 25). Such a utilitarian framing of ecological functions as ecosystem services is problematic because it can boost commodification and privatisation and diminish 'the moral sentiment for conservation' (Gómez-Baggethun, De Groot, Lomas, and Montes, 2010, p. 1216). In addition, the monetary valuation of ecosystem services has been criticised for not

taking ethics into account (McShane, 2007). In response to this critique, the research on ecosystem services has recently emphasised value pluralism (Pascual et al., 2017).

Recent research has concluded that ecosystem services in urban areas differ from ecosystem services elsewhere, as they are strongly mediated by non-ecological elements, such as physical infrastructure, technology, social practices, and the cultural contexts in which people experience human – environmental relations (e.g., Alberti, 2016; Andersson et al., 2007; Jones-Walters and Çil, 2011; Kremer et al., 2016; Menzel and Teng, 2010; Standish et al., 2013). For example, urban gardens produce food and urban wetlands produce recreational values through interactions between social and ecological processes connected with and mediated through the built environment. Moreover, research has posited that, although urban ecosystems alone are insufficient to maintain life in cities, they are crucial for improving well-being and complementing surrounding rural ecosystems and their corresponding benefits (see, e.g., Alberti, 2016; Andersson et al., 2014; Finco and Nijkamp, 2001; Rees and Wackernagel, 1996).

The importance of urban ecosystems will rapidly increase, as it is estimated that two-thirds of the global population will live in urban areas by 2050 (United Nations, 2014). The specific features of urban ecosystem services simultaneously result from urban conditions and link the services to the core problems of urban sustainability, such as growth beyond the capacity of terrestrial and marine systems and the disconnect between humans and the environment (Andersson et al., 2014; Finco and Nijkamp, 2001; Zimmerman, 2001). It is clear that the remaining blocks of natural habitats are insufficient to support today's growing populations and increasing consumption (Rees and Wackernagel, 1996). Therefore, further understanding is needed of how humans are and can be involved with one another and with ecological processes in generating urban ecosystem services (Elmqvist et al., 2013; Fischer and Eastwood, 2016; Leino, Karppi, and Jokinen, 2017). In the next section, we will introduce the capability approach as an alternative to the monetary and opulence-based perspectives in ecosystem services research.

The capability approach

The capability approach (Sen, 1999, 2009) is a broad normative framework for evaluating human wellbeing, social arrangements, policy design, and proposals for societal change (Robeyns, 2005). The interdisciplinary nature of the capability approach makes it applicable to various research fields. The approach values the intrinsic importance of the various aspects of the quality of life, thereby contradicting approaches that explain human wellbeing based on utility, income, consumption, or basic needs fulfilment (Pelenc and Ballet, 2015; Robeyns, 2005; Sen, 1999). According to Sen (1999), income and similar resources cannot be used to indicate wellbeing because other aspects of life, such as rights and liberties, are also important. Thus, income and other resources must be seen as means for achieving wellbeing, not as ends in themselves (Rauschmayer and Lessmann, 2011).

In the capability approach, wellbeing is assessed in terms of human capabilities and functionings. Capabilities refer to people's freedoms and options to lead lives that they have reason to value, whereas functionings refer to the various 'beings' and 'doings' that make life valuable (Robeyns, 2005; Sen, 1999, 2009). In other words, capabilities are potential functionings, and the choices people make define the types and levels of the functionings they achieve. Functionings can be related to fundamental issues, such as health, nutrition and the ability to work, or to more complex factors, such as the ability to participate in society and be respected (Robeyns, 2005; Sen, 1999). The capability approach distinguishes between the means and ends of wellbeing, suggesting that: 'Only the ends have intrinsic importance, whereas means are instrumental to reach the goal of increased wellbeing, justice and development' (Robeyns, 2005, p. 95). However, it is noteworthy that 'in concrete situations these distinctions often blur, since some ends are simultaneously also means to other ends (e.g., the capability of being in good health is an end in itself, but also a means to the capability to work)' (Robeyns, 2005, p. 95).

The capability approach has been proposed as a useful framework in ecosystem services research. In particular, this approach enables researchers to transcend the current monetary and opulence-based framings of ecosystem services and, accordingly, broaden their understanding of the links among ecosystem services, stakeholders and wellbeing (e.g., Garriga, 2014; Polishchuk and Rauschmayer, 2012). From the perspective of the capability approach, the value of ecosystem services is tied to 'the identification of the functionings people obtain from a particular ecosystem', such as 'being able to enjoy a walk in the forest' or 'being able to enjoy good air quality' (Pelenc and Ballet, 2015, p. 41). Consequently, scholars have advanced the rapprochement of the capability approach and sustainable development (e.g., Duraipappah, 2004; Lessmann and Rauschmayer, 2013; Pelenc et al., 2013; Pelenc and Ballet, 2015; Scholtes, 2010; Schultz, Christen, Voget-Kleschin, and Burger, 2013; Sen, 2009, 2013). Although both approaches inform societal decisions concerning human development, the capability approach is an individual level approach, whereas sustainable development is concerned with societal and systemic-level decisions (Lessmann and Rauschmayer, 2013; Pelenc et al., 2013; Schultz et al., 2013). The literature (Ballet et al., 2013; Pelenc et al., 2013; Pelenc and Ballet, 2015; Schultz et al., 2013) seems to agree that to fit the assumptions of sustainable development, the capability approach requires substantiation to include the natural environment and inter-generational justice. Namely, the capability approach problematically views the natural environment as merely instrumental for achieving human wellbeing (Pelenc et al., 2013; Pelenc and Ballet, 2015; Rauschmayer et al., 2015; Sen, 2009). In addition, the current understanding of the capability approach fails to acknowledge how the recursive relationship between humans and the natural environment affects and (at least partly) determines not only these two actors but also the dynamic temporality of the natural environment (Schultz et al., 2013).

Given the preceding, this chapter posits that the capability approach can provide useful insights for considering urban ecosystem services. In particular, unlike the current monetary-based framing of ecosystem services, the capability approach

provides a framework for valuing ecosystem services based on people's freedoms and opportunities 'to be' and 'to do' what they have reason to value (Pelenc and Ballet, 2015; Schröter et al., 2014). However, from a strong sustainability perspective, the capability approach is inevitably limited. To advance the capability approach to meet the ecological challenges of the Anthropocene, we therefore propose that it should acknowledge not only human factors but also the intrinsic value of non-humans. In the next section, we will consider how both human and non-human stakeholders can engage in urban ecosystem generation by discussing the ideas of deliberation and radical democracy.

From deliberation to radical democracy in stakeholder engagement

The generation of urban ecosystem services involves and affects various stakeholders. While the stakeholder approach (Freeman, 1984) offers promising viewpoints for analysing stakeholder interactions and engagement, the underlying stakeholder theory has been criticised for its rational, eco-modernist emphasis on the status quo (Banerjee, 2000), for outsourcing ethical consideration beyond the focal actor (Heikkurinen and Ketola, 2012), and for weak sustainability (Heikkurinen and Bonnedahl, 2013). We address this limitation by explicitly considering strong sustainability. Specifically, we build on a growing stream of research that argues that the natural environment should be granted a stakeholder status (Driscoll and Starik, 2004; Kujala, Lämsä, and Riivari, 2017; Laine, 2010; Vinnari and Dillard, 2016; Waddock, 2011) and argue that the understanding of stakeholders should be broadened to include all humans and non-humans that can affect or are affected by urban ecosystems. We follow Driscoll and Starik's (2004) understanding that 'the natural environment is seen as a stakeholder entity in the same sense as the local community, the general public, future human generations, and developing countries might be' (p. 56). Therefore, by referring to 'humans' and 'non-humans', our aim is not to imply that one is superior to the other; rather, we wish to illustrate that these stakeholder groups are closely intertwined in the generation of ecosystem services (Fischer and Eastwood, 2016; Schultz et al., 2013).

The capability approach has suggested that capabilities and functionings should be identified through a deliberative approach (Sen, 2004; see also Nussbaum, 2000, 2003) that relies on collective reasoning, discursive processes, and engaging moral considerations. The deliberative approach maintains that participants can change their minds to build consensus on collective issues (see Fishkin, 2009; Habermas, 1984; Pelenc and Ballet, 2015). Drawing on this line of research, Pelenc and Ballet (2015) have proposed that the identification of ecosystem services and their contributions to wellbeing should be based on public deliberations that actively involve and empower a broad range of representative stakeholders (see also Garriga, 2014; Lopes and Videira, 2016; Sen, 1999, 2009).

The deliberative approach has been challenged by proponents of radical approaches to democratic processes and stakeholder engagement (see e.g., Beaumont

and Loopmans, 2008; Bond, 2011; Brown and Dillard, 2013; Irvine and Moerman, 2017). We propose that radical democracy, which is derived from Mouffe's (1993, 2000, 2005) radical agonistic pluralism, is useful for explicitly considering the diversity of stakeholder interests and the pluralism and conflicts inherent in socio-ecological settings. Specifically, radical democracy offers alternatives to the two main shortcomings of the deliberative approach: the pursuit of consensus and compromise and the emphasis on rational thinking and argumentation.

First, a major criticism of the deliberative approach is that its pursuit of consensus through predefined procedural norms does not allow for complexity, difference, or disagreement (see, e.g., Beaumont and Loopmans, 2008; Bond, 2011; Brown and Dillard, 2013). As Bond (2011, p. 169) maintained, various competing discourses should not be reduced to a compromise; rather, space should be given to the various opinions and views of different stakeholders. Highlighting differences and disagreements fosters novel, innovative and creative solutions (Brown and Dillard, 2013; Irvine and Moerman, 2017), as well as the potential 'to use conflict and divergent views as a resource to inform a more radical praxis' (Bond, 2011, p. 169). Refusing the idea of a 'final consensus' is vital for preserving democracy and resisting the status quo, which is often dominated by powerful (human) stakeholders (Brown and Dillard, 2013, p. 179). Radical democracy highlights the indeterminacy and openness of democratic processes by arguing that processes, participants, or outcomes cannot and should not be predefined or based on consensus. Building on this premise, radical democracy also allows for the consideration of non-humans as participants in the democratic process (Latour, 2004; Vinnari and Dillard, 2016).

Second, deliberative democracy emphasises rational thinking and maintains that a better argument always wins. This perspective has often been criticised (Beaumont and Loopmans, 2008; Bond, 2011; Brown and Dillard, 2013) as naively idealistic, since, for example, it does not thoroughly recognise stakeholders' unequal distribution of power. Another problem deriving from this narrow understanding of rationality is the valuation of 'rational argumentation based on "disinterested" reason over other forms of communication, in much the same way that monetary measures of performance and value are privileged' (Brown and Dillard, 2013, p. 181). Conversely, radical democracy maintains that participants may reason and argue their views in varying ways, employing not only passion and rhetoric but also the narrative and affective dimensions of everyday interactions (Norval, 2007, taken from Bond, 2011, p. 165). Heikkurinen (2017) identified the limits of linguistic communication as follows: 'While it is of crucial importance to seek common understanding by linguistic means it is also important to acknowledge the limits of language and to complement the experience and knowledge sharing with non-linguistic methods' (p. 13). Indeed, such an open approach to various ways of communicating and expressing views is necessary when the aim is to include both human and non-human participants. The inclusion of non-humans, in particular, requires new ways of understanding what is 'rational' to different entities and how argumentation is used to achieve results. While we propose that radical democracy is useful for including non-humans, we also acknowledge that the practical

application of this approach is limited due to the failure of previous research to explore ways to include non-human views (Vinnari and Dillard, 2016).

To summarise, we argue that radical democracy is useful for understanding the value of pluralism and indeterminacy in the complex processes of ecosystem service generation involving various human and non-human stakeholders. In this radical spirit, it is unnecessary to predefine the processes, participants and outcomes of democracy. Instead of predefined implementation policies or institutional, procedural norms, the radical approach explicitly allows for complexity, difference and disagreement. Such an approach calls for institutions and individuals that rely on an open process involving a 'truly inclusive dialogue' and 'radical inclusiveness of diverse forms of life in the process' (Heikkurinen, 2017, p. 13) necessary for pursuing strong sustainability. In the following section, we suggest a sustainable capability approach based on the capability approach and radical democracy and use empirical examples to illustrate the elements of this approach.

Towards a sustainable capability approach

To ensure strongly sustainable societies, a new understanding of how urban ecosystem services are generated is required. In this light, the chapter suggests a sustainable capability approach that expands the Senian understanding of capability, is informed by situational stakeholder engagement, and utilises the notions of radical democracy. The proposed sustainable capability approach builds on three key, interlinked elements: 1) a multiple value perspective, 2) an open process of participation, and 3) human and non-human stakeholder engagement. To illustrate the potential of the proposed sustainable capability approach, we consider two cases of urban ecosystem services: natural stormwater management and urban parks and forests.

In urban areas, climate change has led to rapid growth in the need for stormwater management approaches that reject the blunt control of nature and instead aim to engage with humans and non-humans simultaneously (Karvonen, 2011). As an alternative to traditional sewage-based constructions, stormwater management is increasingly focusing on open water structures, such as ponds, vegetated basins, and creeks. The main function of natural stormwater management is to handle run-off by delaying, filtering and purifying water. In addition, stormwater management systems offer several other benefits to humans and non-humans in cities, including clean air, landscape enhancement, and biodiversity. Approaches, which integrate numerous land use aims and benefits, are necessary in densely populated cities with increasingly diminishing room for urban ecosystems. For instance, when the city of Tampere in Finland started to develop the new city district of Vuores in the beginning of 2000, a large stormwater system was included as one of the main elements in the planning agenda. This stormwater system was designed and constructed in collaboration with public and private organisations, such as local authorities, environmental consultancy and architecture companies, and construction companies. The stormwater system is now an integral part of the new housing area, and its development has enabled new kinds of human and non-human stakeholder interactions within the urban landscape.

Our other example of urban parks and forests concerns public open spaces that provide and distribute an array of ecosystem services. Urban parks and forests have a long-standing history within cities. As typically medium-to large-scale solid green areas within city environments, they provide sites for learning and interaction among and between humans and non-humans and are thus fruitful for analysing the situational generation of ecosystem services. In addition, urban parks illustrate how ecosystem services arise from processes originally rooted in human stakeholder interactions. For example, when the world's first national urban park, the Nationalstadsparken in Sweden, faced threats of exploitation in the 1990s, dozens of active citizen groups defended the park's future by participating in a dynamic civic mobilisation network, also known as the Ecopark Movement (Ernstson, 2008; Ernstson and Sörlin, 2009).

The first element of the proposed sustainable capability approach is the multiple value perspective. We argue that what is valuable and to whom cannot and should not be predetermined. Instead, the multiple value perspective posits an open approach to valuation and relies on an explicit consideration of the diversity of stakeholder interests. For example, stormwater management systems include functionings that can be valuable to both human and non-human stakeholders: for humans, these functionings mean being able to enjoy recreational and educational opportunities, being able to have clean and adequate water, being able to cope with extreme natural events, and being able to enhance biodiversity. This multidimensionality of functionings may result in conflicting and surprising expectations and views concerning what is valuable. For instance, a shallow basin designed for water delay and purification typically includes various kinds of plants to enhance biodiversity and ecological functionings. However, instead of a variety of plants, a pond might be filled with lupine plants. From the perspective of biodiversity – and, most likely, of local people – this invasive species is mostly destructive. However, lupine plants might function well for the purpose of temporary water delay and thus be valued by city officials. Hence, different stakeholders may simultaneously perceive lupine plants as an ecosystem disservice and a helpful tool for generating ecosystem services related to water purification (Gómez-Baggethun et al., 2013). According to the multiple value perspective, these and other potential functionings and valuations need to be situationally appreciated to ensure an inclusive approach to urban ecosystem services.

From the multiple value perspective, the Nationalstadsparken represents a unique combination of natural, cultural and social values. The park's history inherently raises the idea of value pluralism, as was shown by the Ecopark Movement during its attempt to preserve and enhance the park's natural and cultural values. Today, the park offers rich biodiversity and hosts many rare species, thus providing opportunities for ecological wellbeing. The park's location in the middle of metropolitan Stockholm creates opportunities to support various cultural and social values. The park caters to the various expectations and needs of the city's inhabitants, tourists and other interested parties, offering areas for activities ranging from recreation and sports to events for various civil organisations, such as scouting organisations.

Thus, the park offers and maintains various ecosystem services that contribute to the realisation of multiple functionings, such as natural heritage and landscape quality. Functionings particularly valuable to human stakeholders include opportunities for being able to relax and exercise; being inspired by the natural and social environment; and being able to connect with family, friends and non-human species. Functionings that enhance the quality of life of non-humans, such as rare species, include being able to thrive, to interact with other stakeholders (perhaps creating symbiotic relationships with humans or non-humans), and to propagate and spread and even evolve as species and communities.

The second element of the sustainable capability approach, an open process of participation, maintains that the processes, participants, or outcomes of democratic participation cannot and should not be predefined. For example, in the case of the stormwater system in Vuores, a maintenance guidance was not developed until after eight-year construction of the area. Prior to this time, there were no defined guidelines for the use and upkeep of the area. Rather, vegetation was allowed to develop spontaneously and maintenance decisions were made when necessary. Thus, the maintenance of the area was largely based on experimentation and open-ended outcomes. This experimental maintenance favoured radical democracy, as it avoided defined processes and consensus and was sensitive to complexities, differences and disagreements, which are necessary to create a productive process for seeking alternative solutions and sustainability-oriented transformations. When the new guidance defined clear criteria for the management of the area and vegetation, it partly constrained the open development of the area and the evolving interaction between human and non-human stakeholders. However, thanks to prior development, some space for self-organisation remained in the maintenance guidance.

The element of open process of participation is intertwined with the third element, human and non-human stakeholder engagement, which emphasises the explicit consideration of human and non-human interactions. We maintain that the pluralism of such situational human–non-human interactions should be respectfully acknowledged. Certain forms of contest are valuable in seeking solutions, and creative dialogue is needed. Though handling the tensions arising in interactions may lead to partial agreements and partly consensual solutions, in general, these tensions should be respected and acknowledged as creative powers of radical democracy. This is the politics of diversity based on opening space for productive contestation. Such open processes can trigger new forms of urban life and urban transformation that support not the status quo, but the shift towards strong sustainability (Brown and Dillard, 2013).

The case of open water solutions in contemporary stormwater management offers possibilities for open-ended participation and negotiations for a broad range of stakeholders. Stakeholders who could potentially participate in the design and use of stormwater management sites include human stakeholders, such as civil planners, local citizens, and city officials, as well as non-human stakeholders, such as water, plants, insects and birds. In an open process, stakeholders have various identities and capabilities in relation to the emerging ecosystem services, which cannot be

identified in advance. Some stakeholders participate from the start and continuously; some temporarily, repeatedly, or in the future; and many participate ad hoc in their own way. Non-humans may exist in all these categories, sometimes in predictable ways, but often in contingent and emergent ways triggered by, for example, weather conditions, ecological succession, or random encounters with other stakeholders.

The lupine plants in stormwater systems represent a case in point, as they have varying positive and negative impacts on human and non-human stakeholders. Thus, participation is a learning process through which human stakeholders can gradually acquire highly sensitive skills for operating with non-humans (see Nygren and Jokinen, 2013). The open process perspective accepts that the process of participation might involve challenges, such as disagreements in planning and lock-in developments typical of urban systems (Pearson et al., 2014). Such challenges should not be avoided because they may spark radical innovations. Instead, the non-discriminatory inclusion and engagement of various human and non-human stakeholders provides opportunities for experimentation and allows for the generation of new ecosystem services. A specific feature of cities is that new combinations of plant species (Kowarik, 2011) and 'novel ecosystems' (Hobbs, Higgs, and Hall, 2013) are continuously developing and being developed across the urban landscape. These new combinations and ecosystems result from human–non-human interactions and are valuable for urban biodiversity and ecosystem services.

The elements of the open process of participation and human and non-human stakeholder engagement are also closely intertwined in the case of national urban parks. The Ecopark Movement for Nationalstadsparken involved spontaneous stakeholder networks that mobilised to defend the future of the park and preserve its cultural and natural values (Ernstson, 2008; Ernstson and Sörlin, 2009). In particular, the network was able to enhance knowledge generation and make urban ecological processes visible. As the participating groups were diverse, ranging from boating clubs to allotment gardens and culture and nature conservation groups, they had various interactions with and perceptions of local non-humans. The networks, creating enabling and constraining circumstances for interaction between humans and non-humans, were constantly evolving and could only be partially steered. Thus, this case shows how urban green areas may trigger socio-ecological interactions that can develop into dynamic stakeholder networks, which may, in turn, mediate information and social learning, connect various action groups, and transcend sectoral boundaries and ecological scales.

The sustainable capability approach maintains that dynamic stakeholder networks allow for open processes of participation that involve the human and non-human stakeholders necessary for exploring slow, rapid and uncertain changes in urban environments. As the generation of urban nature is often dominated by powerful human stakeholders and institutions reliant on predefined ways of organisation (Brown and Dillard, 2013), seeking an open process requires strong motivation and commitment on the part of the individuals and institutions partaking in the processes. Our empirical cases of stormwater systems and urban parks and forest have revealed that open-ended participation processes are possible on ad hoc

basis – in situations that are outside or in between institutionalised and predefined ways of organising. Moreover, the cases highlighted situations in which there were no guidelines or plans for the use or development of the areas – this, however, is challenging to apply in the context of traditional institutions, which depend on defined visions and systematic action plans. A related challenge is that in open processes, it is nearly impossible to set long-term goals and to predict the resources required in the process. Additionally, such processes inevitably bear a risk of unwanted events or participants showing up in the process. All in all, concrete guidelines for fostering and carrying out equal and open-ended participation of human and non-human stakeholders require an incremental style of governance. Radical democracy is based on the premise of fostering the indeterminacy and openness of democratic processes by arguing that processes, participants, or outcomes cannot and should not be predefined or based on consensus.

Our cases have illustrated that open processes can inspire and enable new ways of human and non-human interaction in the generation of novel ecosystem services. We maintain that such approaches are needed to complement the traditional ways of understanding urban sustainability.

Conclusions

The sustainable capability approach suggested in this chapter highlights the notion that strong sustainability can be enhanced through active relationships between human and non-human stakeholders involving explicitly explorative processes in which neither the processes, participants, nor the outcomes can be foreseen. The sustainable capability approach builds on the capability approach (Sen, 1999, 2009) to transcend the monetary and opulence-based framings of ecosystem services. It offers a framework for valuing ecosystem services based on people's freedoms and opportunities 'to be' and 'to do' what they have a reason to value (Pelenc and Ballet, 2015). To advance the capability approach beyond its anthropocentric focus, the sustainable capability approach utilises radical democracy to acknowledge the intrinsic value of non-humans, and hence to meet the ecological challenges of the Anthropocene.

The sustainable capability approach highlights discovery and experimentation in ecosystem design and generation (Leino et al., 2017). The approach requires open interactions between human and non-human stakeholders and suggests that incompleteness and constant development in ecosystems and ecosystem services is desirable. We maintain that it is critical to embrace and carefully elaborate on the different perspectives and outcomes of the urban ecosystem generation process, as these differences constitute its truly transformative potential (Heikkurinen et al., 2016; Rauschmayer et al., 2015). Moreover, the sustainable capability approach may prove useful in other situations where various stakeholders interact pursuing sustainability.

We acknowledge the limitations of the sustainable capability approach. The issue of including non-humans is particularly challenging, since, although we accept the

ideas of radical democracy and stakeholder engagement as useful, they do not explain how to include non-humans as participants in practice or how to overcome humans inevitable mediation of non-humans' voices (Laine, 2010; Starik, 1995; Vinnari and Dillard, 2016; Waddock, 2011). We suggest that the inclusion and appreciation of non-humans requires institutions and individuals with strong motivation and commitment to rely on open-ended participation processes. While we have offered the cases of stormwater systems and urban parks and forests to illustrate the engagement of both human and non-human stakeholders, more empirical research is needed to develop a grounded understanding of this issue. We maintain that even though current knowledge on non-human participation is limited, considering such participation is crucial to achieving strong sustainability.

Implications for a hot and full Earth

The sustainable capability approach has important implications for addressing the problem of increasingly hot and full urban areas and the growing need to develop and maintain social and ecological wellbeing to ensure liveable and strongly sustainable societies (Bonnedahl and Eriksson, 2007; Heikkurinen, 2017; Hopwood et al., 2005). We argue that the sustainable capability approach emphasising open-ended participation is useful in appreciating the interactive and reciprocal human and non-human processes within the urban landscape. While both urban and rural ecosystems are required to ensure the continuation of life in cities, the active generation of ecosystem services is especially crucial in urban areas facing growing pressures and conflicting demands with regard to land use (cf. Zimmerman, 2001). Previous literature has recognised the need to move beyond narrow and monetary valuations and develop alternative and more thorough understandings of how to support wellbeing through urban ecosystems (e.g., Pelenc and Ballet, 2015; Rauschmayer et al., 2015; Schröter et al., 2014). The proposed sustainable capability approach posits that urban ecosystems are generated through open processes involving interaction between human and non-human stakeholders. The essential normative implication of this approach is that, to achieve strong sustainability, the generation of urban ecosystem services requires openness to radical processes that appreciate various and conflicting opinions, experimentation and tolerance of uncertainty.

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