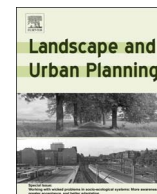




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Research Paper

Stewardship of urban ecosystem services: understanding the value(s) of urban gardens in Barcelona

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ABSTRACT

The notion and assessment of ecosystem services (ES) values is becoming an established part of the discourse regarding urban green space performance. Yet, underlying factors enabling ES values are still poorly understood. We assume the production of ES value crucial for environmental stewardship in cities, and aimed in this study to uncover their key enabling factors. This study has been developed on a broad data base including a survey (n = 201), interviews (n = 46), field observation and remote sensing from 27 urban gardens in Barcelona, Spain, including municipal 'allotment gardens' and 'civic gardens' emerging from bottom-up initiatives. In a first step, we distinguished different urban gardens types regarding the ES values they provide. In a second step, we tested specific garden characteristics including (a) user profiles, (b) biophysical garden properties, and (c) institutional settings for their specific importance to trigger ES values. Results showed ES values to significantly differ with the types of gardens. For example, classical allotment gardens are more likely to provide recreational values, while emerging civic gardens are more likely to produce place-making and social cohesion. A main finding from our study is the importance of social and institutional garden characteristic as enabling factors of ES values. Results indicate, for example, a correlation between childhood experiences and a higher appreciation of ES. Our results further indicate that civic gardens with broader property rights and decision-capacities are more likely to enhance stewardship action. In providing a differentiated understanding of the ES value(s) of urban gardens, this study highlights the potential for green space planning in cities to steer the stewardship of urban gardens by providing institutional and physical space for civic gardening initiatives.

1. Introduction

Stewardship of ecosystem services (ES) is one of the greatest challenges for landscape and urban planning in the 21st century (Rockström, 2015; UN, 2014:15). The global urbanization trend (Seto, Fragkias, Güneralp, & Reilly, 2011) is decreasing people's awareness for human dependency on healthy ecosystems (Colding & Barthel, 2013; Gómez-Baggethun & de Groot 2010; Miller, 2005), and impinging upon environmental stewardship (Andersson & Barthel, 2016). Recent advances in assessing the value of urban ES (e.g., Gómez-Baggethun et al., 2013; Haase et al., 2014) are counteracting this trend by sensitizing for

the importance of environmental stewardship action to maintain and restore multifunctional urban green spaces for human well-being.

Among different green spaces in cities, urban gardens have shown to be hubs for civic engagement and environmental stewardship in cities (Bendt, Barthel, & Colding, 2013; Colding & Barthel, 2013) that inspire civic restoration and community-based green space tending (Connolly, Svendsen, Fisher, & Campbell, 2013; Krasny & Tidball, 2009a). A number of studies has helped shedding light on the specific ES values, which can be understood as an expression of people's needs and preferences in relation to nature and others (Chan et al., 2016), that motivate individuals or groups of people to engage in the stewardship

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action of community gardening (Breuste & Artmann, 2014; Guitart, Pickering, & Byrne, 2012; Hynes & Howe, 2002; Langemeyer, Latkowska, & Gómez-Baggethun, 2016). Chan et al. (2016) distinguished ES values into intrinsic, instrumental and relational values, the latter produced individually as well as collectively. Engaging in stewardship action rewards – and thus motivates – gardeners with several direct benefits (Calvet-Mir, March, Nordh, Pourias, & Čakovská, 2016; Langemeyer et al., 2016). Benefits include emotional, practical and social values (Dunnett & Qasim, 2000) as well as enhanced food security (e.g. Barthel & Isendahl, 2013), recreational benefits (e.g. Hawkins et al., 2011; Van den Berg, Maas, Verheij, & Groenewegen, 2010), educational benefits (e.g. Breuste & Artmann, 2014; Doyle & Krasny, 2003), social cohesion (e.g. Armstrong, 2000), and sense of place and community (e.g. Andersson, Barthel, & Ahrné, 2007; Andersson et al., 2014). A recent study by Camps-Calvet, Langemeyer, Calvet-Mir, and Gómez-Baggethun (2016) lists as many as 20 different ES that make urban gardens valuable for people. The study found relaxation, ‘biophilia’, the satisfaction of blooming life, (Wilson, 1984) and place-making, generally considered to be process of civic or community-based urban regeneration (Healey, 2007; Noori & Benson, 2016), among the most appreciated ES.

Multiple ES values urban gardens provide to city dwellers qualify them as potential nature-based solutions to urban challenges (Cabral, Costa, Weiland, & Bonn, 2017; Kabisch et al., 2016). Community gardening can for example enhance social inclusion (Anguelovski, 2013), stimulate healthier diets (Litt et al., 2011), lower the risk of obesity (Zick, Smith, Kowaleski-Jones, Uno, & Merrill, 2013) and help urban people to reconnect to nature (Krasny & Tidball, 2009a). Urban gardens are also important components of larger urban green infrastructure networks that provide niche habitats and ecological connectivity (Breuste, 2010; Langemeyer et al., 2016). Yet, urban gardens are by no means homogenous, and rapidly changing urban conditions are leading to the emergence of new varieties and approaches to urban gardens (Caputo, Schwab, & Tsiambaos, 2016). Classical ‘allotment gardens’ (publicly owned land formally dedicated to gardening) are complemented by new forms of ‘community gardens’ or ‘civic gardens’ emerging from *ad-hoc* gardening initiatives which do not necessarily follow top-down planning approaches (Camps-Calvet et al., 2016; Caputo et al., 2016; Zammit & Erjavec, 2016). It is thus likely that these garden types provide different values and fit different needs of urban societies. Thus, drafting green infrastructure policies that enable the broad potential of urban gardens in providing benefits to people requires understanding the production of ES values in different types of urban gardens.

In general terms, ES values have been described as originating from the complex interactions within coupled social-ecological systems (e.g., Andersson et al., 2014). Properties of urban social-ecological systems that are generally assumed to enable ES values include ecological and physical elements, beneficiaries’ social and demographic properties as well as the institutional context (e.g., Chan et al., 2012; Gómez-Baggethun & Kelemens, 2008; Kremer et al., 2016; Primmer & Furman, 2014; Scholte, van Teeffelen, & Verburg, 2015). To our knowledge, only two studies have examined factors that enable ES values in urban gardens. Dunnett and Qasim (2000) examined the relation of ES values with demographic properties of gardeners and uncovered relations between the perception of values and the age and gender of gardeners as well as with their employment and time they spent in the garden. Breuste & Artmann, (2014) noted ES values to vary with land cover and gardeners’ behaviour. Understanding institutional factors in the generation of ES poses a major gap in urban ecosystem service research (Kremer et al., 2016). Institutions, which shape the social-ecological relations in urban gardens, have thus far not received any attention as enabling factors for ES values in urban gardens. Here, we understood institutions to be a grouping of formal and informal rules, and related social practices (Ostrom, 2009:18). As mediators at the interface between the physical garden space, garden users and the wider urban

context (cf. Bendt et al., 2013; Colding et al., 2013), we presume institutions to be mechanism for enabling ES values and environmental stewardship.

The goal of this study is to understand the production of ES values in urban gardens, since these values may be crucial motivating factors for to engaging in environmental stewardship action in cities. Our paper presents findings from a larger case study on ES from allotment and civic urban gardens in Barcelona, Spain, and builds on the previous valuation of ES and characterization of garden users reported by Camps-Calvet et al. (2016). To carry out our analysis, we first cluster Barcelona’s gardens with regard to the specific ES values. We then expand upon previous approaches in order to identify enabling factors for ES values by examining the relation between ES values and (a) user properties, (b) physical garden structures, as well as (c) institutional properties of urban gardens.

2. Case study: urban gardens in Barcelona

The city of Barcelona constitutes one of the most densely populated urban areas in Europe characterized by very low levels of urban green spaces per capita. The average amount per capita is 6.64 m² (IDESCAT, 2013), which means Barcelonans have about 1/3 of the green space per capita compared to inhabitants of other European cities (Fuller & Gaston, 2009).

Urban gardens in Barcelona have long suffered from a lack of broader societal and policy appreciation (Domene & Saurí, 2007). We argue that to sustain environmental stewardship in urban areas in the long-run, it is critical to create a broader understanding of the values urban gardens provide. In other (Northern) European cities, such as the city Leipzig in Germany, the “Schreiber”-movement enhanced the popularity of urban gardening for educational and leisure purposes as early as the 19th century (Keshavarz & Bell, 2016). Today gardens cover about 4.1% (1240 ha) of the total urban surface (own calculation based on Stadt Leipzig, 2015a, 2015b). In Barcelona in turn – as in many parts of the Mediterranean and other urbanizing parts of the world – agricultural production sites and horticulture gardens have a history of being marginalized and expelled from the city through different waves of urbanization over the course of the 20th century (Roca, 2000; Vendrell & Clanchet, 1992). The Barcelona City Council (2013) estimates that today not more than 0.3% of the city’s total surface is used for gardening.

But, on par with larger trends in Europe and around the globe (Caputo et al., 2016), in the last two decades Barcelona is undergoing a dynamic restoration of urban gardens, both through top-down (‘allotment gardens’) and bottom-up (‘civic gardens’) approaches (Camps-Calvet, Langemeyer, Calvet-Mir, Gómez-Baggethun, & March, 2015; Camps-Calvet et al., 2016; Domene & Saurí, 2007) (Fig. 1). Top-down approaches include a municipal garden program launched in 1997 for the city-wide creation and allocation of ‘public gardens’ to retired and socially marginalized citizens (Giacchè & Tóth, 2013), as well as the municipal ‘Pla Buit’ (Empty-Spaces Plan), which since 2013, grants vacant land owned by the municipality to civic initiatives for interim uses (Barcelona City Council, 2015). In parallel, Barcelona is witnessing a considerable emergence of self-governed gardens from the bottom-up. These ‘civic gardens’, or ‘community gardens’ as Camps-Calvet et al. (2016) call them, are often associated with squatting of vacant public and private land and have gained particular momentum since the beginning of the global financial crisis in 2007–2008 (Camps-Calvet et al., 2015).

3. Data & methods

Our research assessed 27 urban gardens within the municipal boundaries of Barcelona (Fig. 2) and included ‘allotment gardens’ created under the municipal garden program. In addition we included ‘civic gardens’ emerging from bottom-up initiatives, identified by

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