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REVIEW ARTICLE

Can we plan for urban cultural ecosystem services?

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Abstract

Despite being intangible, subjective and difficult to measure, cultural ecosystem services (CES) are more comprehensible and meaningful to people than many other services. They contribute greatly to the quality of urban life and achieving sustainability. Yet, little attention has been paid to how CES might practically be incorporated into urban planning. This paper addresses this gap by examining the challenges planners might face when handling CES, establishing strategies for addressing the challenges and highlighting key factors planners should consider when planning for CES. CES differ greatly from other ecosystem services—they are definitionally vague, difficult to measure, often bundled with other services and depend on users' perceptions and situational factors. Therefore, rather than adopting a deterministic approach to generating CES, we suggest that urban planners should seek to create opportunities for CES to 'hatch' and 'grow' as people encounter nature in cities. This paper draws from diverse theoretical considerations of the CES concept as well as greenspace planning scholarship and practice. We identify five factors that need to be considered when planning for CES: place, people, past, practices and purpose. We see the proposed '5P' framework as a useful heuristic for planners when implementing CES in urban planning.

Key words: cultural ecosystem services, participatory governance, urban greenspace, urban nature, urban planning

Introduction

The fundamental goal of urban planning is liveability, that is quality of urban life (Myers 1988; Steinø 2004). While for centuries that goal was pursued via technological measures, the rapid urbanisation and the accompanying change in lifestyle in 19th and 20th centuries started compromising environmental sustainability, causing a turn toward considerations of solutions based on nature. Realisation of humanity's impact on natural systems globally led to the genesis of the concept of ecosystem services (ES) (MEA 2005). The definition of ES as 'the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life' (Daily 1997, p. 3) suggests that the concept shares the common goal with urban planning and indeed is increasingly integrated into it (Hansen et al. 2015; Lorance Rall, Kabisch, and Hansen 2015; Woodruff and BenDor 2016; Cortinovis and Geneletti 2018). However, unlike provisioning, regulating and supporting ES, cultural ecosystem services (CES) have not yet been well translated to practice and little attention has been paid so far to how CES might practically be incorporated into urban planning (Campbell et al. 2016; La Rosa, Spyra, and Inostroza 2016). Rare articles covering that topic address only specific aspects such as classifying and valuing of some CES (along other ES) (Gómez-Baggethun and Barton 2013; Canedoli et al. 2017) and reviewing indicators of CES for urban planning (La Rosa, Spyra, and Inostroza 2016; Tratalos et al. 2016). Plieninger et al. (2015) investigated the ways how CES can be incorporated into

landscape management and planning. Our paper aims to focus on urban settings and identifying factors that urban planners need to account for when incorporating CES into comprehensive urban planning and management.

CES have lagged behind other types of ES in terms of both research and practice because their intertwinement with subjective human perception has led to epistemological challenges and has attracted various critique (Fisher, Turner, and Morling 2009; James 2015; Kirchhoff 2019). Moreover, the concept of nature's contributions to people (NCP), adopted by the Intergovernmental Platform on Biodiversity and Ecosystem Services, has drifted from earlier ES concepts partly due to conceptual and practical differences between CES and other ES (Díaz et al. 2018). The NCP concept sees culture permeating 'through and across all three broad NCP groups (. . .) rather than being confined to an isolated category' (Díaz et al. 2018). Irrespective of whether CES are considered as a category in themselves or culture is perceived as an overarching lens, there is a need to translate the cultural dimensions of human–nature relationships into practical urban planning and decision-making.

Due to its role in generating ES in cities, urban nature has been recognised as an important venue for studying and planning urban CES. Dickinson and Hobbs (2017, p. 188) stress the need for exploring the connection between CES and urban greenspace (UGS) in 'unlocking myriad well-being benefits'. Moreover, people seem to interact with nature in order to induce such benefits, which is why Andersson et al. (2015b) proposed that CES can serve as a gateway for addressing and managing urban nature and consequently improving urban sustainability. However, the problem of rising alienation from nature (Pyle 1993; Soga and Gaston 2016) deprives people of various benefits provided by nature and may change their attitude towards nature (Zhang, Goodale, and Chen 2014). Studies of human–nature relationships have hence become increasingly relevant for both research and practice at the intersection between CES and UGS.

Our argument is based on the assumption that CES are the main reason people interact with urban nature (Bertram and Rehdanz 2015; Ko and Son 2018). Modern cities are faced with various social and environmental problems such as social stratification, environmental pollution and loss of greenspace; interacting with nature for associated cultural benefits and meanings may provide viable solutions to these problems. The contributions of CES to social and health conditions of urbanites must not be overlooked (Jennings, Larson, and Yun 2016; Chen et al. 2019). It is imperative, therefore, for CES to be incorporated into urban planning in order to advance the quality of urban life and aim to achieve urban sustainability. Although few studies are directly concerned with translating CES into urban planning, existing research on planning for UGS and ES more generally may provide useful insights to help incorporate CES into urban planning.

In this article, we aim to critically review knowledge of CES and combine it with urban planning principles to propose a conceptual tool for translating CES into urban planning. To maximise the direct applicability of these insights to current practice, we focus our attention on conventional governance cycles based on rational planning tradition that dominate in much of the world. We pursue our aim by examining the following research questions:

1. Challenges: What should planners be aware of when handling CES?
2. Strategy: What strategy could reconcile these challenges for successful planning for CES?
3. Foundational considerations: What factors planners should take into account when planning for CES?

We believe that the trajectory of 'challenge > solution > elaboration' will work best with stakeholders and practitioners interested in CES in urban planning and encourage scholars to build further on our proposal.

Methods

In order to define a plausible strategy for planning for CES, we firstly conducted a qualitative review of literature on the CES concept as well as ES concept where CES are explicitly considered. We aimed to identify characteristics of CES relevant for urban planning that may pose challenges for planners when accounting for CES. While acknowledging diverse approaches to cultural dimensions of human–nature relationships, and aware of criticism, we chose the CES concept as it has a broad set of theoretical and conceptual considerations and is widely accepted by academics due to its affiliation with the broader ES concept. Furthermore, it already has a firm scientific connection with greenspace studies which we deem crucial for developing a framework that will incorporate cultural dimensions of human–nature relationships into urban planning.

The Web of Science (WoS, v.5.32) database was used to search the literature, complemented by a snowball method (Greenhalgh and Peacock 2005), which enabled reaching more relevant papers. The database was searched on 22 April 2019 for exact terms 'cultural ecosystem service*' and 'cultural service*' in the title. The two searches focused on articles published between 1990 and 2019. The searches returned 231 papers. Further selection was carried out against the following criteria: (i) the paper addresses CES, (ii) the paper is written in English, (iii) the paper is either primary research or a review article (datasets were excluded) and (iv) the paper does not address exclusively rural areas. The selection resulted in 90 papers that were subjected to further analysis. The excluded papers included 29 articles not addressing CES (but rather cultural services in non-ES concept context), 108 articles addressing exclusively rural areas, 3 articles in other languages (Korean and Chinese) and 1 article that was returned twice. The snowball method, carried out while reviewing selected papers, added another 19 papers to the analysis, which was performed on a final total of 109 papers, out of which 38 were theoretical and 71 were empirical (see online supplementary data for the final list of articles).

Following the selection phase, papers were analysed qualitatively to identify challenges that CES pose before planning. Based on our practical planning experience and comprehension of CES, we inductively classified the identified challenges into five groups based on their cause:

1. challenges arising from definitions and classifications,
2. challenges arising from people's involvement in CES generation,
3. challenges arising from evaluation,
4. challenges arising from ecological complexity and
5. challenges arising from diminishing contact with nature.

Besides papers on CES, several papers on urban planning, planning for ES and UGS have been reviewed to support the analysis of challenges (research question 1), develop a plausible strategy (research question 2) and explain relevant factors in planning (research question 3).

Challenges in planning for CES

CES are difficult to define, classify and measure; this poses challenges in transferring the CES concept into urban planning. Given that the challenges arise primarily from the distinctiveness of CES in comparison with other ES, to understand them, we need to scrutinise their character and analyses the CES concept in the planning context.

Challenges arising from definitions and classifications

In contrast to the other three types of ES, which can unequivocally be linked to ecological functions, CES seem more related to psychological and social processes. The Millennium Ecosystem Assessment (MEA 2005) thereby defined CES as the 'nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences'. Further, it classified CES into nine non-encompassing sub-categories: cultural diversity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values and recreation and ecotourism. Various authors have attempted to refine the classification (Hernández-Morcillo, Plieninger, and Bieling 2013; Bryce et al. 2016; Rall et al. 2017) and expand the suite (Gould and Lincoln 2017).

The list of CES sub-categories indeed does not seem conclusive nor systematic. In the review of 142 CES-related papers, Blicharska et al. (2017) discovered that there is no consistency in general definitions of CES and their naming. As Huu et al. (2018) remarked, in the broader ES suite, CES are often treated as a broadly labelled, residual category after accounting for other utilitarian benefits. In other words, there is a practical problem of how to distinguish between the CES and the resulting cultural ecosystem benefits (CEB) for users—a division known as the ES cascade model (Haines-Young and Potschin 2010). For instance, a cemetery ('ecological structure') may be a spiritual place ('ecosystem service') that supplies visitors with a feeling of 'staying connected' with the dead ('benefit'), but at the same time also a historical place ('ecosystem service') providing visitors with experiences of a local funeral tradition and funerary architecture (benefits). All these benefits may make the cemetery important to people ('value'). This example shows the complex interconnections among ecological foundation, CES and resulting benefits and due to the unclear disambiguation between elements of the cascade, planners might mistakenly double-count spiritual place and the feeling of 'staying connected' with the dead as two CES (Hernández-Morcillo, Plieninger, and Bieling 2013), whereas only the former pertains to service and the latter is a benefit emerging from the service. Similarly, planners might double-count experiences of funeral tradition and funerary architecture as two CES, while both are actually benefits arising from the same service. Blicharska et al. (2017) documented numerous instances where different elements of the cascade were categorised as CES. Benefits can, indeed, be assessed as well as services, however, for planning purposes, it would be practical to assess them separately.

In an attempt to develop a framework for the research of CES, Fish, Church, and Winter (2016b) subjected the CES concept to the cascade model and discerned biophysical domain (ecological structures and processes), cultural services (and goods), benefits and values. In their framework, CES are divided into 'environmental spaces' and 'cultural practices', which in interaction generate benefits grouped into three categories: 'identities, experiences and capabilities'. Already an initial linking of MEA's sub-categories of CES with the proposed framework suggests that they are actually a mix of services, benefits and values.

It should be noted that most papers on CES build upon the MEA classification and therefore further arguments that we will analyses do not necessarily pertain exclusively to the level of services but also the levels of benefits and values.

Challenges arising from people's involvement in CES generation

One of the critical dimensions of CES in the context of urban planning is the contribution of nature to physical and mental well-being, which corresponds to Fish, Church, and Winter's (2016b, p. 212) level of CEB: 'the identities they help frame, the experiences they help enable and the capabilities they help equip'. For all these benefits to be realised, human participation is indispensable, which is why researchers stress that CES are co-produced between humans and nature (Chan et al. 2011; Fischer and Eastwood 2016; Fish, Church, and Winter 2016b; Dickinson and Hobbs 2017). If CEB are generated through interaction between people and their environment, which implies that they are: (i) place-based which means they cannot be replicated exactly elsewhere because different places generate unique experiences for users (Dickinson and Hobbs 2017; Johansson, Pedersen, and Weisner 2019) and (ii) person-based meaning each person undertakes practices that are in line with values they cultivate and treat benefits according to those values (Fish, Church, and Winter 2016b). Finally, both environment and people's behaviour are susceptible to timing; for instance, the same person may react differently to the same place in different moods or weather conditions. All this together suggests that 'CEB generation is the product of a unique user in a specific place at a particular time'.

This imposes several challenges for planning. Firstly, planners can plan environmental spaces and encourage particular behaviour, but they cannot significantly influence the human factor as described above. Therefore, they cannot plan exactly which CEB will be generated. Secondly, not all behaviours or environmental features would be perceived positively, and people can have conflicting responses to the same features/behaviours. For example, the sound of some birds may be perceived as unpleasant (Belaire et al. 2015); dog walking can be regarded as both positive and negative (Fischer and Eastwood 2016). Moreover, a person may perceive features differently from moment to moment depending on their mood or time of the day (e.g. a lovely park in daylight might seem scary during the night). The planning process should, therefore, account for the potential generation of negative perceptions and experiences that are known as 'disservices' (Lyytimäki and Sipilä 2009).

The third challenge is that 'once degraded CES are unlikely to be replaced by technical or other means' (MEA 2005). For instance, if we replace a meandering river with straightened one flanked by levees, the ecosystem benefit in the form of protection from flooding might improve. However, people who used to play with dogs along the meandering river would likely perceive its new form differently and change their habits accordingly. Consequently, the generated CEB would likely not match those that were generated before. Similarly, no substitute place can generate the same CEB. Finally, in contrast to many other services, CEB can be perceived directly and experienced locally, irrespective of their ecological knowledge or the availability of measuring equipment (Daniel et al. 2012; Andersson et al. 2015b). For instance, direct perception of carbon sequestration

or air quality regulation requires an advanced understanding of ecological processes like photosynthesis, gas exchanges at leaf surface and how they affect human well-being; in contrast, appreciation of beautiful scenery or recreation in a park do not require ecological knowledge (Andersson et al. 2015b).

Challenges arising from CES' evaluation

Among the most prominent challenges in including CES into planning has been their insusceptibility to quantification, commensurability and monetary valuation (Chan, Satterfield, and Goldstein 2012b; Tengberg et al. 2012; Satz et al. 2013; Stålhammar and Pedersen 2017). La Rosa, Spyra, and Inostroza (2016) identified three features of CES that differentiate their evaluation from other ES. The first one originates from the lack of conceptual clarity required for measurement which we addressed in 'Challenges arising from definitions and classifications' section. Consequently, studies have so far concentrated on assessing or mapping benefits rather than services themselves (La Rosa, Spyra, and Inostroza 2016; Blicharska et al. 2017). From a planning perspective, it is essential to consider both service and benefits levels as CES generate CEB, which makes CES subject to planning, whereas CEB is why people interact with urban nature in first place and as such present the outputs of CES.

Secondly, people intentionally interact with nature to generate CEB. Which CEB they want to generate may be influenced by previous experiences, particular values they hold and the attitudes and meanings they attach to the place. This implies that CES show greater variability and subjectivity than other services (La Rosa, Spyra, and Inostroza 2016). As such, pre-planning assessment and post-planning monitoring of CES require different methods to those needed to assess other ES. Finally, it is challenging to spatialise CES when they depend on perception (La Rosa, Spyra, and Inostroza 2016). There might be cases where human–nature interaction may take place outside of the ecosystem and still generate CEB. For instance, a person may recall positive memories of time spent in a park, or experience them virtually, in which case some CEB may be elicited by but not generated within the park. The generation process still requires an ecosystem and human activity, but the interaction need not be physical. This is still an area that requires further exploration, including its importance for urban planning. The difficulty in spatializing CES hindered the application of the 'service providing unit' (SPU) concept to CES, notwithstanding its increasing application when addressing other ES. The SPU concept was introduced by Luck, Daily, and Ehrlich (2003) and defined a physical unit at which certain ES is generated (Calderón-Contreras and Quiroz-Rosas 2017).

In our analysis, almost a fifth of all studies attempted to develop and apply mapping and assessment methods. Nevertheless, most studies addressed only those CES which are relatively easy to spatialise and measure, such as recreation and tourism (Chan et al. 2012a; Milcu et al. 2013; Martin, Mongruel, and Levrel 2018), although there is an increasing trend to use social media for reporting and evaluation of various CES (e.g. Figueroa-Alfaro and Tang 2017; Do 2019). Furthermore, most studies that aimed to evaluate CES have not been used to actually support decision-making, due to which there is a gap in the literature regarding application of evaluation techniques in practice (Canedoli et al. 2017). Despite some isolated examples (Coscieme 2015; Hutcheson, Hoagland, and Jin 2018), the framework for assessing other CES, or desirably the comprehensive framework for assessing all CES, is yet to be designed and transferred to the planning practice. Nonetheless, Pröbstl-Haider (2015) calls for transcending methodological discussion on measurement of CES and focusing on expected outcomes of CES-related decisions, like health and well-being improvement, and evaluating such decisions.

Challenges arising from ecological complexity

A vital issue for planning is how ES generation relates to the complexity of ecological structures and processes. Sometimes more than one ecological structure or process is needed to produce a single service (Davies et al. 2011), but also one structure or process can generate multiple services (Pauleit et al. 2011). Understanding how CES bundle with other ES (Raudsepp-Hearne, Peterson, and Bennett 2010) is of high relevance for planning. For instance, parks as environmental spaces and related cultural practices, like recreation or enjoying scenery, are supplemented by other ES, such as air regulation, noise inhibition and carbon sequestration. CES are bundled with other services more often than other ES (Klain, Satterfield, and Chan 2014; Reyes-García et al. 2015; Cooper et al. 2016). Moreover, CEB are often generated as by-products during the utilisation of other ES (Urquhart and Acott 2014; Díaz et al. 2018). Planning and management of CES should, therefore, consider how approaching them in bundles might lead to improved outcomes for ES overall (La Rosa, Spyra, and Inostroza 2016). Relatedly, some interactions with nature may result in benefits which are not exclusively cultural (Blicharska et al. 2017). For example, fishing may provide food (provisioning service) for some, for others, it may be a recreational activity (CES), but for many people, it may be both (Chan, Satterfield, and Goldstein 2012b).

Challenges arising from diminishing contact with nature

Several authors argue that modern urban life diminishes contact with nature. This problem, also referred as alienation from nature (Pyle 1993) and extinction of experience (Pyle 1993; Soga and Gaston 2016), deprives people from often irreplaceable contributions to their medical, psychological and social well-being as well as opportunities for unique and fulfilling experience (Bixler, Floyd, and Hammitt 2002; Daniel et al. 2012). The ES concept understands these contributions as CEB, which means that with diminishing contact comes a reduction in CEB. Additionally, this may lead to reduced people's awareness of nature and subsequently care for its protection and willingness to practice pro-environmental behaviour (Pyle 1993; Collado, Staats, and Corraliza 2013; Soga and Gaston 2016), consequently distancing us from achieving urban sustainability. Some have suggested a positive feedback loop where reduced awareness of nature further decreases desire for contact with nature (Soga and Gaston 2016). The positive feedback loop can also be reversed—increased contact with nature leads to enhanced awareness of nature and pro-environmental behaviour (Ives et al. 2018). The study by McGinlay et al. (2018) suggests that a sense of nature connectedness may enhance the generation of CEB, which in turn are more influential in motivating pro-environmental behaviour compared with other types of ES, although also more marginalised in policy and planning (Hirons, Comberti, and Dunford 2016). Similarly, in their study of the human–nature relationship in two Scandinavian cities, Beery et al. (2017) found that CEB generated during incidental contact with nature may stimulate intentional contacts and consequently disrupt the trend of diminishing contact with nature.

Conceiving a strategy for addressing observed challenges

A framework for including CES in urban planning cannot be built upon the natural-science paradigm that underpins other ES and emphasises independence and objectivity (Tengberg et al. 2012; Raymond et al. 2017a) as CES generation depends on human participation, and this is the decisive factor in planning for CES. There are myriad CEB that may be generated, perceived and received differently depending on factors such as the individual or groups' reasons for being at the location, previous experiences, expectations and existing values, or health and mobility. Thus, even if planners attempt to organise an ecosystem to generate specific CEB, the outcome of the generation process may not match the planned benefits.

Building on identified challenges, we designed a framework for planning for urban CES that proposes solutions to each of them (Fig. 1). As a general principle, we suggest that planners focus on 'providing opportunities for CES to "hatch" and "grow"' as people encounter nature in cities. Instead of planning elements of the ecosystem that would stimulate particular CES, this proposed strategy would mean planning ecosystems to enable opportunities for people to interact with urban nature, co-produce diverse CES and derive most diverse benefits.

Foundations of the proposed strategy

Here we outline a strategy for making the CES concept more relevant for urban planning, based upon addressing the three most pressing challenges identified in the previous section:

1. clear disambiguation between CES and CEB,
2. spatial dimension of the CES concept and
3. reversal of the trend of diminishing contact with nature as a contribution to achieving urban sustainability.

Considering these challenges and based on the literature review, the proposed strategy combines the framework by Fish,

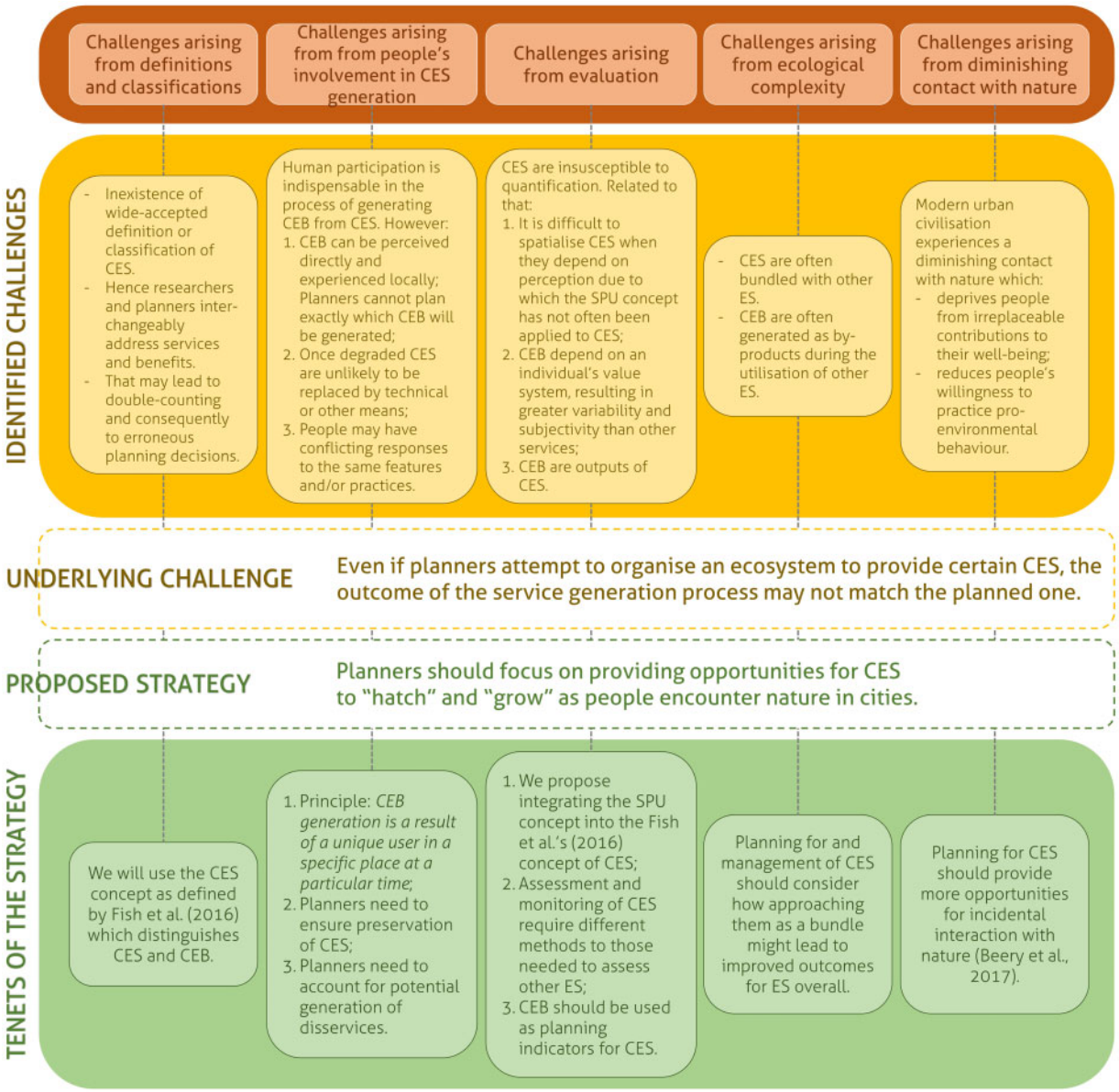

Figure 1: Overview of identified challenges and proposed solutions for incorporation in urban planning.

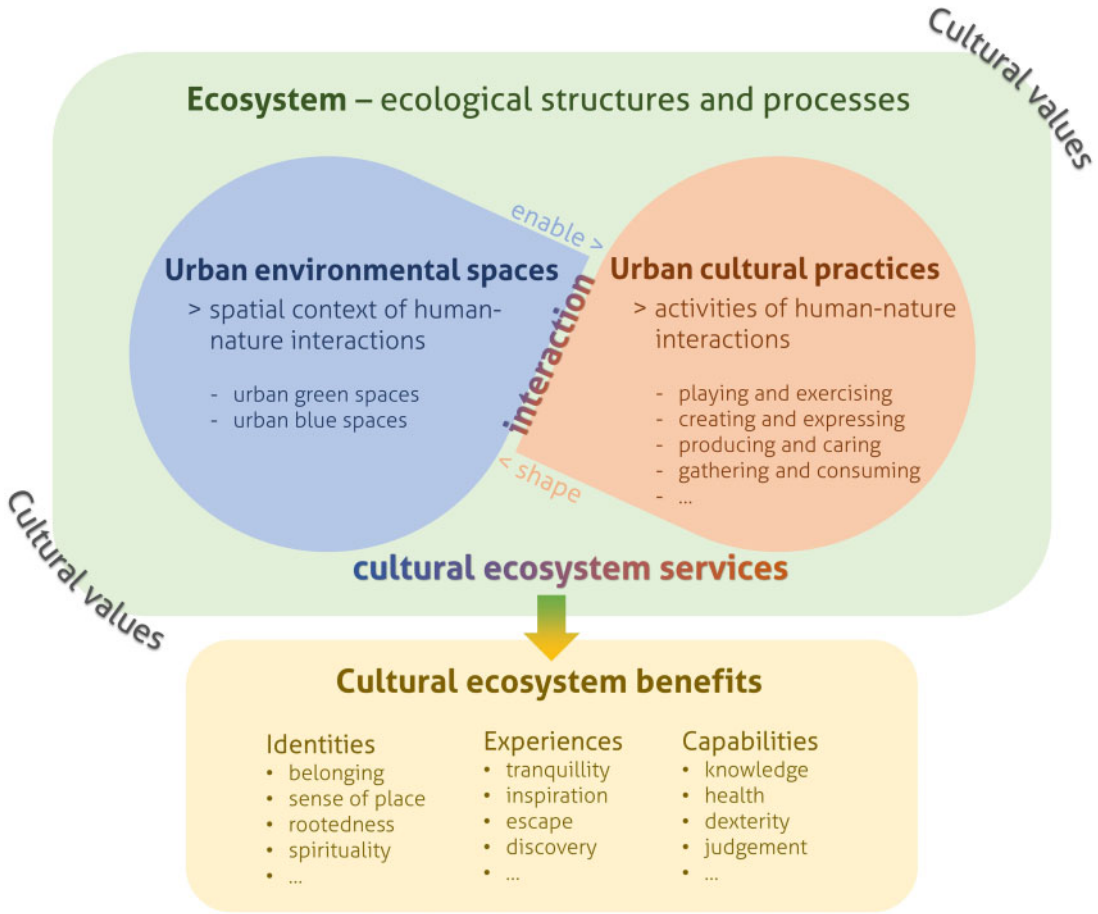

Figure 2: Concept of cultural ecosystem services and benefits, adapted from Fish et al. (2016b).

Church, and Winter (2016b), which systematically disambiguates CES and CEB, with the concept of SPU (Luck, Daily, and Ehrlich 2003; Andersson et al. 2015a) and Beery et al.'s (2017) Incidental Nature Experience Cycle model.

Fish, Church, and Winter's (2016b) framework (Fig. 2) distinguishes environmental spaces and cultural practices as mutually reinforcing CES. Environmental spaces provide a spatial context for cultural practices which represent expressive, symbolic and interpretive interactions between people and nature. Environmental spaces enable and inspire cultural practices which in turn shape these spaces. Practices are shaped by cultural values, but they may also shape those values through contributions of human–nature interactions to human well-being, that is, CEB (Fish, Church, and Winter 2016b). CEB are further classified into experiences that are generated in discrete encounters with urban nature, capabilities that are generally enhanced through recurrent encounters with urban nature and identities that represent symbolic associations with specific urban natural places.

The disambiguation between different elements of the CES cascade is valuable in bringing the scientific concept of CES closer to practice. Systematic division and classification between CES and CEB can help decision-makers and practitioners more effectively to understand, detect, plan for and manage cultural services and benefits (Fish, Church, and Winter 2016b; Blicharska et al. 2017; Potschin-Young et al. 2018). By means of environmental spaces, CES can be more firmly spatialised, which greatly facilitates their planning. Because cultural practices always take place in environmental spaces (or are connected to them in mind), it follows that environmental space corresponds to SPU. This enables planners to link detected/mapped cultural practices and CEB to specific places.

CES can have a pivotal role in achieving urban sustainability by integrating benefits from urban nature in urban planning and management (Andersson et al. 2015b; Chan and Satterfield 2016) and reversing the trend of diminishing contact with nature (Hirons, Comberti, and Dunford 2016). Andersson et al. (2015b) argue that CES are meaningful to people because they are comprehensible and recognisable in interactions with nature. However, documented alienation from nature (Pyle 1993; Soga and Gaston 2016) seems to distance us from sustainability goals. We see Beery et al.'s (2017) Incidental Nature Experience Cycle model useful in combating that trend. The model suggests that exposure to the incidental experience of nature (e.g. green reflections in temporary rainwater puddles or seeing an otter in the river) during daily activities may stimulate intentional experiences. The actual stimuli there are the CEB linked to incidental experiences such as emotions evoked when seeing an aesthetically appealing natural phenomenon or a wild animal in a greenspace. Besides the direct effect of incidental experiences leading to subsequent repeated intentional experiences, they also show that social media records of incidental experience may stimulate other people's intentional experience. Beery et al. (2017) hence propose that if arranged to involve transitory visits to greenspace, daily urban activity (such as mobility for work, school or supply) may provide both intentional and incidental opportunities for interaction with nature.

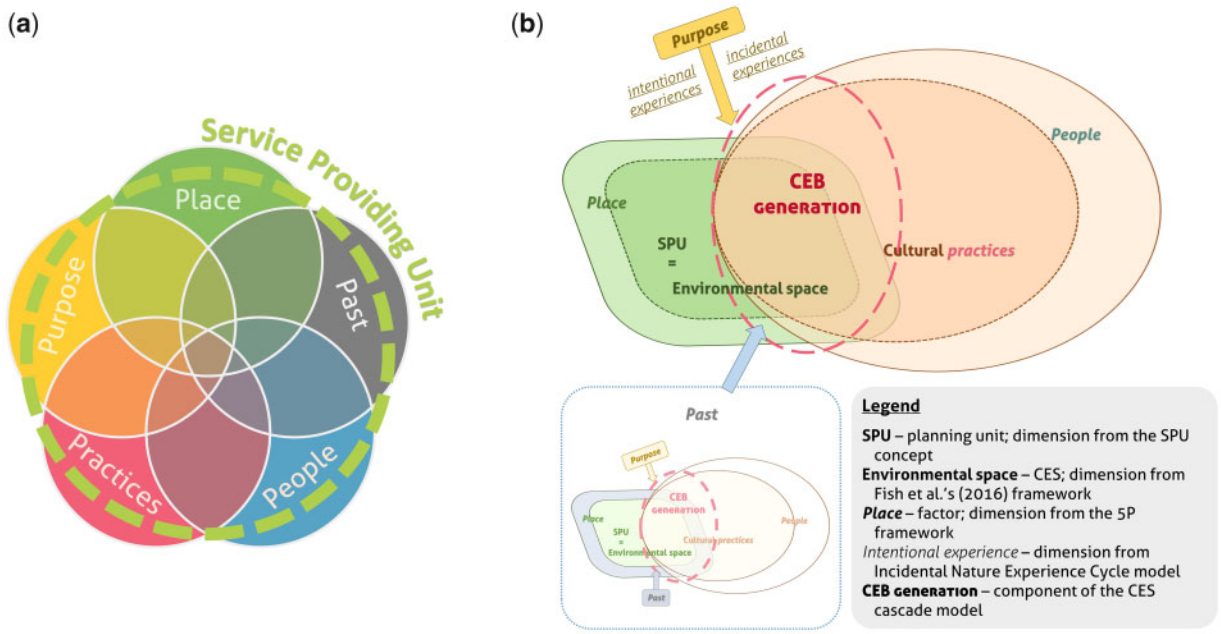

Figure 3: The proposed strategy for incorporating CES into urban planning: (a) the 5P framework and (b) the 'hatch' and 'grow' strategy.

Our strategy follows the principle that CEB generation is a result of a unique user in a specific place at a particular time. Hence, exactly which CEB will be generated depends on a combination of human and situational factors at a given time. In practice, that means designing and distributing diverse environmental spaces across cities in order to make them easily accessible and attractive for users. That way, both intentional and incidental interactions with nature are enabled and encouraged, allowing for generation of diverse CEB, hence contributing to the quality of urban life (Andersson et al. 2015b; Raymond et al. 2017a). While we advocate that primary planning goals should be designing multifunctional and internally diverse environmental spaces, Niemelä et al. (2010) imply that even small UGS can be sufficient for interaction with nature, whereas Ko and Son (2018) show that even everyday surrounding, such as street trees, can suffice for eliciting CEB. That said, it is important that planners also anticipate potential disservices that may discourage people from interacting with particular environmental spaces or hinder the generation of CEB (see 'Place' section).

Finally, we round up the strategy with a so-called 5P framework by which we outline a set of five key factors that influence the CES generation process: place, people, past, practices and purpose. These factors are often interwoven and firm boundaries among them cannot be drawn (Fig. 3a). For example, the place factor corresponds to biophysical settings of an environmental space. These settings influence the possible purpose of the space as well as what practices users will perform in it. But the biophysical settings may also be (re)shaped by purposes given to that environmental space and practices that people perform there over time.

We could imagine CES generation process, in a simplified manner, as a function of factors where different combinations of factors generate different conditions for human–nature interactions, and subsequently different CEB may be generated. But individual factors are not unidimensional, they are an umbrella for a number of specific modifiers. For example, place factor is not a single determinant of the CES generation process but rather a set of several different modifiers (e.g. size, landscape diversity, etc.) that each influence the human–nature interaction; modifiers are thematically subsumed under place factor. In that sense, not only different combinations of factors would influence what CEB will be generated but also different combinations of modifiers within each factor.

The 5P framework encourages planners to carefully consider these multifaceted factors when planning for CES as they determine its success and the planning outcomes. While we outline each of the factors within our 5P framework below, we stress that each combination of environmental space and cultural practices is unique and no universal list of modifiers can be given that would be applicable in every planning situation. Moreover, we do not see the 5P framework as a comprehensive list of all relevant factors that need to be accounted for in planning for CES, but rather as a set of five key factors that should not be omitted in urban governance, especially assessment, planning and management phases. The factors are primarily relevant for planning individual SPUs; however, to ensure diversity of opportunities for CES generation across urban space, some aspects might be of relevance when developing city- or neighbourhood-wide urban plans.

Figure 3b shows the schematic representation of all the components discussed above integrated into the hatch and grow strategy. CEB generation process takes place at the interface between cultural practices and environmental spaces (which corresponds to an SPU). This process is directly or indirectly influenced by the 5P factors that represent the main venues for urban planners to influence the generation of CEB. Note that strategy addresses the influence of factors within an SPU, but the factors themselves are not bounded within SPU. For instance, the surrounding of a park may influence how users will perceive it, and someone may generate CEB in their house when remembering a time spent in the park.

Incorporating the proposed strategy into the spatial governance of cities

We argue that the proposed strategy should be incorporated into the spatial governance of cities. While recognising diversity

Figure 4: Spatial governance cycle for SPU. The process begins with assessment and finishes with implementation phase, followed by a new cycle of plans and implementation. Theoretically, the management phase continues without interruptions, although it is amended by new instructions stemming from the planning process at the beginning of every implementation phase. Note that the length of phases in schematics does not approximate the duration of phases in the real process.

of urban governance systems (Grisel and van den Waart 2011; Tosics 2011), to demonstrate this, we use a conventional governance system based on rational urban planning. This is still in place across much of Europe (Tosics 2011) and often serves as a foundation for the introduction of alternative approaches from multi-level governance and planning (Faludi 2012; Stephenson 2013; Tillemann, Suškevičs, and Külvik 2015; Daniell and Kay 2017; Giaimo et al. 2019), incremental planning (Lindblom 1959) and democratic approaches like transactive planning (Friedmann 1973) and planning based on critical communication theory (Forester 1980).

The rational spatial governance process involves five main components: assessment, planning, decision-making, implementation and management (Fig. 4). These are discussed in turn below. While we present components sequentially here, in practice this is an iterative, circular process and it may be necessary to move fluidly among the stages to ensure appropriate outcomes. In accordance with principles espoused by proponents of multi-level governance and public participation (Taralunga 2010; Fischler 2012; Daniell and Kay 2017), we uphold active participation of all interested parties in all segments of governance (and planning) processes. That includes city authorities, citizens, civil organisations, private sector, public institutions and other levels of government (i.e. local, regional, national, supranational).

The first stage is for planners and decision-makers to assess the state of CES provision by obtaining quantitative and qualitative data about ecosystems and how people use and appreciate them. Fish, Church, and Winter's (2016b) framework can effectively facilitate the assessment of both CES and CEB at SPUs of interest. It is important that planners acknowledge the subjectivity of CES and use different methods for their evaluation than for other ES (La Rosa, Spyra, and Inostroza 2016). The lack of quantitative data is often mentioned as a problem in applying ES and CES concept in practice, however, planning often does not necessitate very detailed data but rather robust information to inform decision-making (Albert et al. 2014). Moreover, Fish, Church, and Winter's (2016b) framework helps with quantitative treatment of CES as it discerns spaces and practices and classifies CEB. Furthermore, in contrast to most other ecosystem benefits, people can directly perceive and experience CEB (Andersson et al. 2015b), which implies that they could, therefore, serve as indicators of CES. Examples of the use of reported CEB in assessing CES can be found in Church et al. (2014), Fish et al. (2016a) and Bryce et al (2016).

Secondly, collected data serve as input for the planning process, enabling planners (preferably via a participatory process involving all interested stakeholders) to come up with co-produced variant solutions and present them to decision-makers and/or stakeholders (depending on the decision-making system). Importantly, we see the planning process as a fruitful discussion in which stakeholders propose ideas and defend their individual and group interests while planners bring ideas and expertise, abiding by professional principles and encouraging innovation. SPUs should be planned and designed to increase opportunities for diverse encounters between people and nature, thereby advancing urban nature's contributions to the well-being of urban dwellers. These should entail both incidental and intentional opportunities. In proposing solutions for existing SPUs, planners should account for irreplaceability of CES as the lost CEB could not be substituted by technical or any other means (MEA 2005). Planners should treat urban nature as multifunctional ecosystems, managing them as bundles of various ES, with CES being most easily recognisable and appreciated among stakeholders (see 'Purpose' section).

Thirdly, decision-makers and/or stakeholders can choose which of the proposed solutions will be implemented. The implementation phase usually begins after decisions are made and may last until the completion of the next planning phase, depending on the number and timing of changes that need to be introduced to SPUs. It may include short incubation periods after implementation when both the ecosystem and its users adapt to changes. This is the period during which new meanings of the place and attitudes towards it may be formed. The management phase continues in parallel with all other phases and ensures the ecosystem functioning according to the maintenance and use regime in effect. A vital component of management is monitoring, which role is to monitor the ecosystem functioning, use and maintenance. Effective monitoring should inform timely the decision-makers about the state of SPUs and possible issues, so they are able to respond and fix them. Moreover, adequate monitoring should provide constant dynamic information about the state of SPUs, which will provide evidence for assessment. Again, CEB might effectively serve as monitoring indicators of CES and the state of the ecosystem as people perceive them directly (see 'Purpose' section).

Key factors planners should consider when planning for CES

Following the settings of the proposed strategy and based on the characteristics of CES and challenges identified, here we elaborate on each factor of the 5P framework.

Place

Place factor entails biophysical setting of an SPU planned area. In Fish, Church, and Winter's (2016b) framework, place corresponds with environmental spaces which in urban context

entail urban green and blue spaces (UGBS) as primary instances of urban nature. As such, the place factor enables identification of locational potentials and limits. There is a longstanding tradition of planning for greenspace provision in virtually every city in the world (e.g. Maruani and Amit-Cohen 2007; Slukan Altić 2012), so we consider both research and practice of greenspace planning a useful starting point for developing the framework for planning for CES which could aid the development of grounded guidelines for planners. 'Urban greenspace' can range from remnants of semi-natural vegetation through private gardens to managed public parks and playgrounds (Dickinson and Hobbs 2017). In the practical sense, UGS planning overlaps considerably with planning for CES and should be used as a venue for incorporating CES into urban planning.

Consideration of place should occur in planning at various scales. When planning particular environmental spaces, planners need to account for its landscape-ecological character, management regime and surroundings. All three of these define the character of a place and outline its locational potentials and limits. Creating opportunities for CES to hatch and grow, that is enlarging the variety of CEB that people may generate by incidental and intentional interactions with urban nature, requires diversity and structural complexity of SPUs. In other words, where possible, an SPU should be diverse biologically, geologically and in terms of landscape design. The study by Jaligot, Hasler, and Chenal (2019) showed that elements like woods, lakes, parks and paths are critical factors for eliciting CES to a varying extent. The appropriate structural (and infrastructural) arrangement of UGBS may increase the users' satisfaction with them and generation of CEB (Zwierzchowska et al. 2018). On the other hand, varying degree of management in different parks may provide diverse ecological conditions (in terms of animals and plants) and thereby diverse opportunities for incidental interaction and eliciting CEB (Langemeyer et al. 2015; Ponizy, Majchrzak, and Zwierzchowska 2017). In addition, a park will have quite a different character depending on whether quiet family houses or busy roads surround it, although the impact of unfavourable surroundings can be mitigated by shrubs and trees that serve as buffer (Hansen et al. 2015).

On a larger scale, it is essential to ensure that SPUs vary across the city area providing different opportunities to their visitors. Since cities are functionally connected to their surroundings, Xiao, Haiping, and Haoguang (2017) propose addressing urban CES over the scale as large as urban agglomeration. The ecological character of circular zones around city centre usually determines the type of environmental spaces that are available for interaction with nature. Rall et al. (2017) found that the inner city does not necessarily provide less CES than suburban zones; on the contrary, it can be a hotspot of CES, only different ones to those in suburban area. There is a need to assess preferences along the urban–rural gradient in urban agglomerations to inform planning for CES as residents of different zones might prefer different environmental spaces (Zhou, Koomen, and van Leeuwen 2018). The participatory process can prove helpful in evaluating diverse design proposals and their outputs in terms of opportunities for CES generation (Steen Møller et al. 2019). Moreover, studies are demonstrating the potential and usefulness of participation in planning UGS at different scales when focusing on benefits (Dennis and James 2016; Careva et al. 2018). Users' involvement can be important in reconstruction plans given the CES' trait of irreplaceability (Andersson et al. 2015b), because the future use of changed environmental spaces and consequently generation of CEB may be greatly affected by the design that users do not concur with.

When designing a UGBS, planners should be aware of possible 'disservices' and 'disbenefits' that can be generated due to the location character or certain structural elements. Weighing place-related factors (such as a location of elements and buffering of surrounding processes) could influence the occurrence and intensity of disservices and disbenefits generation. Fischer and Eastwood (2016) identified four types of cultural disservices and disbenefits which planners should be aware of and account for:

1. forgone benefits, that is, missed opportunities for the generation of CEB (e.g. absence of ducks in a pond),
2. ecosystem structures that usually provide services yielding disservices (e.g. too many paths in a park or too many animals of particular species),
3. ecosystem structures that produce ES and cultural disservices simultaneously (e.g. plantation forest can produce both timber and unpleasant views) and
4. ambivalently perceived services (e.g. use of a public park for dog walking may be perceived as a service by some and disservice by other people; we recognise that this is not necessarily related to the place factor).

Planners should take care of certain ecosystem structures that may provide both services and disservices. For instance, parks may attract birds and the opportunity to see them is often perceived as a service; however, if crows spread litter from bins in a park, that is often remarked as a disservice (see Cox et al. 2018). Citizens' involvement in deliberative decision-making might prove a successful strategy for addressing disservices and disbenefits at the local level, especially those related to activities that are perceived ambivalently.

People

While UGBS are indispensable for CEB generation, CEB are co-created by people. This is, therefore, the most demanding factor to consider as a variety of users, and their needs have to be accommodated. Urban planning should identify the (prospective) users of planned UGBS and assess relevant demographic characteristics as well as people's habits, wishes and needs. This should help to reveal the demographic potentials and limits that need to be accounted for if the use of UGBS and the generation of CEB is to be maximised. It is essential to consider how people generate and utilise CEB. As argued earlier, CEB are generated through contact with nature where individuals' experiences, values and viewpoints shape the resulting benefits (Chan et al. 2011; Fish, Church, and Winter 2016b). While that implies that every individual will receive 'self-tailored' benefits, it does not mean that the generation process is exclusively individual. Some CEB can be generated in individual contacts with nature, whereas others may require a group of friends or pets or a group activity such as sport (Church et al. 2014). That means that in creating solutions, planning for CES must not neglect individuals and groups' preferences at the expense of the community as a whole. Riechers, Barkmann, and Tscharntke (2018) found out that different age groups may show differing preferences towards environmental spaces and cultural practices. Planners, therefore, need to pay special attention to demographic variance to provide diverse opportunities for CEB generation that will benefit as many people as possible.

The use of UGBS and utilisation of CEB are strongly influenced by the demographic characteristics of users and many personal factors (preferences, wishes, needs, etc.) that need to be accounted in planning for CES (Dickinson and Hobbs 2017;

Riechers, Barkmann, and Tscharntke 2018). Such information should be surveyed and given appropriate weight. However, even if planners try to assess citizens' preferences, they cannot assess their whole perception and value systems, and consequently, the outcome might still be inconsistent with users' desires (Riechers, Noack, and Tscharntke 2017). For that reason, we argue that users should be actively involved in the decision-making, planning and management of CES (cf. Spyra et al. 2019). Since CES can be perceived directly and experienced locally, people are likely to be willing to participate in planning for CES (Klain, Satterfield, and Chan 2014; Cooper et al. 2016). Hernández-Morcillo, Plieninger, and Bieling (2013) noticed that a participatory assessment of CES usually resulted in more successful outreach than non-participatory assessment. We thereby believe that users' active participation in planning would have a similar effect. Such an opportunity would enable them to influence, amend and propose solutions that will be implemented.

Users can be involved in several ways. The conventional forms are surveys, interviews, public meetings and focus groups, but these usually allow low involvement in the decision-making. Research on ES planning increasingly utilises 'public participation geographic information system', which is often more participatory than meetings, more spatially nuanced than public surveys and more quantitative than focus groups (Ives et al. 2017). Several studies have shown the benefits of using public participation geographic information system in assessing and planning for CES (Brown, Pullar, and Hausner 2016; Canedoli et al. 2017; Rall et al. 2017; Steen Møller et al. 2019). Another approach is citizen science that encourages people to become more involved in applied research, planning and management of urban nature in their community (Ahern, Cilliers, and Niemelä 2014). By using their knowledge of parks, citizens can recognise subtle changes and report them to managers. Such involvement creates more engaged, knowledgeable and ecologically literate CES users (Ahern, Cilliers, and Niemelä 2014), which can make a precious contribution to CES planning and management. Moreover, frequent UGBS users can supply valuable monitoring data. Every method has its advantages and disadvantages, its advocates and opponents. Combining approaches may increase the CES users' influence on the planning outcomes, but as facilitator of participation planners need to carefully select appropriate approaches and adapt them to the local context (Spyra et al. 2019).

Albert et al. (2014) warn of challenges that participation poses before planning for ES in general, such as the time that can be allocated to participation, limited experience and resources for facilitating participation and integration of different knowledge types. Furthermore, Riechers, Barkmann, and Tscharntke (2016) found out that in Berlin experts saw nature in more practical and management-centred way, whereas laypeople seemed to prioritise enjoyment of nature, which may induce conflict between them. Moreover, UGBS users are not a homogenous group, and there may be some interest groups within. Spyra et al. (2019) warn of the 'My ES' phenomenon where one or few services may be overemphasised because of particular interests of influential planning actors.

Past

There are always layers of past uses and activities which help define the character of a place (Edwards, Collins, and Goto 2016). In some places, historical use may be the defining factor of their character without having a broader significance, elsewhere there might be elements of natural or cultural heritage that not only need to be considered but also preserved in a physical form. If people are aware of the history of a UGBS, it might affect how they use the site and what CEB are generated (Church et al. 2014). People often have long histories of association with particular UGBS, specific memories and feelings, which give it special meaning (Urquhart and Acott 2014). This notion is connected with the research field of sense of place and place attachment (Brown and Raymond 2007; Hausmann et al. 2016). Fish, Church, and Winter (2016b) argue that an environmental space becomes a CES through unique place meanings created by myriad personal and/or social interactions with it. Although historical uses and meanings in the landscape cannot be planned, they should be accounted for when planning for CES (Brown, Raymond, and Corcoran 2015).

Planners can work with the past by incorporating it in opportunities for CEB generation. If a new function of a place is planned, it should involve traditions of the historical use of the place as this might elicit benefits like sense of place, belonging or local identity (Urquhart and Acott 2014). If historical use and contents are carefully combined with the new function of the site, the opportunities created may help produce many CEB. In some instances of urban development, past ecosystems cannot be returned to its original ecological status (e.g. drying of an urban marsh to create conditions for construction in its surrounding). Such past ecosystems can be converted into UGBS that partly resemble the previous ecological status, but if adequately planned may provide opportunities for generation of CES (and other ES) that were minimal or perhaps even absent from its original form (Collier 2014).

Apart from history and past experiences, people also perceive and engage with nature differently depending on the age of a place. When a UGBS is created or *reconstructed, users will need some time to adapt to it, that is to form or renew their connection with it. Moreover, the natural development of UGBS (the change in its structure) changes the relationship between users and ecosystems. For instance, an old park with tall, ancient trees will provide opportunities for the generation of different CEB in comparison with an entirely new park with only young trees (Elliott, Watkins, and Daniels 2011).

Practices

According to Fish, Church, and Winter's (2016b) concept, cultural practices represent CES along with the environmental spaces, but besides being a medium for interaction with nature, they are also a factor of CEB generation process. Practices are influenced by users' previous experiences, current mood and needs and other personal factors (cf. Raymond et al. 2017b). They can be sporadic like walking or laying on the grass and regular like gardening or dog walking. Investigating existing practices, exploring the possible ones and surveying relevant public needs and wishes may provide planners with plenty of insights for designing UGBS and creating opportunities for CEB generation. Moreover, in many cases, collaboration with users may result in enhancing the CES output of existing practices as well as using them as a 'track' for introducing new ones that would unlock new opportunities (Nikolaidou et al. 2016; Heikkinen et al. 2019).

Practices vary depending on the investment of energy and time (cf. enjoying the park from a bench and running). Urban (community and allotment) gardens are fine example of voluntary practice requiring substantial investment of energy and time (Bendt, Barthel, and Colding 2013; Colding et al. 2013;

Buijs et al., 2016). Although technically the product of the latter is fruits and vegetables, the more important outputs are likely to be social cohesion, placemaking, nature experience, stress reduction, exercise, etc. (van den Berg et al. 2010; Bendt, Barthel, and Colding 2013; Camps-Calvet et al. 2016). These studies show that social–cultural benefits often outnumber provisioning services, implying that CEB are the underlying reason for gardening with food as a useful by-product. Moreover, the example of community gardens developed on vacant or abandoned land plots to create opportunities for CES (Andersson et al. 2014; Dennis and James 2017) as well as initiatives focused on reintroductions of native species, removal of invasive species or tree planting (Daniel et al. 2012; Andersson et al. 2014; Lorance Rall, Kabisch, and Hansen 2015; Plieninger et al. 2015) imply that the community interest in urban nature is an important lever for the planning and management of CES. These studies suggest that people are willing to invest their energy and time in engagement with nature to generate CEB.

Planners should use this 'capital' to strengthen the public–civil partnership in urban planning and management and jointly produce opportunities for CEB generation in the community area. The instances indicated above may be subsumed under the environmental stewardship concept, which involves the willing and active engagement of citizens in the processes of planning, decision-making and management of local UGBS (Bennett et al. 2018). Environmental stewardship benefits the whole local community (Krasny and Tidball 2012; Ives et al. 2014; Plieninger et al. 2015) as well as individuals, that is stewards (Krasny and Tidball 2012). It also reduces the risk of severe degradation of UGBS as stewards provide constant monitoring. Moreover, by utilising smartphone technologies, planners and managers may ensure a valuable and constant input of rich environmental data from UGBS users (Guerrero et al., 2016). Such stewardship increases the environmental, institutional and social resilience of the whole city (Buijs et al. 2016). Beery et al. (2017) showed that the use of smartphone technologies and social media in experiences with nature could stimulate further encounters with nature. More opportunities to interact with nature may also foster the sense of connection with nature and thereby reinforce the will and desire to engage with nature (Winthrop 2014; Katz-Gerro and Orenstein 2015; Soga and Gaston 2016), which is needed to leverage the societal change for sustainability (Ives et al. 2018).

Planners must also be aware of the challenges that accompany environmental stewardship. The most prominent is the probable lack of knowledge for comprehensive UGBS planning and management among UGBS users (Ambrose-Oji et al. 2017). Functional governance and maintenance of UGBS necessitate the active involvement of local authorities and professionals, who will ensure that UGBS are appropriately distributed, planned and managed, satisfying the needs of the urban population. Moreover, some training for stewards might need to be provided. The initiation of local environmental stewardship will often require a 'push' from an external agency to come to life. Local authorities and non-governmental organisations can play an important role in instigating active citizenship (Buijs et al. 2016). These initiatives often start as public–civil programmes which may evolve or grow into a robust public endeavour (Lorance Rall, Kabisch, and Hansen 2015).

Purpose

In highly utilised landscapes such as cities, every location has its purpose that determines its function and uses in urban system. With a plethora of actors involved, the role of urban planning is to manage competing interests to ensure optimal functioning of an urban system and satisfaction of various needs of its population (Pegan 2007). That means that production of CES will be competing with other important functions and land uses (such as residential, commercial, industrial, etc.) in planning. Nevertheless, CES have an essential advantage in the form of ES bundling, which means that UGBS may accommodate various functions and generate multiple benefits at the same location (Cooper et al. 2016). We have already argued that planners should approach CES as part of ES bundles. Planning multifunctional UGBS that can generate a plethora of ES appears to be a desirable necessity in urban context (Pauleit et al. 2011). The degree of multifunctionality would depend on the 'place' factor (locational possibilities) as well as the broader ecological situation at various scales: from neighbourhood to districts to city to agglomeration. Planners should assess the ecological situation at different scales, identify the needs at each scale and by considering locational possibilities plan a system of multifunctional UGBS. Depending on their size and location within a city, multifunctional UGBS may contribute to achieving neighbourhood and district sustainability and a cleaner environment (Pauleit et al. 2011).

Considering purpose factor may provide an excellent opportunity for planners to consider creation and design of UGBS that may provide opportunities for incidental encounters with nature. Accordingly, planners should not ignore the multifunctional characteristics of transitory and private UGS. Creating transitory green spaces like street trees or green pedestrian corridors may provide opportunities for both incidental and intentional experiences with nature (Beery et al. 2017) as well as generating ES like air cooling and ventilation (Andersson et al. 2015a). Similarly, private gardens significantly contribute to the overall generation of ES in urban areas while providing opportunities for CEB generation to owners and visitors (Schneider et al. 2019). Such opportunities for contact with nature may aid the development of pro-environmental behaviour, and elicit fulfilment and satisfaction.

Planning in bundles may be challenging as different ES require different treatments; for instance, provision of specific ES other than CES (such as water filtration, noise reduction, etc.) often requires very specific planning and management. We should, therefore, put efforts into exploring how to plan urban nature areas to provide simultaneously particular services and opportunities for somewhat vaguer CES. Furthermore, Riechers, Barkmann, and Tscharntke (2018) found out that certain ES come in specific bundles and that different bundles may have negative influence on each other. We need more research on inter-bundle relations that would inform planning for (C)ES. On the other hand, supposedly aware that people can perceive CES more easily and directly than other ES, planners may use CES as an 'alarm clocks' signalling the change in the whole bundle (Andersson et al. 2015b). For instance, water areas in cities generate multiple valuable services such as local air cooling and pollution filtration. However, most people will first notice a change in aesthetic attributes or opportunities for recreation, that is change in CES (Andersson et al. 2015b). The shift in the generation of one service often means a change in others, which may not be immediately apparent. Bundling can thus facilitate ES management as well as active participation of ES users in the management and planning of urban ecosystems.

The proposed strategy of creating opportunities for CES generation might seem to be in contrast with giving a specific purpose to a place, but in many individual cases articulating clearly

the purpose of a UGBS may be required within the planning process. Whereas creating opportunities in UGBS often means designing places that could be used in diverse ways, certain practices require specific spatial settings or at least specific elements. For instance, certain forms of recreation require trails, bike racks, benches or water fountains; children may require playgrounds; natural areas like ponds or marshes may require some safety equipment or signage. Giedych and Maksymiuk (2017) argue that designing park equipment with individual character is essential for CEB generation, but it should be done in a participatory manner. On the other hand, other factors of the 5P framework may delimit the future purpose of a place; such are demographic characteristics of potential users (e.g. elderly population), the presence of heritage elements, legal protection status and traditional use of the site. The latter is an especially important factor for planning as it directly links the place with its users. People will often stand up to defend CES if the traditional purpose of a place is threatened or reduced (Andersson et al. 2015b). The inhabitants of the Savica neighbourhood in Zagreb, for instance stood up against the city's decision to reduce the area of the neighbourhood park to create a space for construction of a church (Kramarić and Lisac 2017). This example depicts that people often wish to defend greenspace which is a tangible element that they associate with CEB.

Discussion and conclusion

Rapid industrialisation and urbanisation often decrease opportunities for human–nature interactions, especially within cities where now more than half of global population lives (Soga and Gaston 2016; Jaligot, Kemajou, and Chenal 2018). However, although many societies have become less dependent on locally generated provisioning and regulating services because of economic development and technological solutions, their dependency on CES increases (Guo, Zhang, and Li 2010). Nevertheless, a systematic approach to planning for CES is in its early stage of development. There are challenges in the application of the concept, which arise from both the character of CES themselves and the introduction of this new aspect to the traditional practice of urban planning. To analyse the challenges, we assessed 109 CES-related papers from WoS database, which provided extensive information on progress in CES field. Further, analysing other databases such as Scopus or Google Scholar would yield an extended set of papers. However, we believe that WoS provided a representative overview of advancements in CES field.

We built a strategy for incorporating CES into urban planning in response to challenges identified. First of all, we identified as an underlying principle that CEB generation is a result of a unique user at a specific place in a particular time, which aligns with Raymond, Giusti, and Barthel's (2017b) argument that human–environment connections are not solely produced in the mind but through relations between mind, body, culture and environment through time. Secondly, we adopted Fish, Church, and Winter's (2016b) concept of CES, which provides disambiguation of services and benefits—the uncertainty that has limited the CES concept's transferability to practice. We recognise the need for better discerning between environmental spaces and cultural practices as CES, but we find the concept useful for development of a strategy for incorporating CES into urban planning. Thirdly, we combined Fish, Church, and Winter's (2016b) framework with Luck, Daily, and Ehrlich's (2003) concept of SPU to define spatial units viable for planning (environmental spaces), and Beery et al.'s (2017) Incidental Nature Experience Cycle model that we see as a useful means to combat diminishing contact with nature and improve urban sustainability. Based on assessment of CES (and other ES), the SPU concept enables comparisons between individual SPUs in terms of their success in generating (C)ES and CEB (Andersson et al. 2015a). Furthermore, while Beery et al.'s (2017) model was developed with empirical observational data, we hold that additional testing of the model should be carried out to strengthen its validity.

We proposed a strategy focused on creating opportunities for CES to hatch and grow rather than planning for specific CES. Instead of 'locking' environmental spaces to provide specific CEB, we believe that the proposed strategy would actually enable generation of myriad more CEB. Furthermore, we advocate strengthening ties between CES and UGBS research and planning practice as they are intertwined in the real world. There are many theoretical and practical findings in the UGBS field that are compatible with CES research and governance (Dickinson and Hobbs 2017; Giedych and Maksymiuk 2017; Di Marino et al. 2019) and we encourage urban planners to engage more strongly with these.

Finally, to facilitate the strategy, we developed the 5P framework that outlines five key factors (place, people, past, practices and purpose) that planners should consider when planning for CES. We acknowledge that there are other potential factors that might be relevant when planning for CES, but we focused on those factors that we see as indispensable in early attempts to transfer CES into urban governance. We have attempted to give an outline of relevant determinants within each factor, but we recognise the need for further research and practical engagement.

The proposed strategy may best fit into the UGBS segment of urban planning as CES are one of the main reasons for the creation and maintenance of UGBS (Dickinson and Hobbs 2017). Incorporating CES in the assessment of UGBS may yield new data to inform planning development and maintenance of UGBS. In such plans, planners can adopt the hatch and grow strategy when considering the design and spatial distribution of environmental spaces across cities. This links to classical UGBS that enable intentional encounters with nature as well as spaces where the introduction of urban nature elements can stimulate incidental experiences of nature, alongside the generation of other ES like ventilation, carbon sequestration, stormwater infiltration, etc. (Pauleit et al. 2011). The 5P framework should prove very useful in creating such plans as it facilitates connections of UGBS with CES and helps to improve urban dwellers' well-being. We deem the participatory approach pragmatic and advantageous when embracing the strategy for planning for CES, especially considering the subsequent utilisation of planned solutions. The participatory approach seems to be a useful tool for successful solutions as it enables the end users of UGBS to participate in decisions according to their own needs and desires. Furthermore, they can provide necessary monitoring during the management phase and thus timely warn on change in either ecological status or provision of CES as well as ES in general.

The application of the strategy in urban planning may be hindered by a lack of knowledge or experience of CES. There needs to greater exchange between research and practice (Radford and James 2013). Scientific knowledge of CES is often written using terminology which is not easily understood by practitioners (Niemelä et al. 2010). Furthermore, communication between scientists and practitioners is either minimal or inexistent. Secondly, as our review of CES-related papers in WoS showed, applied research is still scarce in the CES field,

further slowing down the transfer from research to practice. Another obstacle may occur in the application of participatory processes. Probable deficiencies in knowledge for comprehensive UGBS planning and management among UGBS users may weaken their contribution to the governance processes (Ambrose-Oji et al. 2017). There is still a need for research on how to strengthen their participatory potentials and improve utilisation of their contributions.

Knowledge gaps remain on how accessibility and biophysical features of environmental spaces influence users and their motivation to visit UGBS (Zhang, Guo, and Jiang 2018). In contrast to rich literature on connections between CES and UGS, there is still a need for ore research on the connection between urban blue spaces and CES (Finlay et al. 2015). Research on sense of place and place attachment is growing, especially in planning context (Brown, Raymond, and Corcoran 2015; Verbrugge et al. 2019), but there remains the need for research in that field (Wartmann and Purves 2018) that might help to better understand cultural benefits, especially the category of 'identities'. Furthermore, more work is needed on how historical use of a UGS affects its current and future use. In addition insights can be gained by studying protests and debates regarding the conversion of UGBS to other land uses (Štulhofer 1991). We believe that such studies can provide valuable understandings of how people perceive and appreciate CES and CEB. Finally, the issue of ES bundling is still quite challenging to apply in practice and further research on inter-bundle relations will help inform planning UGBS (Riechers, Barkmann, and Tscharntke 2018; Saidi and Spray 2018).

Supplementary data

Supplementary data are available at *JUECOL* online.

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