Land Use Policy 69 (2017) 93–101

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Urban green infrastructure in Europe: Is greenspace planning and policy compliant?

Clive Davies[a,c,*], Raffaele Lafortezza[a,b]

[a] Department of Agricultural and Environmental Sciences, University of Bari "A. Moro", Via Amendola 165/A, 70126 Bari, Italy
[b] Center for Global Change and Earth Observations (CGCEO), Michigan State University, East Lansing, MI, 48823, USA
[c] Department of Architecture, Planning & Landscape, Claremont Tower, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK

ARTICLE INFO

Keywords:
Climate change adaptation
Connectivity
Ecosystem services
Greenspace planning and policy
Urban green infrastructure

ABSTRACT

Urban green infrastructure (UGI) planning, based on certain principles, has emerged as a way to conceptualise connected greenspace in urbanised environments. This is achieved through the application of processes and approaches linked to policy themes to which the concept can significantly contribute. Taken together the processes, approaches and policy themes constitute the principles of UGI, which when adopted can promote, maintain and enhance quality of life in resource-efficient, compact and climate-resilient cities. In this study we explore the extent to which strategic greenspace planning in Europe is UGI compliant, as we hypothesised that the above principles are presently under-represented in planning documents and policies. This was accomplished by conducting a comparative analysis of the adoption of UGI principles in current practices of greenspace planning across European city-regions based on a systematic review of previous data and reports. The study found that many UGI principles and related concepts are present to some degree in strategic greenspace planning in Europe. However, gaps exist with regard to their scope and level of consideration. Presently, conservation emerges as the predominant task in strategic urban greenspace planning. However, enhancing network connectivity is key to the development of UGI, hence a greater focus on the restoration and creation of greenspace is required in the future. Based on our analysis it can be concluded that the advancement towards UGI planning is well established and progressing, although some areas are markedly under-represented. Strategic greenspace planning in Europe, with a few exceptions, requires further development to be effectively considered as UGI compliant.

1. Introduction

Though it is sometimes used to describe a palette of green engineering technologies and their application in urban design, green infrastructure (GI) is also commonly used as a term associated with strategic approaches to greenspace planning that focuses on network connectivity (Benedict and McMahon, 2002; Rouse and Bunster-Ossa, 2013; Lennon, 2015). In Europe, the GI concept has become widely recognised for its potential to contribute towards ecosystem services preservation and restoration and is now embedded in European policy (EC, 2013); it has also been linked to territorial planning and cohesion (EEA, 2011, 2014). GI has been defined as "…a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services…" (EC, 2013, p. 3).

As more and more of the world's population is becoming urban and challenges such as maintaining a high quality of life and adapting to climate change are occupying political agendas for cities, the concept of GI for urban areas has been gaining more attention. This has led to a new urban agenda where promoting environmental sustainability can foster a transformative change when a critical connection is established between the environment, urban planning, and governance (UN, 2016). The increased attention GI is receiving is evidenced by recent policies and guides developed by cities and countries across the globe referencing GI (e.g., in England, Green Infrastructure Planning Practice Guidance [UK Government, 2016]; in the US, Philadelphia's Green Stormwater Infrastructure Planning Guidelines (Philadelphia Water, 2015) and the Environmental Protection Agency's various guides [c.f. US EPA, 2010, 2014]) and by extensive research. For example, Gill et al. (2007) explored the important role that GI can play in adapting the city for climate change. Spanò et al. (2017) considered how established approaches, such as the EEA's Driving force–Pressure–State–Impact–Response (DPSIR) framework, can be used in support of GI planning. Other studies have linked components of GI

* Corresponding author at: Newcastle University, School of Architecture Planning & Landscape, Newcastle upon Tyne, NE1 7RU, UK.
E-mail address: clive.davies@newcastle.ac.uk (C. Davies).

http://dx.doi.org/10.1016/j.landusepol.2017.08.018
Received 15 March 2017; Received in revised form 22 June 2017; Accepted 15 August 2017
Available online 14 September 2017

in urban areas to human health and wellbeing (Tzoulas et al., 2007; Lafortezza et al., 2009; Dentamaro et al., 2011; Carrus et al., 2015; Coutts and Hahn, 2015).

More recently, urban green infrastructure (UGI) planning has emerged as a distinct subset of GI aimed at creating and managing networks of greenspace in urbanised environments through the application of certain planning processes, approaches and policy themes (e.g., Ahern, 2007; Mell, 2009; Pauleit et al., 2011; Davies et al., 2015). Conceptually, UGI is linked to neighbouring GI at the landscape scale whilst simultaneously focusing on creating and managing networks of multifunctional greenspace in the urban context (EC, 2011). Planning a UGI network involves linking greenspaces at multiple scales whilst addressing groundwater, surface water, and air movement systems (Young et al., 2014). Hence, a UGI typology will include many types of features encompassing both the natural and man-made (e.g., river corridors, parks, forests, green routes). Contributions to the definition and principles of UGI (e.g., Ahern, 2007; Mell, 2009; Pauleit et al., 2011) have been followed by an increasing number of critical accounts on the perspectives of this approach. For instance, it has been argued that GI is a neoliberal concept where the value of 'green' is mainly seen in economic terms (Thomas and Littlewood, 2010; Horwood, 2011; Lennon, 2015). Although we do not set out to investigate this in our study, it has been posited that creating more 'green' in cities via UGI planning may promote gentrification rather than reduce social and environmental inequalities (Dooling, 2009; Wolch et al., 2014).

We also consider UGI as a biophysical concept (biotic and abiotic urban surroundings, Deng and Wilson, 2006) and its application in territorial and functional land-use planning. However, we realise that this also needs to be considered within the context of the grey-green continuum as first proposed by Davies et al. (2006) and subsequently by Mell (2014) and Roe and Mell (2013), and Lennon (2015). We recognise that the term 'green infrastructure' is now being used in respect of urban design to describe various, often technological, approaches to the management of built form (e.g., sustainable urban drainage systems or green roofs), which are functionally 'green' but also involve a significant amount of 'grey' infrastructure. This grey-green continuum has been brought ever more into focus by recent developments at the European level (EC and ALTER-Net, 2015), notably through the promotion of nature-based solutions to tackle urban resilience in the face of global change. This focus is manifesting itself in a variety of 'green' engineered solutions where the biophysical concept of UGI may be minimal.

Lafortezza et al. (2013) have pointed out that there is a strong relationship between GI planning and temporal considerations. We recognise that the UGI policy themes discussed later in this work (e.g, social cohesion, biodiversity) can be considered within a time-dependent framework. The same applies to the significance of governance (Buizer et al., 2015; Gulsrud et al., 2016). However, we decided not to expand our investigation to include these aspects, the reason being that they either merit separate studies or that these are already underway. Yet, we were aware while undertaking this research that UGI-compliant interventions operate within a time-based context and that planning and policy is strongly linked to governance considerations; hence, these topics set boundaries to our study.

In this work, we focus on greenspace planning in Europe from a strategic perspective and how compliant strategic greenspace plans are with the processes, approaches, and policy themes of UGI as determined through the European Union-funded FP7 GREEN SURGE (ENV.2013.6.2-5) project. Firstly, however, let us define strategic greenspace planning as it is used in this work. According to CABE Space (2006), an overall approach to greenspace will have specific achievable goals, including the methods and time (i.e., temporal component) required to meet them. In most cases, this planning is undertaken by public authorities − often local municipalities − and is linked upwards to corporate aims such as territorial land-use plans and downwards to more detailed strategies looking at, for example, nature conservation or urban forestry. Hence, a strategic approach to greenspace planning provides a bridge between local delivery, policy, and overarching aims and objectives which may have been set at the local level, or possibly at a higher tier of government (based on CABE Space, 2006).

Our overarching aim is to test whether, and to what extent, strategic greenspace planning in European cities complies with the principles of UGI planning approaches, processes, and policy themes. We hypothesise that these UGI principles are presently under-represented in planning documents and policies, and that this is a consequence of the level of adoption, the significance of presence, the advancement of policies, and planning contradictions. We expect our investigation of UGI principles to reveal the degree to which they have been adopted and provide us with the necessary evidence to justify further research. Contextually, our hypothesis hinges upon the fact that GI remains a relatively new concept. Therefore, we believe that a number of predecessor concepts, such as those referred to by Davies et al. (2006) (e.g., ecological networks) will feature in our investigation.

The study was informed by our awareness that a number of European cities already had well-established strategic approaches to greenspace planning, and that many of these encompass the planning approaches, processes, and policy themes of UGI, without the authors of these documents being aware of the UGI concept or mentioning it. To corroborate our hypothesis, the following research objectives were defined:

- Understand to what extent our case study cities have adopted UGI principles and what type of correlation exists with the planning family they are part of;
- Define which of the UGI processes, approaches and policy themes are more, or less, significantly present and what impact this has on strategic urban greenspace planning;
- Determine whether there are any contradictions in planning policy that would hinder the development of UGI principles.

2. Materials and methods

We aimed to test our hypothesis through a systematic review of data and reports previously obtained for the GREEN SURGE project and then subjected these to re-analysis to answer research objectives derived from our hypothesis. We had access to: a questionnaire survey, desk study, document analysis, and a semi-structured interview with authors of strategic greenspace plans in 20 major European cities across 5 study-defined planning families.

Firstly, we undertook a fresh review of the UGI principles, as determined by the project, and agreed that they are a robust basis to conduct our study. Specifically, the principles of *connectivity, multifunctionality, (grey-green) integration, and multi-scale* (operating at different spatial levels) constitute the concept of UGI as a planning approach; the principles of *strategic, inter- and transdisciplinary,* and *socially inclusive* represent the UGI planning process; while *biodiversity, ecosystem services, climate change adaptation, green economy, human health,* and *social cohesion* represent the UGI policy themes (based on Benedict and McMahon, 2006; Kambites and Owen, 2006; Ahern, 2007; Pauleit et al., 2011; EC, 2013; Hansen and Pauleit, 2014; Mell, 2014; Davies et al., 2015).

To assess these UGI principles and the relative compliance of current greenspace planning, we revisited the comparative case study research that was undertaken in the European project, which employed both qualitative and semi-quantitative methods. Twenty case studies representing a variety of European cities and city-regions were re-analysed. These provide a sample of planning systems and different situations affecting urban greenspace planning (e.g., land cover and population dynamics) across Europe (Hansen and Rall, 2015).

We reassessed the existing planning family classifications in Europe based on Nadin and Stead (2008), who adapted the ESPON (2007) and European Commission Compendium (EC, 1997) classifications; these