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Chapter 3.4

Biodiversity, ecosystem services and environmental planning

Kimmo Lapintie and Mina di Marino

Introduction

During recent decades, discussions on urban nature have gone through several conceptual frameworks that highlight its different dimensions (Di Marino et al, 2018; Gunnarsson et al, 2017; Haaland and van den Bosch, 2015; Barbosa et al, 2007). The traditional dichotomy between the recreational values of blue-green infrastructure and the protection of selected species and landscapes with special natural and/or cultural value were reconceptualised in the sustainable development and urban ecology discourses, where nature was seen as part of an integrated urban and regional system with its ecological, cultural and economic dimensions. On the other hand, this early phase of the 1970s and 1980s also included more radical critique of speciesism, for instance so-called deep ecology (Naess, 1989), according to which the human species does not have a legitimate status to use other species for its own purposes, thus optimising its own benefits from nature. This philosophical attitude was connected to animal rights movements and, more recently, to veganism as a consumer-driven rejection of the human exploitation of other sentient beings.

In urban and environmental planning, however, this radical standpoint never gained foothold, based mainly on the dominance of economic considerations. Traditionally, urban planning was - and still is - mainly based on a division of land into different functional areas for human beings, including the recreational green and blue elements of the urban fabric. Indeed, the environmental impacts of recreation in green areas depends on the level, type, frequency and duration of use for various human activities. In addition to this, urban parks, streetscapes

and private gardens can also provide habitat and resources for fauna and plant species.

However, within urban planning, the recreational areas are mainly acknowledged as places for social interactions and physical activities that support the psychological restoration of urban residents (Lee et al, 2015). This is one of the main purposes for which the green elements have proved to be effective planning (Kaplan, 1995; Wells, 2000; Berman et al, 2008; Lee, et al 2015; Grinde and Patil, 2009).

In this context, the protection of rare species and the later interest in biodiversity are exceptions to this human-centric understanding and management of green areas. Constructed and well maintained parks, beaches and other blue-green elements are often not rich in biodiversity, although they are appreciated by residents for their recreational values. Rare species also do not reside in these artificial green areas compared to more natural ones. This has resulted in conflicts between compact urban development and natural values. For instance, the Siberian flying squirrel (*Pteromys volans*) is a strictly protected species in the European Union and US legislation, forbidding clearcutting and other major changes in the environment that could endanger its natural environment. A single protected species can thus prevent major development projects, something not easily understood by their proponents, politicians and even many citizens.

These conflicts reflect a major shift in environmental policies and planning, suggesting a more indirect assessment of the benefits of natural areas. However, the indirect benefits of green areas on climate change, water purification, biodiversity and formation of soil are often intangible and difficult to quantify. In contrast, environmental benefits directly provided by nature, such as food and forests, are more ‘visible’ and perceived by a larger audience of both experts and non-experts. However, the value of biodiversity cannot be derived directly from

the human perception or even the restorative effects of forests and other natural areas; many of the rare species are seldom seen or appreciated by the urban populations. While it is taken for granted that biodiversity is not only beneficial but necessary for human beings in the long run, it remains a rather abstract concept that cannot so easily be adapted in the daily work of urban planning, particularly if it is confronted with major development of residential or other directly functional uses. The argument often is that local green areas can be sacrificed for development in order to preserve larger green areas outside the cities. But often no convincing cost-benefit analysis for such compensation measures can be given.

Thus, the aim of the chapter is to provide a critical understanding of the current conflicts between human/nature within the urban development. The chapter also focuses on the challenges to influence the current planning practices when developing the emerging concepts of green infrastructure and ecosystem services. Then, the chapter aims to contribute to the discourses on knowledge and socio-political legitimacy and the ways of communicating biodiversity and ecosystem services to large audience (of experts and non-experts). The discussion then shifts to visioning current and future challenges of the compact city by considering all these themes.

Dichotomy of human/nature: green infrastructure and ecosystem services

The most recent concepts in this area, green infrastructure (GI) and ecosystem services (ES), attack the traditional dichotomy of human/nature from two directions. GI can be defined as ‘an interconnected green space network (including natural areas and features, public and private conservation lands and other protected open spaces), that is planned and managed for its natural resources and values and for the associated benefits to the population’ (Benedict and McMahon, 2012, page 3). The ES can be categorised as supporting services (for

example, soil formation, biodiversity and habitat), providing services (for example, fish and wood), regulating services (for example, storing carbon and controlling flood) and cultural services (for example, recreation, wellbeing and inspiration from interaction with nature) (Millennium Ecosystem Services, 2005; **TEEB, 2011**). Infrastructure, meaning roads, pipes, ducts and wires, is the basic technical concept of urban development, and it is very easy to understand and appreciate. Services, on the other hand, are part of the functional understanding of the city, referring both to private services as part of the growing service economy, and to public services as part of the welfare state. With respect to these, urban nature has traditionally been seen as a background, on top of which the ‘hard’ infrastructure is formed. The new concepts seek to change this, by making the green-blue structure an active and connected part of the infrastructure, partly technical, as in the case of storm water management by retention pools, and partly ecological, as in the case of preserving areas rich in biodiversity. The ‘soft’ dimensions of cultural and aesthetic values can be included in the concept of ES, thus benefitting from this new framework.

However, the concepts used by scholars do not automatically find their way to mainstream planning practice. Even the most advanced cities have difficulties in incorporating the new concepts into their daily work. In our study of Helsinki, Milan and Montreal (Di Marino and Lapintie, 2018) - all of which have adopted one or several of these concepts - we could clearly see that the planners and policy makers were unsure of how to address the ES and GI in different scales and types of plan. Furthermore, the traditional dichotomy of recreational values and protection of natural habitats still holds sway over the new conceptualisations.

For instance, ES are mentioned in the general requirements of the Helsinki City Plan (City of Helsinki, 2016), but they are not given any concrete interpretation in the plan. Instead of GI,

Helsinki uses the concept 'network of green areas', thus losing the technical and functional connotation of the former. They are said to include 'many scenic and historic entities, large recreational areas, such as outdoor sports parks and neighbourhood parks, as well as protected areas, such as Natura areas'. Thus, the categorisation is still based on the traditional dichotomy, including recreation and the protection of nature. These two main categories are also depicted in two separate thematic maps on 'recreational network' and 'urban nature'. The latter includes 'nature conservation areas, Natura areas, the areas currently included in Helsinki's nature conservation programme, the woodland network, the meadowland network and the core areas of urban nature'. Only the first three categories, which already have a formal status, are included in the legally binding land use map of the City Plan. Thus, there is no analysis nor policies that would address the dynamic and systemic nature of the GI (Di Marino and Lapintie 2018, page 146).

To sum up this section, three key issues are identified as follows: the ability to inform planning practices, and therefore, select adequate planning tools; the dominance of existing discourses on recreational areas and protection of nature; and the difficulty in designing appropriate policies for the emerging concepts of GI and ES. In addition to the current practices in planning, the three issues are closely related to the knowledge gap between academics and practitioners. While planning practitioners are familiar with more established concepts of recreation and protection of nature, their understanding of ES, which are provided by, for instance, urban green areas (for example, improving physical and psychological health, filtering pollutants and dust from air, providing shade and lower temperatures) is still vague. It is evident that the mechanisms to transfer knowledge on GI and ES from research to practice are still complex and need further investigation.

Knowledge and socio-political legitimacy

The academic and planning discourses can be conflicting for several reasons. Urban and regional planning needs to deal with a variety of knowledge, some of which is produced outside its main domains (such as in ecology, sociology, economics, political science and philosophy), some of which is created through its own practice, where knowledge often has a tacit dimension (such as in design, communicative skills, creativity, visioning, meaning creation). There is no straightforward path from explicit knowledge to practice; existing knowledge does not automatically inform planning practice (even to the extent that it often does not 'exist' in the process). Therefore, it is necessary to understand what kind of inputs research could bring to planning practices in order to help planners and policy makers to deal with new challenges such as resilience, GI and ES within the land use changes.

Moreover, the inclusion of a multiplicity of epistemologies, often cherished in communicative and radical planning theories (Sandercock, 2000), fails to address the relevance of justification, which is still a necessary condition of knowledge (Gettier, 1963). The inevitable connectedness of knowledge and power (power/knowledge, i.e. through disciplinary silos and professionalism, political regimes, discourse coalitions) has to be taken into account (Foucault, 1980; Hajer, 1993). When thinking of disciplinary silos and professionalism, for instance, we need to reflect on the kinds of strategies, representations, arguments and theoretical inputs that have not yet found their way to the planning discourses. Theoretically, thus, it is necessary to understand this relationship between episteme and praxis, which often ends up in ignoring, disregarding, misunderstanding and tokenism of new knowledge that questions the existing conceptualisations of the professions responsible for planning.

Furthermore, as planning is an established social practice with a certain position in the political system, it can also be seen as a subsystem of wider social forces. It is a practice that needs to take an integrative approach, by using knowledge from different disciplines (for example, ecology, environmental sciences, nature conservation), and by developing specific skills (deliberation, tacit knowing, conflict resolution, strategic understanding, design skills). For instance, specific textual and visual representations of green can strongly influence the planning discourses. This is the case of the green fingers in Helsinki which are broken in many places due to large roads cutting through them, but they are still represented as unity. The idealised map does not allow policy makers and the larger public to understand that the movement of animals is threatened and people have difficulty to use them as recreational routes (Di Marino et al, 2018). In addition, people with different backgrounds and professional skills are differently emphasised and given different meanings, such as the city as a visual landscape, as an ecological habitat, as a social structure and as an economic entity. However, to maintain its legitimacy, planning cannot choose any of these perspectives but needs to present itself and its products as general and comprehensive. This is also one of the reasons why it is so difficult to develop strategic planning, which is exactly the opposite, concentrating on a few main targets, and avoiding attempts at comprehensivity (Bafasarat, 2015; Albrechts and Balducci, 2013; Healey, 2007; Newman, 2007).

As this subsystem receives inputs from the outside, it needs to react to them, but only if it considers them important for its social and political legitimacy. In fact, it seems to have established practices for non-responding to them: for instance, the common NIMBY (not in my back yard) argumentation aims at discrediting both local knowledge and local interests, because they are considered to represent vested interests. In this context, planners think they represent both public interest and objectivity. They tend to inform the citizens and not to

discuss or present arguments. Moreover, as the social and political pressure grows and the public discourses change, there comes a time when planning needs to change its own vocabulary and ways of argumentation. The ways of using, communicating and addressing the key environmental concepts are still generating several challenges and conflicts within planning strategies (resilience, urban growth and the compact city).

Many initiatives exist to improve the way to communicate biodiversity. Most of the time, however, a technocratic model of communication has been used, in which scientific facts are transmitted directly to policy advisers to solve problems (Young et al, 2014, page 387). This way of communicating is, however, considered inadequate, and biodiversity is still not really used in decision making process and implementation. Discourses on biodiversity are often used to contain the urban growth, defend green areas and wildlife rather than ensure both new developments and opportunities to promote biodiversity and to maximise its contribution within the built-up areas and to people's life. Several discourses around biodiversity are also embedded in the environmental impact assessment of new urban developments and master plans. In this context, experts are often called to solve conflicts between green and grey infrastructures (Di Marino, 2016). For instance, wildlife eco-dots and green bridges are developed in response to new projects of infrastructures that are approved by policy makers. While there are several measures to solve environmental impacts, knowledge on biodiversity and related contents have not been effectively embedded within the early and middle stage of planning (for example when predicting new urban scenarios and developing master and detailed plans). Official practitioners and policy makers should further think about biodiversity and the ways to embed and communicate it. This process can also involve real estate developers. New residential constructions, for instance, emphasise the panoramic

views to parks and lakes and the proximity to green areas, while the ecological benefits of these areas are rarely mentioned to the public.

This debate on the way we communicate biodiversity can be also extended to the concept of ES. ‘Biodiversity and ecosystem services ... include uncertainty, complexity, diverse values and the involvement of many sectors ... The cross-sectoral nature of some conservation and environmental issues means that many policies are linked and contain multiple objectives, thereby adding to their complexity’ (Young et al, 2014, page 390). On the other hand, the scholars argue that biodiversity is not visible to all publics or policy makers. People might consider the biodiversity an irrelevant issue to them. The biodiversity might be highlighted by focusing on ES, or the benefits of nature to people. This can result in an excessive ‘commodification of nature’. The biodiversity loss should be communicated in a simple way, but it is caused by a complex set of issues working at different levels.

The ambiguity in the definitions of key terms such as ecosystem functions and services has been debated amongst scholars. (Haase et al, 2014; Niemelä et al, 2010; Wallace, 2007).

‘Which ecosystem services in a given scale are most relevant varies greatly depending on the environmental and socio-economic characteristics of each geographic location’ (Gomez et al, 2013, page 178). As the scholars stated, other factors, such as the economic evaluation of ES, are frequently requested by policy makers and practitioners as supporting information to guide decisions in urban planning and governance (Gomez et al, 2013). ES should be clearly communicated to policy makers, city planners and official practitioners, without any possibility of misinterpretation (Haase et al, 2014). The scholars stated that ES have to be easily understood by those actors, as well as non-scientific audiences and citizens, who should be able to understand the economic, physical, spiritual and wellbeing benefits.

Nevertheless, a few studies have examined the ES generated by the land use mixtures and urban green areas, as well as the dynamics of urban ecosystems at a more detailed level (for example, functionality of existing green spaces within the urban fabric). In order to involve a wider number of stakeholders, Haase et al (2014) argued that it is important: a) to understand the relevance of the concept of ES in planning, as well as further investigate the ES; (b) to develop a framework and selection of relevant ES and indicators; and c) to collect data and assess ES.

Recently, the concept of ES has been introduced in landscape and urban planning. However, the ways in which an ES framework could advance planning goals are still unclear (BenDor et al, 2017; Hansen et al, 2015). Scholars have identified several challenges in incorporating the concept in land use planning (Kaczorowska et al, 2016). Environmental planning goals are clear to larger audiences and related, for instance, to practical issues, such as the management of water and green quality as well as coastal hazards, while there has been a limited use of ES data and concepts. BenDor et al (2017) gave an interesting picture of planning in which city and regional planning practitioners can contribute to the creation and implementation of policies. However, the connection of the planning profession and ES has been mainly unidirectional 'Ecosystem service studies frequently reference planning efforts and the impacts of urban decisions on ecological functions ... , however, it is rare for this information to be fed back into planning practice as a mechanism for development and land-use decisions' (BenDor et al, 2017, page 260).

There are several well-known challenges in connecting landscape sciences with situated governance and place-based human values (Swaffield, 2013). The contextual application of knowledge and expertise and related questions of legitimacy, as well as the inevitable

ambiguity of intents and uncertainty in decision making have characterised the democratic and deliberative processes. It is very difficult to apply the local contextual knowledge as well as transfer general principles from landscape ecology into real contexts of scientific credibility, political legitimacy, and social relevance (see the overview given by Swaffield, 2013).

To sum up, there are professional, cultural, planning and political contexts where the new knowledge on biodiversity, ES and GI is challenged by the status quo of expertise (Di Marino and Lapintie, 2018). The ways of representing our cities, communicating biodiversity and embedding ES and GI within planning practices are closely related to disciplinary silos and professional skills, as well as socio-political forces.

Current and future challenges

Since the 90s, within the European policy framework, the compact city has been acknowledged as the most sustainable model for urban development (Naess, 2014). The concept of compact city has been dominated by the very dense model of populated core areas in Europe, based on the theory that we should provide an urban containment: a sustainable social mix of uses able to reduce the need to travel and the corresponding energy use and emissions (Jenks et al, 1996).

However, planners have expressed serious doubts about the positive effects of the compact city (Hofstad, 2012; Dempsey, 2010; Neuman, 2005; de Roo, 2000). As de Roo (2000) stated in the early 2000s, even if the compact city concept favours mixed use and a dense urban development, reducing travel needs might not be the primary solution to the environmental conflicts in urban areas. There are also conflicts between living and working functions. The

urban growth that enables compact settlement is connected to a larger hinterland with urban sprawl and workplace locations outside the city as well as a corresponding need to travel long distances (de Roo, 2000; Elliott and Clements, 2014). In this context, by adopting the model of the compact city, politicians, policy makers and planners have often underestimated the conflicting priorities for the long-term protection of the environment (Dempsey, 2010).

Today, we are more aware that environmental conflicts can also be found in the complex spatial context of the compact urban core, and they can cause several consequences (for example, air pollution, soil contamination, climate change and loss of biodiversity). In the last two decades, the environmental conflicts have involved a large number of different interests and expertise. Today, some scholars have focused on a greener picture of compact cities, dealing with the climate change, for instance (Matthews et al, 2015; Jim, 2013). ‘Cities could be compact as well as green, with meticulous attention to every aspect of the urban greening complex’ (Jim, 2013, page 755). As the scholars argued, however, this requires filling the existing knowledge gap on urban nature between researchers, practitioners and academics, while a successful synergy between the actors involved would help to go beyond the physical and institutional challenges.

In fact, planning GI is still facing several challenges in cities undergoing densification, such as provision of local green spaces, counteracting social inequalities, considering the resident perspectives, and avoiding the deterioration of recreational experience and compensation travels (Haaland and van den Bosch, 2015). Compact cities have incurred inherent physical and institutional obstacles, restricting the quantity and quality of the urban green (Jim, 2004). Scholars have paid more attention to the fact that the densification of urban areas has exerted a high pressure on urban green spaces such as the loss of the green areas themselves (Tappert

et al, 2018). In several cases, the increase of built-up areas has often limited the access to existing parks and other recreational areas (Naess, 2014).

Moreover, scholars have debated about the crucial role of blue and green areas in providing important ES in urban areas, the contact with nature and biodiversity, as well as the influence on physical and mental wellbeing (see for example, Gomez et al, 2013). Thus, this is not only a question of aesthetic, size and accessibility of the green areas (for example, closeness to home, offices and schools), and related provision of facilities and vegetation (Haaland and van den Bosch, 2015). The pressure on the green areas affects the everyday life and environment of urban dwellers (Gunnarsson et al, 2017).

Therefore, there is a need to further investigate the challenges amongst practitioners in using and addressing the key environmental concepts, such as biodiversity, ES, as well as GI and resilience within the planning policies and practices in contexts undergoing densifications (Di Marino and Lapintie, 2018). The current challenges are often related to the ways of communicating the key concepts of biodiversity, ES, GI and resilience (in terms of power and values) to a larger audience. Additionally, conflicts in participation and power/knowledge are also relevant to the cases where green areas are transformed to residential areas (for example, the influence of governance and institutions, and concerns for justice and fairness).

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