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Title	The 'natures' of planning: evolving conceptualizations of nature as expressed in urban planning theory and practice
Authors(s)	Duvall, Phoebe, Lennon, Mick, Scott, Mark J.
Publication date	2017-11-27
Publication information	Duvall, Phoebe, Mick Lennon, and Mark J. Scott. "The 'Natures' of Planning: Evolving Conceptualizations of Nature as Expressed in Urban Planning Theory and Practice" 26, no. 3 (November 27, 2017).
Publisher	Taylor & Francis
Item record/more information	http://hdl.handle.net/10197/9641
Publisher's statement	This is an electronic version of an article published in Duvall, P., Lennon, M. and Scott, M. : The Natures of Planning: evolving conceptualisations of nature as expressed in urban planning theory and practice. European Planning Studies, 2017-11-27, pp.1-22. DOI: 10.1080/09654313.2017.1404556 . European Planning Studies is available online at: www.tandfonline.com/doi/abs/10.1080/09654313.2017.1404556
Publisher's version (DOI)	10.1080/09654313.2017.1404556

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The ‘Natures’ of Planning: evolving conceptualisations of nature as expressed in urban planning theory and practice

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Abstract

Over the course of the past century, the idea of nature in the city has become increasingly intricate, evolving from being viewed as a refuge separate from the city to being understood as an essential component of dynamic urban systems. As such, attempts are currently being made to ‘re-nature’ cities to support local and global ecosystems, increase human wellbeing, and address environmental issues such as climate change. While the literature has examined changing assumptions about society-nature relationships in planning, a dearth of knowledge exists relating to the changing conceptualisation of nature’s relationship with the *city* and how this has influenced how urban planning with respect to ‘nature’ has evolved in both theory *and* practice. In this paper, we address this lacuna by tracing the history of the entwined relationship between nature and city planning. The conceptual framework developed from this review is subsequently employed as an analytical lens through which to investigate an illustrative case study of planning for nature in Dublin City, Ireland. The paper concludes by reflecting on how exploring the natures of planning provides scope for greater critical attention to what we do as planners when we seek to address the challenge of safeguarding nature through policy.

Key words: nature, social-ecological systems, green infrastructure

Introduction

In 1960, urban areas contained 33.6% of the global population (World Bank, 2016b). By 2016, that figure had surged to 54.5% and is predicted to rise to 60% by 2030 (UNDESA, 2016). In the face of this intensifying urbanisation, many concerns have been raised about the consequent separation of humans from natural environments (Beatley, 2011; Andersson *et al.*, 2014). Indeed, over the course of the past century and a half, the idea of nature in the city has become increasingly intricate, evolving from being viewed as a refuge separate from the city to being understood as an essential component of dynamic urban systems. As such, attempts are currently being made to 're-nature' cities to support local and global ecosystems, increase the wellbeing of human populations, and address environmental issues such as climate change (Lennon & Scott, 2016). Nevertheless, such re-naturing is rendered complex by the very idea of 'nature' itself. This is consequent on how nature is a nuanced concept, defined in myriad ways across varying geographical, historical and cultural contexts (Coates, 1998; Franklin, 2002; Descola, 2013; Castree, 2014, Scott *et al.*, 2013; Adams *et al.*, 2014).

Several authors have analysed the evolution of planning models from environmental perspectives (Selman, 1995; Jabareen 2006; Daniels 2009; Davoudi, 2012; Sharifi 2016;). For example, as recorded by Davoudi (2012), over the last century the changing assumptions about human-environment relationships have led to numerous meanings of "the environment" in planning, which in turn influenced the choices made between: preserving, enhancing, protecting, compromising, trading, exploiting or guarding against, the environment. While these and others have made significant contributions to our understanding of environmental planning, they do not directly address how the nuanced concept of nature has evolved in, and influenced planning. Both Lennon and Scott (2016) and Hagan (2015) provide an overview of this, however, a discernable knowledge gap persists with respect to how these evolving concepts are operationalised in actual policy documents. Consequently, this paper responds to an identified knowledge deficit by exploring how the changing conceptualisation of nature's relationship with the city has

influenced how urban planning with respect to ‘nature’ has evolved in both theory *and* policy. This is undertaken by tracing the history of the entwined relationship between nature and city planning. The conceptual framework developed from this review is subsequently employed as an analytical lens through which to investigate the implications of such evolving conceptualisations on the practice of planning via an illustrative case study of planning for nature in Dublin City, Ireland. The paper concludes by reflecting on how exploring the natures of planning provides scope for greater critical attention to what we do as planners when we seek to address the challenge of safeguarding nature through policy.

The ‘Natures’ of the City

In this section we focus on developing an analytical framework for examining the evolving conceptualisation of nature within planning policy frameworks based on synthesising the literature within this area. In doing so, we recognise that planning for ‘nature’ takes place within broader shifts within planning frameworks on the balance between the environment and economy and that planning ‘styles’ also evolve, such as the much discussed shift from land-use regulation to spatial planning. Moreover, as discussed by Scott et al. (2013), spatial planning itself can often become disintegrated from wider discourses of sustainability. This review and the subsequent analysis of Dublin will focus on ‘*official*’ narratives of nature within *planning* policy; therefore, our analysis does not include alternative narratives emerging from counter practices or more radical conceptions of nature emerging from bottom-up actions. For example, Adams et al., (2014) provide an account of novel practices that challenge planners ordered approach to managing space, such as guerrilla gardening and permaculture, that confront and challenge planning through more positive engagement with nature and sustainability. Similarly, the literature on environmental justice (e.g. Agyeman and Evans, 2003) presents a further challenge to how planners have conceptualised nature (and its access) intersected with broader social justice debates. Table 1 summarises the discussion below, providing an overview of the thematic analysis.

Table 1: Summary of the Conceptual Evolution of Nature in the City

Summary of the Conceptual Evolution of Nature in the City			
	Nature as Relief	Nature as Boundary	Nature as Greening
Temporal Beginning*	Post-Industrial Revolution (Mid-19 th century)	Inter and Post-War periods (1920s-1950s)	Rise of environmental movement and sustainable development (1960s-1990s)
Main Themes	Nature for human benefit (aesthetics, recreation, physical and mental wellbeing); spatial separation of nature from the city	Site-specific preservation ethic. Nature for human benefit; spatial separation; nature conservation	Focus on the global environment and sustainability (climate change mitigation and adaptation, reduced resource and energy consumption; economic benefits and ecological modernisation)
↓ ↓ ↓			
Nature as Systemic			
Themes From Earlier Stages	Benefits of nature for humans	Site-specific preservation (to a more limited extent); nature conservation	Environmental and sustainability concerns
↓ ↓ ↓			
Nature as Infrastructure			
New Themes	Focus on spatial multifunctionality; recognition of the dependence of cities on local and global ecosystems; provision of ecosystem services in urban areas; operationalised through the green infrastructure concept		

**These do not have distinct end points as many themes are reflected in later perspectives.*

Nature as Relief

The conceptual divide between nature and the city is deeply rooted. Throughout much of European history, nature was a source of fear, perceived as dangerous,

chaotic, disordered and unknown (Hobbes, 1981; Coates, 1998; Adams et al., 2014). Towns and cities were therefore viewed as providing security and places of order from those threats (Barry, 2007). However, the advance of the industrial revolution in the 18th and 19th centuries began to shift popular perceptions of the relationship between nature and the urban environment. As cities grew increasingly polluted, congested, and unsanitary, nature began to be romanticised and desired rather than feared (van den Berg *et al.*, 2007). Nevertheless, this shift also reinforced the nature-city dichotomy as nature became the conceptual counterpoint of poor urban industrial conditions. In practice, the incorporation of nature into cities in some form became a planning-based response to those conditions, as exemplified in both the urban parks and garden cities movements (Scott et al., 2016).

The urban parks movement emerged in mid-19th century North America as a response to the strains of urban industrial life. It was led in large part by Frederick Law Olmstead (the designer of New York's Central Park and Boston's Emerald Necklace among others) who viewed parks as meeting points between the natural and the urban (Hall and Tewdwr-Jones, 2011). He believed that parks were essential refuges from the noise, congestion, pollution, sanitation issues, and the artificiality of the city's built environment. As such, he saw them as spaces for social interaction that also bolstered mental and physical wellbeing (Botkin & Beveridge, 1997; Fisher, 2011). In response to similar problems of industrialisation experienced in English cities, Ebenezer Howard devised the Garden City in the early 1900s, an urban model that aimed to reintroduce nature into city life (Howard, 1946; Daniels, 2009). He envisaged a low-density city with a garden at its centre and six main avenues connecting the centre to an encircling green belt. This central city would be surrounded by smaller settlements and the entire web interconnected by trains (Sharifi, 2016). The foundation of Howard's model was the strategic co-planning of rural and urban areas to combine what he considered to be the best aspects of both: the economic and social opportunities of the town with the beauty, fresh air, sunlight, and clean water of the countryside (Lennon & Scott, 2016).

The perceptions of nature and urban environments exhibited in these two movements illustrate the nature-city dichotomy characteristic of the time. Nature was associated with the countryside (thus spatially and conceptually separate from the city), greenery, clean water and air, sunlight, and tranquillity. Therefore, it was seen as the antipode to the uncleanness, chaos, smog, crowds, and artificial surfaces of the city (Daniels, 2009; Fisher, 2011). Crucially, these attempts to bring nature into the city primarily framed nature through its benefits to humans. For example, nature serves a largely aesthetic purpose. Howard emphasised incorporating the beauty of nature into the city (Howard, 1946; Mumford, 1945), and Olmstead expressed the need for landscape views as an escape from urban life (Botkin & Beveridge, 1997). Both models also underscore that there are public health and psychological benefits to be gained from time spent in parks and other natural spaces (Daniels, 2009; Fisher, 2011). Both the aesthetic and health considerations continue to influence contemporary thinking on nature in cities. Furthermore, the language used to describe differences between the city and nature was predominantly anthropocentric. Howard (1946) stated that the countryside is characterised by 'land lying idle' (implying that human, not natural, processes make land productive) and a 'lack of society and amusement'. He also spoke of bringing intellectual and social benefits (distinctly human characteristics) to the countryside. Ultimately, while these approaches and conceptualisations treat nature and the city as spatially distinct, they aim to unite elements of the two. This laid key groundwork for later movements.

Nature as Boundary

A significant impact of the garden cities movement in the early 20th century was its contribution to the concept of urban green belts, which gained influence in the 1920s, especially in the UK (Thomas, 1963; Amati & Taylor, 2010, Cullingworth et al., 2014). Green belts, or swaths of open land encircling a city, emerged as a land use planning mechanism to be deployed when attempting to curtail unrestricted physical urban growth experienced in the inter- and post-WWII years. In addition, green belts aimed to provide open spaces for recreational use, conserve land for agriculture and forestry, and, critically, preserve the scenic qualities of the countryside (Thomas,

1963; Amati, 2008). These preservationist values were championed by UK planners, such as Raymond Unwin (1909) and Patrick Abercrombie (1945) whose work on the London green belt helped cement the concept as a cornerstone and enduring legacy of UK planning (Cullingworth et al., 2014). Furthermore, green belts were internationalised in the planning sphere in the mid 20th century and were also used to control growth in other cities around Europe and in the United States (Amati & Taylor, 2010). The impact of these steps in the conceptual evolution of nature in the city was the deepening of a rural-urban polarity (Amati, 2008), which correlates with the spatial and perceptual separation of nature and urban areas seen in earlier conceptualisations of nature. In this way, nature as landscape was positioned as a moral and aesthetic notion of backcloth and setting to urban-based development (Davoudi et al., 1996), a manifestation of an architecture-planning culture evident in the establishment of the planning profession.

Nevertheless, while the benefits of nature were still seen as largely anthropocentric, an increase in scientific knowledge began to introduce ecological values as well. Notably, the growing field of ecology and earth sciences throughout the 1960s and 70s, fuelled a greater awareness of environmental problems such as air pollution and acid rain. This burgeoning knowledge bank, combined with rising scientific literacy and the growth of the environmental movement, had fundamental implications for conceptions of nature in the city from the late 20th century onward. Prominent among these was the emergence of the new urbanism movement, and more specifically, the compact city model. This developed as a reaction to the burgeoning trend of urban decentralisation and suburban growth (Breheny, 1997), combined with the 1970s oil crisis and a heightened environmental awareness that raised concerns about rapid urbanisation, sprawl, and the consequent reliance on long distance car travel. The compact city model emphasises a form of urban organisation influenced by historic city patterns of medium density and contiguous mixed land uses. In doing so, it aims to decrease the distance between residences, services, work places and recreation sites; make energy, resource, and fuel use more efficient; preserve rural and natural areas outside of cities; and create social cohesion and a vibrant city life (Jenks et al., 1996; Breheny, 1997; de Roo & Miller,

2000; Jabareen, 2006; van den Berg *et al.*, 2007; Lennon & Scott, 2016). Thus, environmental concerns are framed in terms of resource and energy use as well as pollution through the model's objective to use dense designs to make land and energy use more efficient, thereby decreasing resource consumption and pollution (Fouchier, 2000; Snellen *et al.*, 2000). Although environmental concern is evident in the reasoning behind the compact city approach, it does not emphasise the incorporation of green components (Beatley & Manning, 1997; Daniels, 2009). Therefore, tensions may exist between the compact city model and the incorporation of nature into urban areas. Indeed, many authors argue that increasing the density of cities frequently decreases the available area for green space (Snellen *et al.*, 2000; van den Berg *et al.*, 2007; Brennan *et al.*, 2009; Howley *et al.*, 2009). Others, such as Bolund and Hunhammar (1999), approach this from an ecological perspective, asserting that increasing density places urban ecosystems at risk. Ultimately, the motivation to protect rural land from sprawl through densification demonstrates concern for natural areas akin to the preceding conceptualisations. Yet this also continues the tendency to place nature spatially and conceptually outside of the city, making nature increasingly prominent closer to the fringes of the city rather than within it (Ruggeri, 2015).

Nature as Greening

On the heels of an escalating global environmental concern arose the now widely used concept of sustainable development (Baker, 2006; Carter, 2007). Though a contested and often misused concept, its basic premise is that a reconciliation of environmental, social and economic values is possible (Dryzek, 2005). The balancing and positioning of these values and needs in relation to one another has been conceptualised in a range of ways, each giving different weights or positions to the these values and expressing different tensions between them (Campbell, 1996; Connelly, 2007). It was against this backdrop that the eco-urbanism movement emerged. This movement advocated a more environmentally-centred approach than new urbanism to tackling rapid urbanisation and urban environmental problems (Lennon & Scott, 2016). Introduced in the late 1980s by urban theorists such as Richard Register (1987), and experiencing widespread international

application in the early 2000s (Joss *et al.*, 2013), eco-urbanism has seen various manifestations, perhaps the most prominent being the 'eco-city' (Sharifi, 2016). Though there is no one set definition of eco-cities, they are generally acknowledged in the literature as using environmental design to address resource constraints as well as climate change and sustainable development at the city scale (Jabareen, 2006). Eco-cities share some similar goals with the compact city approach, such as dense design, transit and pedestrian-oriented spaces, and efficient energy use (Tang & Wei, 2010). However, greater stress is placed on the desirability of flora and fauna within the city. In its early days, proponents of the concept used an ecological framing to describe the eco-city concept, for example, the need to live within biological carrying capacities (Register, 1987; Tang & Wei, 2010; Sharifi, 2016). The protection of ecological resources, natural environments, and biodiversity within cities as well as the provision of green space are still noted by many authors as components of eco-cities (Kenworthy, 2010; Tang & Wei, 2010; Sharifi, 2016). However, these elements came to play a secondary role to the use of 'green' technology and engineering to address environmental and sustainability issues such as water treatment, waste management, greenhouse gas emissions, energy efficiency, and renewable energy production (Caprotti, 2014; Tsolakis & Anthopoulos, 2015).

Hence, the eco-city movement represents a conceptual shift regarding the place of nature in the city, not only due to its techno-centric orientation, but also its strong emphasis on economic sustainability. Essentially, the eco-city concept represents an attempt to resolve the tension between the protection of the environment (and nature) and economic growth (Caprotti, 2014). As such, it has become couched within a discourse of ecological modernisation wherein market-driven initiatives are applied as win-win solutions to environmental problems (Barry, 2003; Hajer, 2005; Carter, 2007). This is exemplified in the World Bank's Eco² Cities plan (2010), which uses the catchphrase, 'ecological cities as economic cities' and stresses eco-cities as a vehicle for a transition to a 'green' economy. This framing of eco-cities as business models (World Bank, 2010), drivers of economic growth (Tsolakis & Anthopoulos, 2015), and leaders in transitions to green capitalism (Caprotti, 2014) has led to

criticisms of the model as a technical and engineering-based manifestation of the neo-liberalisation of nature and the environment (Joss *et al.*, 2013). For example, Davoudi *et al.* (1996) highlight how environmental quality can become packaged with other local assets and offered to potential investors and deployed within place-branding, termed as a marketised utilitarian framework. Correspondingly, Sharifi (2016) argues that the ecological focus initially advocated by Register and others has in many ways been superseded by the economic emphasis.

Throughout the latter half of the 20th century, knowledge and attention expanded further beyond the urban problems of industrialisation to a global view of the environmental crises facing the planet. Consequently, there was a shift in focus from the concept of *nature* in the city to *environmental* concerns such as energy use, resource conservation, and emissions reduction. This classification of environmental concerns as primarily energy and resource-related in both new urbanism and eco-urbanism highlights the overarching conceptual and rhetorical difference between the environment and nature (Barry, 2007). This focus on the global environment rather than nature is also exemplified by the increasing prominence of climate change concerns. For example, the introduction of the Kyoto Protocol in 1997 to limit global greenhouse gas emissions introduced a 'carbon discourse' into eco-city thinking (Joss *et al.*, 2013; Sharifi, 2016). This stresses the importance of reducing urban carbon emissions using concepts like 'carbon neutral' and 'zero energy' in reference to cities. The climate change theme was not present in early conceptions of eco-cities, yet has become dominant and has formed a vital part of contemporary conceptualisation of nature in the city (Bulkeley, 2013). The environmental emphasis is also evident in the fact that these models are often framed using the discourse of sustainable development (Tsolakis & Anthopoulos, 2015). However, this emphasis on the environment over nature is a nuanced one. For example, Lennon and Scott (2016) point out that many eco-urban developments take steps to reduce the ecological impacts of urban activity, develop green and blue (water-related) infrastructure, utilise nature-inspired design, and avoid building on greenfield sites to protect natural habitat. Therefore, although eco-cities are often framed in terms

of global environmental concerns and economics, considerations of nature in the city are by no means absent from the eco-urban models.

Nature as Systemic

In the 1990s and early 2000s, increasing amounts of research examined the impacts of cities on their local and global ecosystems. This growing awareness of human and urban pressures on ecosystems intensified the calls for cities to function within their ecological contexts and limits (Beatley & Manning, 1997), reflecting a wider interest in natural capital assessments. Correspondingly, cities themselves became seen as complex ecological systems (Andersson *et al.*, 2014; Beatley, 2016). Humans were increasingly recognised as playing vital roles within these ecosystems, leading cities to be viewed as not simply ecosystems, but social ecological systemsⁱ (Haase, 2016; Lennon *et al.*, 2016). This stage in the conceptual evolution of urban nature does not mark the end of previous conceptualisations. Rather, the social ecological systems perspective can be thought of as an amalgamation and expansion of principles from earlier perspectives. It includes the desire to reconnect urban populations with nature and the value of nature to humans seen in the parks, garden cities, green belts, and national parks movements (Kos, 2008). A key component of this is the emphasis on the positive impacts of nature on human wellbeing (aesthetics, health, recreation, etc.) (Tzoulas *et al.*, 2007; van den Berg *et al.*, 2007; Thompson *et al.*, 2010) – in other words, a much more integrative approach consistent with the turn to spatial planning. Simultaneously, the socio-ecological systems perspective addresses the environmental and sustainability focus of the late 20th century, for example, the emphasis on reduced consumption, climate change, and the carbon discourse. Increasing amounts of research have shown that incorporating green space and nature-based design in cities can accomplish these goals, mitigate climate change (reducing emissions), and help cities adapt to its impacts (e.g. reducing flood risk, decreasing the urban heat island effect, etc.) (Gill *et al.*, 2007; Susskind, 2010; Demuzere *et al.*, 2014; European Commission, 2015). Though site-specific conservation is still prominent, the socio-ecological systems conception with its recognition of the complexity of urban ecosystems and its goal of incorporating natural space into the urban fabric, represents a departure from the rural-urban

polarity perspective seen in the early conceptualisations wherein nature was perceived to exist primarily outside and separate from the city (Beatley & Manning, 1997).

Perhaps the deepest expression of the socio-ecological systems perspective is found in the biophilic urbanism model advanced by Timothy Beatley (2011). With foundations in E.O. Wilson's notion of 'biophilia' – the inherent connection between humans and nature (Wilson, 1984) – biophilic cities aim to go beyond simply incorporating natural spaces into urban areas. They strive for the integration of nature into all aspects of urban planning, management, and daily life with city design at all scales incorporating natural forms, systems, and processes (Beatley, 2016). Despite the growing influence of the socio-ecological systems perspective, Andersson *et al.*, (2014) argue that the conceptual disconnect of people and cities from nature is still engrained in popular perception. Correspondingly, Beatley (2011) asserts that the general public attitude that one must venture outside of cities to experience nature remains entrenched (see also Roberts and Farley's (2012) exploration of England's urban 'edgelands'). Therefore, although cities are increasingly adopting natural design principles (Erickson, 2006; Hagan, 2015), even as evidenced in the eco-city model, the socio-ecological systems perspective has not yet gained sufficient traction publically for biophilic cities to be fully operationalised.

Paralleling the emergence of the biophilic city concept has been the increasing traction of the 'ecosystem services' concept as a way to re-forge the connection between nature and cities (Scott *et al.*, 2013), and supply a means of expressing the dependent relationship of urban areas and their populations on ecosystem functions both internal and external to the city (Bolund & Hunhammar, 1999; Wilkinson *et al.*, 2013; Haase, 2016). This concept, though originating in the 1970s, gained international attention in 1990s and early 2000s (Daily, 1997; Lennon & Scott, 2014), particularly after the publication of the Millennium Ecosystem Assessment (MEA), which defines ecosystem services as: 'the benefits people obtain from ecosystems' (MEA, 2005, pg. v). Recent years have witnessed the concept refined to reflect an increasing awareness of the complexities and values entwined in viewing nature as

providing services to society (TEEB, 2016). Attempts have also been made to help ecosystem services gain policy traction via economic valuation (de Groot *et al.*, 2010). Yet, in and of itself, the ecosystem services concept is not a policy approach. Therefore, operationalising it has proved challenging, especially within planning (Lennon & Scott, 2014; Wilkinson *et al.*, 2013). In response to this challenge, 'the green infrastructure' approach has emerged as a means to apply the ecosystems services concept in the planning, design and management of urban spaces (Rouse and Bunster-Ossa, 2013; Lennon & Scott, 2014; Mell, 2016).

Nature as Infrastructure

Though its underlying principles can be found throughout earlier movements, green infrastructure (GI) has arisen as a unified concept much more recently (Sinnott *et al.*, 2015) (Lennon, 2015b). It has been explained in myriad ways, yet is most commonly described using Benedict and McMahon's definition as 'an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife' (2006, pg. 1). These networks can include parks, urban trees, waterways, green roofs and walls, wetlands, permeable paving, and other urban green spaces (Gill *et al.*, 2007; Austin, 2014). However, such elements cannot exist in isolation; crucial to the operationalization of the GI concept is the principle of connectivity. Based in ecological network theory, effective GI includes large core green (or habitat) areas linked by corridors and hubs, which allow for species movement (Benedict & McMahon, 2006; Lennon & Scott, 2014). This connected green network approach draws on the green belts concept (Amati & Taylor, 2010; Thomas & Littlewood, 2010), but expands upon it by ensuring that a green space network is woven throughout the fabric of a city instead of merely encircling it. Thus, as Lennon & Scott (2014) maintain, GI takes a more holistic approach than the site-specific strategies of nature conservation emphasised in many earlier conceptualisations by stressing the connectivity expressed in the urban parks movement advanced by Olmstead and others (Botkin & Beveridge, 1997). Another key principle of GI is its multifunctionality. Here the components of the green network are seen to perform a variety of functions that benefit humans, ecosystems,

communities, and economies (Benedict & McMahon, 2006; Roe & Mell, 2013; Lennon & Scott, 2014; Sinnett et al, 2015). This concept thereby seeks to operationalize the ecosystem services concept and bring together various threads from the conceptual evolution of nature in the city. Examples of this are outlined in Table 2.

Table 2: The Multifunctionality of Green Infrastructure

The Multifunctionality of Green Infrastructure		
Multifunctional Aspect	Link to Ecosystem Services	Connection with Conceptualisations of Nature in the City
Habitat provision and facilitation of biodiversity	Habitat and supporting service	Recognition of urban areas as both containing and being part of ecosystems is crucial to the socio-ecological systems perspective
Climate change mitigation and air quality improvement	The carbon sequestration and atmospheric pollutant removal done by plants (regulating service)	These reflect key parts of the environmental and sustainability focuses seen in the late 20 th century, especially as concerns about climate change grew
Water resource management	Flood mitigation through the use of the natural permeable surfaces, constructed wetlands	
Recreation (gardens, walking and cycle paths, sports facilities)	Cultural services	Recreation, health, and wellbeing benefits have been valued throughout the evolution since the parks and garden cities movements
Health and wellbeing		
Visual aesthetics	Cultural services	The aesthetic value of nature has been valued throughout the conceptual evolution, especially in the preservationist movement (green belts, national parks)
Increased economic competitiveness (e.g. tourism)	Cultural services	The economic benefits of green space are highlighted in a sustainability focused interpretation (e.g. eco-cities)
<i>Sources Benedict & McMahon, 2006; Gill et al., 2007; Tzoulas et al., 2007; Baycan-Levant et al., 2009; Roe & Mell, 2013; Demuzere et al., 2014 Lennon & Scott, 2014,</i>		

With its focus on ecological as well as human and societal values, the multifunctionality of GI extends the socio-ecological systems perspective. Young *et al.* (2014) uphold this notion, stating that GI is a 'socio-ecological cross roads: combining ecological and social processes within planning to simultaneously

enhance social and ecological health' (2014, pg. 2572). However, reminiscent of the criticisms of the eco-urbanism movement, the growing focus on the human-centric and economic benefits of GI has led some to assert it runs the risk of becoming part of the neo-liberalisation of nature, wherein the ecological focus potentially becomes subordinate to economic concerns (Lennon, 2015b). Additionally, from a practical perspective, because the multifunctionality of GI spans many different professional arenas (ecology, engineering, drainage, planning, transportation, community management, economics etc.), a multidisciplinary approach is needed to plan, implement, and manage it (Benedict & McMahon, 2006; Baycan-Levant *et al.*, 2009; Lennon & Scott, 2014). However, stakeholder involvement must go beyond professional arenas to include government bodies, communities, and businesses (Rouse and Bunster-Ossa, 2013; Andersson *et al.*, 2014). This principle is not unique to GI theory. For example, in the garden cities movement, Howard (1946) advocated for planning and design to be collaborative amongst a diverse set of people. However, there are practical challenges associated with the multidisciplinary approach. The various disciplines often approach GI from different perspectives and with differing priorities, which can lead to decision-making impasses (Roe & Mell, 2013). Moreover, a pivotal aspect to GI's ability to operationalize the ecosystem services and broader socio-ecological systems approaches is the linking of the ecological (the 'green') with the infrastructural necessities of a city (Thomas & Littlewood, 2010; Lennon & Scott, 2014; Lennon, 2015a; Mell, 2016). Using the example of water management in North America, Mell (2013) asserts that integrating the green with the grey (or built) infrastructure has led to more tangible and sustainable engineering outcomes. Sandström *et al.* (2006) argue that this also helps break down communication barriers between the various disciplines needed in such a multidisciplinary approach. On a more discursive level, Lennon (2015b) maintains that this view of GI alters the notion of green spaces as simply passively existing in a city to one where they are a critical, active part in day-to-day urban functions.

In further advancing the GI approach, ideas of 'nature-based solutions' (NBS) have also emerged in policy discourses as the latest term to reimagine the relationship

between nature and the city. It is defined simply as '*actions which are inspired by, supported by or copied from nature*' (EC, 2015, p. 5) and therefore encapsulates *inter alia* green infrastructure, blue infrastructure and biomimicry as urban design and planning tools for ecologically sensitive urban development. A recent EC publication, *Nature-based Solutions and Re-naturing Cities* (2015), outlines the key discursive strands of NBS approaches to include: protecting and restoring ecosystem functions; enhancing well-being; urban regeneration through NBS; climate change mitigation and adaptation; frugal technologies; and risk management – therefore, NBS are framed as an attempt to reconcile nature and urban development.

In summary, perspectives on nature in urban planning theory have evolved from those with a primarily anthropocentric focus to a more holistic socio-ecological understanding. This evolving trajectory is illustrated in Table 1. Nevertheless, such theories speak of the abstract. Thus, tracing the 'real-world' transformation of nature as a planning concept facilitates greater understanding of how theory becomes manifest in practice through the expression of ideas in policy on how to organise interactions with our environment in an urban context. Accordingly, the next section explores how the concept of 'nature' deployed in an urban planning context developed in parallel with the broader evolution of perspectives on nature's relationship to the city as outlined above. Specifically, the next section reviews the 'natures' of planning in Dublin City over the period 1967 to 2016.

The 'Natures' of Planning

Dublin provides a useful case study for illustrating how abstract concepts of nature become manifest in planning. This is because the administrative attributes of the Irish system coupled with the varied biogeographical characteristics of the city render it possible to trace the evolving conceptualisation of nature in planning policy within an urban context of diverse physical and biological features. Specifically, Dublin is situated amongst several major waterways, including the rivers Liffey, Dodder, Tolka, Santry, and Camac, as well as the man-made Grand Canal and Royal

Canal. The city is flanked on its south-western side by the Dublin Mountains. The eastern portion of the city is bounded by coastline and includes Dublin Bay and North Bull Island, which are protected sites for species and habitats under European law (Council Directive, 1979; Council Directive, 1992). A number of historic urban parks, including one of Europe's largest municipal parks (Phoenix Park), are located in the city. Dublin City Council is also the oldest (established in 1840) (DCC, 2016d) and largest local authority (municipal authority) in Ireland (DCC, 2016a). Importantly, since formalisation of planning procedures in the 1963 Planning Act (entering into force in 1964), all Irish local authorities, including Dublin City Council, have been legislatively required to produce statutory development plans every six years (Government of Ireland, 1963, 2000). These plans explicate the local authority's strategies, policies and objectives for the future development of the city and are focused on such topics as infrastructure, the economy, housing, transport, green space, and urban structure. Consequently, these development plans facilitate a longitudinal examination of interpretative developments regarding the conception of 'nature' in urban planning policy (Lennon, 2015a).

A key objective of the paper is to examine representations of nature through the mobilisation of new narratives or discourses within planning policy. Therefore, we draw on discourse or interpretive analysis to examine the extent to which narratives of nature evolve and in turn how policy and practice as discourse become institutionalised within the planning arena. Discourse analysis suggests that the basis on which people make sense of the world is social and linguistic in nature, and recognises the importance of the way in which policy problems are constructed and related to the rest of the policy process, particularly to the nature of the solutions proposed (Hastings, 1999). Jacobs (1999) contends that interpretive and discursive approaches to policy analysis emphasise that policy decisions constitute a setting where different groups compete to establish a particular version of 'reality' in order to pursue their objectives. Therefore, the methodological assumption is that these conflicts are revealed in texts and speech as well as in the actions of individuals, interest groups and government agencies. In relation to nature and urban planning, discourse analysis potentially enables the research to 'reveal' how policy actors and

agencies have constructed and interpreted various meanings of nature and therefore 'frame' both analysis of nature or environmental and urban problems, the identification of priorities and proposed policies.

All Dublin City development plans since the Planning Act entered into force 1964 were analysed and represent the following years: 1967, 1971, 1976, 1980, 1987, 1991, 1999, 2005-2011, 2011-2017, and 2016-2022. During the production process, each development plan goes through multiple draft stages prior to formal adoption. Whenever possible, final ('adopted') versions were analysed as they become the official policy record and guide the activities of the authority over the lifetime of the plan. The 1967, 1976, 1987, and 2016-2022 plans are exceptions. The first three were only available in draft form in university and public library archives, and the latter was still in the draft stages at the time of the research. To identify sections and passages related to nature in urban environments and the various themes expressed in the literature, each plan was examined page by page, including the appendices, amounting to approximately 2,670 pages. This was essential as language relating to, for example, nature, natural environments, open space, green space, ecology, biodiversity, sustainability, environmental concerns, and green infrastructure is not exclusively found in portions of the plans under obvious headings such as 'Open Space' or 'Green Infrastructure'. Scanned or PDF copies of the relevant plan pages were uploaded into NVivo 10, a qualitative data analysis software programme, to facilitate data organisation (Bryman, 2012). There, the text was coded using the in-built NVivo functions. The analysis then looked for patterns and relationships in the codes and categorized them into larger themes, (Dryzek; 2005; Hajer 2005, 2006; Starks & Brown Trinidad, 2007). Analytical memos were written throughout the process to help organise the emerging themes (Bryman, 2012). This coding process was conducted by one researcher, thereby facilitating consistency and coherency in the analysis of the collated material.

The review of the ten development plans produced for Dublin City reveal an evolving conceptualisation of nature that may be grouped into four period-linked themes. The first grouping (1967, 1971, 1976, and 1980) focuses on the human value of

nature as an amenity. The second group (1987 and 1991) maintains this perspective but adds an ecological frame. In the third group (1999 and 2005) this ecological frame becomes its own focus, as does the idea of sustainable development. The socio-ecological systems perspective also emerges. In the final group (2011 and 2016), the socio-ecological systems perspective is consolidated and rendered concrete as GI becomes an overarching concept integrating those perspectives that have come before.

1967-1980: Nature as Relief and Boundary: The Amenity Frame

The four plans produced during this period establish and maintain two key interrelated conceptions of nature: 'amenity' and 'open space'. Here, the term 'open space' is the primary lens giving focus to nature as amenity. Open space in this context refers to green or semi-green areas mostly devoid of structures, for example, parks or the banks of Dublin's rivers and canals. It most frequently refers to areas within the city's urban fabric that have had more extensive human modification than less heavily modified areas such as Dublin Bay and North Bull Island, which are more commonly called 'natural features' or 'natural amenities'. Significantly, both 'open space' and 'natural features' are continuously used in reference to 'amenity'. The word amenity, though never actually defined in any plan, implies value while concurrently bearing strong connotations of human utility. The anthropocentric character of the nature-as-amenity perspective was revealed in the 1971 policy for 'Rural Environment and Amenity' to 'preserve and improve the existing rural and urban environments for the benefit and enjoyment of the citizens' (DC, 1971, pg. 47). Two key frames highlighted this human-centric perspective: aesthetics and recreation. There was a clear emphasis on the aesthetic value of nature, exemplified by the extensive use of terms such as 'natural beauty', 'scenic character', and 'visual amenity' and demonstrated in policies on the removal or prohibition of 'visually obstructive features'. There was also heavy emphasis on the recreational value of both open spaces and natural features. These areas were often described in terms of their 'recreational utility' or as having amenity due to their status as recreational areas, exemplified by the extensive use of terms such as "natural beauty," "scenic character," and "visual amenity" and demonstrated in

policies on the removal or prohibition of “visually obstructive features”. Such frames echoed the human-centric view of the benefits of nature seen in the urban parks, garden cities, green belt, and national parks movements (Unwin, 1909; Howard, 1946, Cherry, 1975; Amati, 2008). This echoes Davoudi et al.’s (1996) identification of an ‘aesthetic utilitarian’ approach within English structure plans as a legacy of planning in the 1970s/80s, which sees the environment as ‘functional resources’ to be conserved, and as amenities to be enhanced, for human enjoyment and exploitation.

The nature-as-amenity perspective is also illustrative of the rural-urban polarity and the spatial separation of nature from the city. Most areas of ‘high natural amenity’, e.g. the Dublin Mountains, North Bull Island, Dublin Bay, and the Howth Peninsula, were located outside the main urban area of Dublin and were perceived as spatially delimiting the city. All four plans stress the importance of preserving these areas of natural amenity by using words such as ‘preserve’, ‘protect’, ‘conserve’, and ‘maintain’, thus aligning with the preservationist movement in the mid-1900s and the related emphasis on site-specific conservation (Cherry & Rogers, 1996).

1987-1991: Nature as Greening: An Emerging Ecological Consciousness

The nature-as-amenity perspective framing the interpretation of open space remained prevalent throughout the 1987 and 1991 plans, as did the emphasis on aesthetic and recreational values and the preservation of areas of high amenity. These two plans are important, however, because the nature-as-amenity perspective began to incorporate ecological frames. Although terms such as ‘wildlife’ had been used in the earlier plans, the word ‘ecosystem’ was used for the first time in 1991, perhaps indicative of the growing body of scientific work around ecosystems in the late 20th century. The term ‘nature conservation’ was also introduced, but primarily used as a justification for protecting areas deemed to have high amenity value such as North Bull Island. Likewise, the 1991 plan states that the protection of ‘natural ecosystems (flora, fauna and wildlife)’ (DC, 1991, pg. 53) is an important goal when developing tourism and leisure facilities. Nevertheless, these two plans incorporated a list of specific habitat types for conservation, signifying the increased focus on

ecology. Ultimately, however, the conservation of nature was still site-specific (as 'islands of protection' – see for example Owens and Cowell, 2011) largely directed at core areas such as Dublin Bay and North Bull Island, and generally reflective of human utility values, for example, 'the need to preserve [Dublin Bay] as a natural amenity for the use of the public' (DC, 1991, pg. 54). This phase suggests that while new discourses and framing devices for 'nature' emerged, new approaches co-existed alongside established practices which often proved difficult to displace entirely, often due to an enduring public concern for amenity (rather than nature) protection.

1999-2005: Nature as Greening: The Ascendancy of Sustainable Development

These two plans introduced the 'sustainable development' concept, with both plans identifying sustainable development as an underlying strategy, discursively tying together the needs for economic and social growth without 'compromising high environmental standards' (DC, 1999, pg. 32). Much weight was given to economic development, perhaps due to the economic boom being experienced in Ireland at the time (Ní Mháille Battel, 2003). Within this economic reframing of nature, an ecological modernization discourse was advanced in the 1999 plan, wherein it was asserted that 'many pressures on the environment appear to decrease as economies prosper' (DC, 1999, pg. 31). The sustainable development frame also aligned with some of the environmental goals of the eco-urbanism models emerging during this period, including those focused on emissions and waste reduction, energy conservation, and sustainable public transport. The latter was often discussed in conjunction with higher density development, particularly in the 2005 plan, thereby also aligning with the compaction principles of new urbanism. However, though these goals are expressive of broader environmental concerns, they were not yet framed using terminology about climate change, which was only mentioned four times in the 2005 plan and not at all in 1999. Indeed, the nature-as-amenity perspective remained salient and continued to express the relationship between the city and nature for human benefit particularly related to localised quality of life concerns. However, ecology shifted from a sub-frame within that perspective to be its own lens for interpreting and representing nature within planning policy.

Specifically, in the context of open space, ecological concerns became their own policies and objectives with emphasis laid on ideas such as ‘habitat creation’ and ‘facilitating biodiversity’. Thus, while open space within the urban fabric was still discursively and spatially distinguished from ‘natural features or amenities’, ecological objectives for their own sake also were applied to these areas. Additionally, the socio-ecological systems perspective began to emerge in a structured way, and the sustainable development concept became one early discursive vehicle expressing it. For example, the 1999 plan advances the importance of the sustainable development concept by asserting that it is ‘geared to looking at the holistic integrated nature of the city and at promoting the rich complexity of the natural, social and cultural city’ (DC, 1999, pg. 13). The socio-ecological systems conceptualisation became more concrete in the 2005 plan’s commitment to create a green or open space network. Expanding greatly on the network suggested in the first plans, the 2005 plan stated that these ‘green chains’ would provide spaces for walking and cycling as well as habitats and biodiversity. This provided an operational way to link the nature-as-amenity and ecology perspectives.

2011-2016: Nature as Systemic: Socio-Ecological Systems and Green Infrastructure

The preceding perspectives of nature permeated the two plans of this period. Notably, the ecological frame was deepened by the addition of ‘biodiversity’ as an important concept supplying a unifying trope for ecological concerns. ‘Open space’ continued in use, but was supplemented by ‘green space’, a phrase with more environmental and ecological connotations. The principle of ecological networks and connectivity, which were captured in the refinement of a green network strategy also took a more holistic approach than site-specific conservation (Lennon & Scott, 2014). Furthermore, the word ‘green’ was used throughout the plans, including in reference to a ‘green economy,’ directly evoking ecological modernisation and sustainable development discourses. Also within the plans’ policy narratives, climate change mitigation and adaptation, utilising a carbon discourse so influential in new urbanism, became a fundamental strategy and reason for increasing the environmental focus of planning policy. However, the most dramatic shift occurred through the introduction of the GI concept in 2011, and its

presentation as a strategic policy approach in its own chapter in 2016. GI has become the overarching concept both unifying and structuring a series of formerly discrete planning issues that aligns with the socio-ecological systems perspective in recognising ‘the importance and benefits of interaction between the man-made city environment, including parks and open spaces and the natural environment’ (DCC, 2011, pg. 85). Correspondingly, it encompasses the foci of other conceptualisations of nature through a concern with multifunctionality. This was clearly expressed by the inclusion of language about the many benefits for humans, society, ecology, the environment, and the economy in the descriptions of each GI development policy and planning objective. Indeed, GI was integrated throughout the plan (drainage, building development standards, etc.), with action-oriented words like ‘connects’, ‘integrates’, ‘provides’ and ‘facilitates’ used in relation to the function of the green elements. Green space thereby became reframed as an active element of urban land use in creating value through its multifunctionality and connectivity. This represented a change from early plans, which primarily viewed green or natural spaces as passive, possessing utility value, but places to be protected.

Figure 1: Dublin’s Strategic Green Network: The proposed GI network in the 2016 draft plan. Source: Dublin City Council, 2016c.



Thus, the evolution of perspectives on urban nature in Dublin City's development plans reflects the broader development of concepts of nature in planning theory. In essence, perspectives evolved from a primarily anthropocentric view of nature-as-amenity to one that includes ecologically and sustainable development-focused frames. The GI perspective ultimately encapsulates and integrates those perspectives preceding it by embodying the socio-ecological systems conception of nature in the city. It does this by rendering natural spaces active rather than passive, and multifunctional rather than as solely sites for recreation, conservation, preservation or development. In this context, the term '*green infrastructure*' performs as an important rhetorical device: firstly through finding parallels between green and traditional grey infrastructure as a framework for investment; and secondly, through shifting a focus from nature protection and preservation towards the creation and enhancement of ecological networks. This also has implications for how land may be valued and conceived within the planning system – for example, rather than viewing urban brownfield sites as land awaiting development with a real estate function, these sites may be revalorised in terms of its potential ecosystem functions and services, such as health benefits of greenspace or urban cooling (Haase, 2016).

Conclusion

The concepts of 'nature' employed by urban planning are not fixed. Rather they change as modern ideas incorporate the threads of older concepts in weaving new meanings in response to contemporary planning concerns. As interpretations of nature alter and influence the direction of planning policy, so too do the objectives of planning policy foster different interpretations of nature. Thus for example, concern with the negative consequences of urban sprawl bred a desire for urban containment as expressed in green belt and compact city planning approaches. This in turn both drew upon and consolidated traditional views of nature as outside and separate to the city – that which must be preserved. Conversely, an increasing awareness of how global environmental issues such as climate change are

instantiated in the urban realm, shifted perceptions of nature as something 'out there' to something 'everywhere', including 'within' the built environments of cities that were previously viewed as zones barren of nature. Hence, as ecosystems increasingly became seen to provide valuable services and discourses concerning the systemic interrelations between ecology and society gained currency, 'urban natures' emerged as a topic of planning concern. Accordingly, new planning approaches such as green infrastructure were developed to give policy presence to such abstract ideas.

What this points to is how views on what nature is emerge hand-in-hand with the perceived problems generated by increasing urbanity and the search for planning solutions to such challenges. Hence, when the pressures of urban industrialisation became a problem priority for planning, nature was conceived as a source of bucolic relief beyond the confines of the polluted and congested city. Similarly, as global environmental issues assumed centre stage in policy discourses, concepts such as sustainable development gained traction in planning as efforts were sought to reconcile economic growth and societal enhancement with safeguarding the environment. Accordingly, nature was reinterpreted as also residing within the urban realm, with policies formulated to enhance the nature of cities and not just the nature exterior to urban boundaries. However, as with most of these reconceptualizations, the pattern of previous interpretations remains woven into the new concept, such that the perceptions of nature inscribed in planning policy reveal the outline of previous views entwined with newer ideas.

This is not to suggest that there is no such thing as 'nature'. Instead, it suggests that the 'natures' of planning better represent the relationship of policy with the challenges planning seeks to resolve in a particular time and place than it does with a singular objective nature that planning seeks to conserve. In this sense, it is probable that new interpretations of urban nature will emerge in the future as the objectives of planning policy respond to the perceived problems of their day. Nevertheless, just as cities are palimpsests obliquely disclosing the histories of foregone eras, so too will the natures of planning in forthcoming times reflect the subtle interlacing of

past and contemporary perceptions of nature in the city. Sensitivity to this dynamic and critical reflection on the consequences of solely advancing a particular interpretation of nature offers scope for the simultaneous existence, mutuality and positive synergies of the multiple natures of planning.

Moreover, while 'nature' and cities are often framed within discussions of benign technical or ecological fixes to mounting urban sustainability dilemmas, alongside these technical and design considerations, more critical perspectives are also crucial within these debates. For example, past experiences have shown how economic imperatives often capture environmental dimensions of spatial planning, and similarly enhancing nature within cities can quickly become appropriated as part of a neoliberal planning discourse. This includes the reduction of nature to the status of green place-branding (e.g. the green city) or as an enabling device within a pro-development agenda, for example to permit development on the basis of incorporating green infrastructure elements (Scott and Lennon, 2016). More fundamentally, there are growing concerns that green infrastructure provision have been increasingly incorporated *into* private development schemes leading to a privatisation of urban greenspace governed and managed outside the public realm, leading to new processes of spatial exclusion and control, begging the question of who benefits from more green and sustainable cities. Similarly, enhancing urban greenspace may lead to new processes of nature-led urban 'regeneration' that intermeshes with gentrification and subsequent displacement following rising property values (Anguelovski, 2016). This is not to suggest that green infrastructure and enhancing nature do not offer potential for more ecologically sound planning outcomes, but rather that emerging research in this area should also ensure that reconceiving the nature-city relationship is also couched in terms of just and equitable cities, particularly as a means to reduce risk and enhance well-being for the city's most vulnerable groups.

References

- Abercrombie, P. (1945) *Greater London Plan 1944*. London: Her Majesty's Stationary Office.
- Adams, D., Scott, A. and Hardman, M. (2014) Guerrilla warfare in the planning system: revolutionary progress towards sustainability? *Geografiska Annaler: Series B*, 95, pp. 375-387
- Agyeman, J. and Evans, T. (2003) Towards just sustainability in urban communities: building equity rights with sustainable solutions, *The ANNALS of the American Academy of Political and Social Science*, 1, pp. 35-53
- Amati, M. (2008) "Green Belts: A Twentieth-century Planning Experiment" in Amati, M. (ed.) *Urban Green Belts in the Twenty-First Century*. Hampshire, England: Ashgate Publishing, pp.1-17.
- Amati, M. & Taylor, L. (2010) "From Green Belts to Green Infrastructure", *Infrastructure, Planning Practice & Research*, 25 (2), pp. 143-155.
- Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C. & Gren, A. (2014) "Reconnecting Cities to the Biosphere: Stewardship of Green Infrastructure and Urban Ecosystem Services", *AMBIO*, 43(4), pp. 445-453.
- Anguelovski I. (2016) From Toxic Sites to Parks as (Green) LULUs? New Challenges of Inequity, Privilege, Gentrification, and Exclusion for Urban Environmental Justice. *Journal of Planning Literature*. 31 (1) pp. 23-36.
- Austin G. (2014) *Green Infrastructure for Landscape Planning: Integrating Human and Natural Systems*, London, England, U.K.: Routledge.
- Baker S. (2006) *Sustainable Development*, New York, New York State, U.S.A.: Routledge.
- Barry, J. (2003). "Ecological Modernisation", *Environmental Thought*, 2003, pp. 191-214.
- Barry, J. (2007) *Environment and Social Theory*. New York: Routledge.
- Baycan-Levant, T., Vreeker, R. & Nijkamp, P. (2009) "A Multi-Criteria Evaluation of Green Spaces in European Cities", *European Urban and Regional Studies*, 16 (2), pp. 193-213.
- Beatley, T. (2011) *Biophilic Cities: Integrating Nature into Urban Design and Planning*. Washington D.C.: Island Press.
- Beatley, T. (2016) "Planning for biophilic cities: from theory to practice", *Planning Theory & Practice*, 17 (2), pp. 295-300.
- Beatley, T. & Manning, K. (1997) *The Ecology of Place: Planning for Environment, Economy, and Community*. Washington D.C.: Island Press.
- Benedict, M. & McMahon, E. (2006) *Green Infrastructure: Linking Landscapes and Communities*. London, England: Island Press.
- Bolund, P. & Hunhammar, S. (1999) "Ecosystem services in urban areas", *Ecological Economics*, 29 (2), pp. 293-301.
- Botkin, D.B. & Beveridge, C.E. (1997) "Cities as environments", *Urban Ecosystems*, 1, pp. 3-19.
- Breheny, M. (1997) "Urban compaction: feasible and acceptable?", *Cities*, 14 (4), pp. 209-217.
- Brennan, M., McInerney, D., Hochstrasser, T. & Hayden, T. (2009) "Where have all the parks gone? Changes in Dublin's green space between 1900 and 2006", *University College Dublin Urban Institute Working Paper Series*.

- Bryman, A. (2012) *Social Research Methods, 4th Edition*. Oxford: Oxford University Press.
- Bulkeley H. (2013) *Cities and climate change*, London, England, U.K.: Routledge.
- Campbell, S. (1996) "Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development", *Journal of the American Planning Association*, 62 (3), pp. 296-312.
- Caprotti, F. (2014) "Eco-urbanism and the Eco-city, or, Denying the Right to the City?", *Antipode*, 46 (4), pp. 1285-1303.
- Carter N. (2007) *The Politics of the Environment*, Cambridge, England, U.K.: Cambridge University Press.
- Castree N. (2014) *Making Sense of Nature*, London, England, UK: Routledge.
- Cherry, G.E. (1975) *Environmental Planning Volume II: 1939-1969*. London: Her Majesty's Stationary Office.
- Cherry, G.E. & Rogers, A. (1996) *Rural Change and Planning: England and Wales in the Twentieth Century*. London: E & FN Spon.
- Coates P. (1998) *Nature: western attitudes since ancient times*, Cambridge, England, U.K.: Polity Press.
- Connelly, S. (2007) "Mapping Sustainable Development as a Contested Concept", *Local Environment*, 12 (3), pp. 259-278.
- Council Directive (EC) 79/409/EEC of 2 April 1979 on The Conservation of Wild Birds.
- Council Directive (EC) 92/43/EEC of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora
- Cullingworth B, Nadin V, Hart T, et al. (2014) *Town and Country Planning in the UK*, London, England, U.K.: Taylor & Francis.
- Daily GC. (1997) *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington D.C., U.S.A.: Island Press.
- Daniels, T.L. (2009) "A Trail Across Time: American Environmental Planning From City Beautiful to Sustainability", *Journal of the American Planning Association*, 75 (2), pp. 178-192.
- Davoudi, S. (2012) Climate Risk and Security: New Meanings of "the Environment" in the English Planning System, *European Planning Studies*, 20, pp. 49-69.
- Davoudi, S., Hull, A. and Healey, P. (1996) Environmental Concerns and Economic Imperatives in Strategic Plan-Making, *Town Planning Review*, 67, pp. 421-436.
- de Groot, R. S., Fisher, R., Christie, M., Aronson, J., Braat, L.C., Haines-Young, R., Gowdy, J., Maltby, E., Neuville, A., Polasky, S., Portela, R. & Ring, I. (2010) "Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation", in P. Kumar (ed.), *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*. New York, Routledge, pp. 3-40.
- Demuzere, M., Orru, K., Heidrich O., Olazabal, E., Geneletti, D., Orru, H., Bhawe, A.G., Mittal, N., Feliu, E. & Faehnle, M. (2014) "Mitigating and adapting to climate change: Multi-functional and multi-scale assessment of green urban infrastructure", *Journal of Environmental Management*, 146, pp. 107-115.
- de Roo, G. & Miller, D. (2000) "Introduction – Compact cities and sustainable

- development", in de Roo, G. & Miller, D. (eds.) *Compact Cities and Sustainable Urban Development*. Hampshire, England: Ashgate Publishing Company, pp. 1-13.
- Descola P. (2013) *Beyond Nature and Culture*, Chicago, Illinois, U.S.A.: University of Chicago Press.
- Dryzek, J. (2005) *The Politics of the Earth: Environmental Discourses* (2nd Edition). Oxford:Oxford University Press.
- Dublin City Council (2011) *Dublin City Development Plan 2011-2017*. Dublin: Dublin City Council.
- Dublin City Council (DCC) (2016a) *About Dublin City Council*. Available at <http://www.dublincity.ie/main-menu-your-council/about-dublin-city-council>. [Accessed on 18 July 2016].
- Dublin City Council (DCC) (2016d) *History of Dublin City Council*. Available at <http://www.dublincity.ie/main-menu-your-council-about-dublin-city-council/history-dublin-city-council>. [Accessed on 18 July 2016].
- Dublin Corporation (DC) (1971) *Dublin City Development Plan 1971*. Dublin: Dublin Corporation.
- Dublin Corporation (DC) (1991) *Dublin City Development Plan 1991*. Dublin: Dublin Corporation.
- Dublin Corporation (DC) (1999) *Dublin City Development Plan 1999*. Dublin: Dublin Corporation.
- Erickson D. (2006) *Metrogreen: Connecting Open Space in North American Cities*, Washington, D.C, U.S.A.: Island Press.
- European Commission (2015) *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions and Re-Naturing Cities*. Luxembourg: Publications Office of the European Union.
- Fisher, C. (2011) "Nature in the City: Urban Environmental History and Central Park", *Organization of American Historians: Magazine of History*, 25 (4), pp. 27-31.
- Fouchier, V. (2000) "The case of the Paris Region, and its urban density and mobility: What do we know? What can we do?" in de Roo, G. & Miller, D. (eds.) *Compact Cities and Sustainable Urban Development*. Hampshire, England: Ashgate Publishing Company, pp. 241-250.
- Franklin, A. (2002) *Nature and Social Theory*. London: Sage Publications.
- Gill, S.E., Handley, J.F., Ennos, A.R. & Pauleit, S. (2007) "Adapting Cities for Climate Change: The Role of the Green Infrastructure", *Built Environment*, 33 (1), pp. 115-133.
- Government of Ireland. Planning and Development Act (1963). Dublin: Stationary Office.
- Government of Ireland. Planning and Development Act (2000). Dublin: Stationary Office.
- Haase, D. (2016) "Reflections on urban landscapes, ecosystem services and nature based solutions in cities", *Planning Theory & Practice*, 17 (2), pp. 276-280.
- Hagan S. (2015) *Ecological urbanism: the nature of the city*, London, England, U.K.: Routledge.
- Hajer, M. (2005) "Coalitions, Practices, and Meaning in Environmental Politics: From

- Acid Rain to BSE", in Howarth, D. & Torfing, J. (eds.) *Discourse Theory in European Politics: Identity, Policy and Governance*. Hampshire: Palsgrave MacMillan, pp. 297-315.
- Hajer, M. (2006) "Doing Discourse Analysis: Coalitions, Practices, Meaning", in: M. van den Brink & T. Metze (eds.) *Words Matter in Policy and Planning – Discourse Theory and Method in the Social Sciences*, Netherlands Geographical Studies 344, Utrecht: KNAG / Nethur, pp. 65-74.
- Hall P and Tewdwr-Jones M. (2011) *Urban and Regional Planning*, New York City, New York, U.S.A.: Routledge.
- Hastings, A. (1999) Analysing Power Relations in Partnerships: Is There a Role for Discourse Analysis? *Urban Studies* 36(1), pp. 91-106
- Hobbes, T. (1981) *Leviathan*. London: Penguin (originally published, 1651).
- Howard, E. (1946) *Garden Cities of Tomorrow*. London: Faber and Faber (originally printed 1902).
- Howley, P., Scott, M. & Redmond, D. (2009) "Sustainability versus livability: an investigation of neighbourhood satisfaction", *Journal of Environmental Planning and Management*, 52 (6), pp. 847-864.
- Jabareen, Y.R. (2006) "Sustainable Urban Forms: Their Typologies, Models, and Concepts", *Journal of Planning Education and Research*, 26 (1), pp. 38-52.
- Jacobs, K. (1999) Key Themes and Future Prospects: Conclusion to the Special Issue, *Urban Studies*, 36, pp. 203-213
- Jenks, M., Burton E. & Williams, K. (1996) *The Compact City: A Sustainable Urban Form?* London: E & FN Spon.
- Joss, S., Cowley, R. & Tomozieu, D. (2013) "Towards the 'ubiquitous eco-city': An analysis of the internationalisation of eco-city policy and practice", *Urban Research and Practice*, 6 (1), pp. 54-74.
- Kenworthy, J. (2010) "Making Eco-Cities a Reality: Some Key Dimensions for Eco City Development with Best Practice Examples", in Tang, Z. (ed.) *Eco-City and Green Community: The Evolution of Planning Theory and Practice*. New York: Nova Science Publishers, pp. 39-58.
- Kos, D. (2008) "Nature in the city or the city in nature?", *Urbani izziv*, 19 (2), pp. 129-132.
- Lennon, M. (2015a) "Explaining the currency of novel policy concepts: learning from green infrastructure planning", *Environment and Planning C: Government and Policy*, 33, pp. 1039-1057.
- Lennon, M. (2015b) "Green infrastructure and planning policy: a critical assessment", *Local Environment*, 20 (8), pp. 957-980.
- Lennon, M. & Scott, M. (2014) 'Delivering ecosystems services via spatial planning: reviewing the possibilities and implications of a green infrastructure approach', *Town Planning Review* (85) pp. 563-587.
- Lennon, M & Scott, M. (2016) "Re-naturing the city", *Planning Theory & Practice*, 17 (2), pp. 270-276.
- Lennon M, Scott M, Collier M, et al. (2016) The emergence of green infrastructure as promoting the centralisation of a landscape perspective in spatial planning—the case of Ireland. *Landscape Research*: 1-18.
- Mell, I. (2013), "Can you tell a green field from a cold steel rail: examining the

- "green" of a Green Infrastructure approach", *Local Environment*, 18 (2), pp. 152-166.
- Mell I. (2016) *Global Green Infrastructure: Lessons for Successful Policy-making, Investment and Management*, London, England, U.K.: Taylor & Francis.
- Millennium Ecosystems Assessment (MEA) (2005) *Millennium Ecosystems Assessment: Ecosystems and Human Well-Being: Synthesis Report*. Washington, DC, Island Press.
- Mumford, L. (1945) "The Garden City Idea and Modern Planning", in Howard, E. (1946) *Garden Cities of Tomorrow*, London: Faber and Faber, pp. 29-40.
- Ní Mháille Battel, R. (2003) "Ireland's 'Celtic Tiger' Economy", *Science, Technology & Human Values*, 28 (1), pp. 93-111.
- Owens, S. & Cowell, R. 2011. *Land and Limits: interpreting sustainability in the planning process*, New York City, New York, U.S.A.: Routledge.
- Register, R. (1987) *Ecocity Berkeley: Building Cities for a Healthy Future*. Berkeley, California: North Atlantic.
- Roberts, M. and Farley, P. (2011) *Edgelands: Journeys into England's True Wilderness*, London: Jonathan Cape
- Roe, M. & Mell, I. (2013) "Negotiating value and priorities: evaluating the demands of green infrastructure development", *Journal of Environmental Planning and Management*, 56 (5), pp. 650-673.
- Rouse, D. & Bunster-Ossa, I.F. (2013) *Green Infrastructure: A Landscape Approach*. American Planning Association: Planning Advisory Service Report Number 571.
- Ruggeri, D. (2015) "Not Just a Park. The Inevitability of Urban Nature in Contemporary City Design", *Journal of Urban Design*, 20 (3), pp. 318-320.
- Sandström, U.G., Angelstam, P., Khakee, A. (2006) "Urban comprehensive planning – identifying barriers for the maintenance of functional habitat networks", *Landscape and Urban Planning*, 75, pp. 43-57.
- Scott, A., Carter, C., Reed, M., Larkham, P., Adams, D., Morton, N., Waters, R., Collier, D., Crean, C., Curzon, R., Forster, R., Gibbs, P., Grayson, N., Hardman, M., Hearle, A., Jarvis, D., Kennet, M., Leach, K., Middleton, M., Schiessel, N., Stonyer, B. and Coles, R. (2013) Disintegrated development at the rural–urban fringe: Re-connecting spatial planning theory and practice, *Progress in Planning* 83: 1–52)
- Selman, P. (1995) Local sustainability: can the planning system help get us from here to there?, *Town Planning Review*, 66, pp. 267-302
- Sinnett D, Smith N and Burgess S. (2015) *Handbook on Green Infrastructure: Planning, Design and Implementation*, Cheltenham, England, U.K.: Edward Elgar Publishing.
- Snellen, D.M.E.G.W., Borgers, A.W.J. & Timmermans, H.J.P. (2000) "Towards an evaluation methodology for urban concepts", in de Roo, G. & Miller, D. (eds.) *Compact Cities and Sustainable Urban Development*. Hampshire, England: Ashgate Publishing Company, pp. 53-64.
- Starks, H. & Brown Trinidad, S. (2007) 'Choose Your Method: A Comparison of Phenomenology, Discourse Analysis and Grounded Theory', *Qualitative Health Research*, 17 (10), pp. 1372-1380.
- Susskind, L. (2010) "Responding to the risks posed by climate change: Cities have no

- choice but to adapt", *The Town Planning Review*, 81 (3), pp. 217-235.
- Tang, Z. & Wei, T. (2010) "The History and Evolution of Eco-City and Green Community" in Tang, Z. (ed.) *Eco-City and Green Community: The Evolution of Planning Theory and Practice*. New York: Nova Science Publishers, pp. 11-35.
- The Economics of Ecosystems and Biodiversity (TEEB) (2016) *Ecosystem Services*. Available at <http://www.teebweb.org/resources/ecosystem-services/>. [Accessed 15 June 2016].
- Thomas, D. (1963) "London's Green Belt: The Evolution of an Idea", *The Geographical Journal*, 125 (1), pp. 14-24.
- Thomas, K. & Littlewood, S. (2010) "From Green Belts to Green Infrastructure? The Evolution of a New Concept in the Emerging Soft Governance of Spatial Strategies", *Planning Practice and Research*, 25 (2), pp. 203-222.
- Thompson CW, Aspinall P and Bell S. (2010) *Innovative Approaches to Researching Landscape and Health: Open Space: People Space 2*, London, England, U.K.: Taylor & Francis.
- Tsolakis, N. & Anthopoulos, L. (2015) "Eco-cities: An integrated systems dynamics framework and a concise research taxonomy", *Sustainable Cities and Society*, 17, pp. 1-14.
- Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kazmierczak, A., Niemela, J. & James, P. (2007) "Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review", *Landscape and Urban Planning*, 81, pp. 167-178.
- Unwin, R. (1909) *Town Planning in Practice*. Reprint, New York: Princeton Architectural Press, 1994.
- van den Berg, A. E., Hartig, T. & Staats, H. (2007) "Preference for Nature in Urbanized Societies: Stress, Restoration, and the Pursuit of Sustainability", *Journal of Social Issues*, 63 (1), pp. 76-96.
- Wilkinson, C., Saarne, T., Peterson, G. D. & Colding, J. (2013) "Strategic Spatial Planning and the Ecosystem Services Concept - an Historical Exploration", *Ecology and Society*, 18 (1), pp. 1-19.
- Wilson, E.O. (1984) *Biophilia*. Cambridge, Massachusetts: Harvard University Press.
- World Bank (2010) *Eco2 Cities: Ecological Cities as Economic Cities*. Washington, D.C.: The World Bank.
- Young, R., Zanders, J., Lieberknecht, K. and Fassman-Beck, E. (2014) "A comprehensive typology for mainstreaming urban green infrastructure", *Journal of Hydrology*, 19 (C), pp. 2571-2583.

ⁱ Though it gained prominence in current conceptualisations, the concept of closely intertwining nature and the urban built and social environments is not new. For instance, in his 1969 text, *Design With Nature*, Scottish landscape architect, Ian McHarg, helped lay the foundations for the ecological turn in urban planning and policy by suggesting that nature should not simply be seen as relief from the industrial city. Rather, it should be perceived and protected as a vital source of life. He questioned the notion of nature simply encircling the city with greenbelts and advocated the incorporation of nature in cities spatially in terms of green space and through nature-based design.