Environmental Science & Policy xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Environmental Science & Policy

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

# Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning

Marta Camps-Calvet[a], Johannes Langemeyer[a,b,*], Laura Calvet-Mir[a,c], Erik Gómez-Baggethun[d,e]

[a] Institute of Environmental and Technology (ICTA), Universitat Autònoma de Barcelona, Spain
[b] Stockholm Resilience Centre, Stockholm University, Sweden
[c] Internet Interdisciplinary Institute (IN3), Universitat Oberta de Catalunya, Spain
[d] Norwegian Institute for Nature Research (NINA), Norway
[e] Department of International Environment and Development Studies, Norwegian University of Life Sciences (NMBU), Norway

ARTICLE INFO

*Article history:*
Received 10 February 2015
Received in revised form 18 October 2015
Accepted 12 January 2016

*Keywords:*
Barcelona
Ecosystem services
Green infrastructure
Nature-based solutions
Urbanism
Urban agriculture

ABSTRACT

In many European cities, urban gardens are seen as increasingly important components of urban green space networks. We adopt an ecosystem services framework to assess contributions of urban gardens to the quality of of their users. First, we identify and characterize ecosystem services provided by urban gardens. Secondly, we assess the demographic and socioeconomic profile of its beneficiaries and the relative importance they attribute to different ecosystem services. Next we discuss the relevance of our results in relation to critical policy challenges, such as the promotion of societal cohesion and healthy lifestyles. Data were collected through 44 semi-structured interviews and a survey among 201 users of 27 urban gardens in Barcelona, Spain, as well as from consultation meetings with local planners. We identified 20 ecosystem services, ranging from food production over pollination to social cohesion and environmental learning. Among them, cultural ecosystem services (non-material benefits people derive from their interaction with nature) stand out as the most widely perceived and as the most highly valued. The main beneficiaries of ecosystem services from urban gardens are elder, low-middle income, and migrant people. Our results about the societal importance of urban gardens were deemed highly relevant by the interviewed green space planners in Barcelona, who noted that our data can provide basis to support or expand existing gardening programs in the city. Our research further suggests that ecosystem services from urban gardens can play an important role in addressing several urban policy challenges in cities, such as promoting stewardship of urban ecosystems, providing opportunities for recreation and healthy lifestyles, and promoting social cohesion. We conclude that urban gardens and associated ecosystem services can play an important in urban policies aimed at enhancing quality of life in cities, particularly if access to their benefits is expanded to larger segments of the population.



## 1. Introduction

With more than half of the world's population living in cities and a projected urban population of 60% by 2030, achieving more sustainable, livable and resilient cities stands among the greatest challenges for urban policy and planning in the 21st century (UN, 2013). Recent policy developments call for novel approaches to address complex and interrelated economic, social and environmental challenges (EC, 2014). A move in this direction is the growing attention paid to urban ecosystems for their potential to offer nature-based solutions, i.e. solutions supported by nature that simultaneously provide economic, social and environmental benefits to address societal challenges, ideally in a resource-efficient and adaptable manner (EC, 2015).

In public policy discourse, urban ecosystems such as parks, cemeteries, green roofs, forests and gardens are increasingly portrayed as 'green infrastructure' (EEA European Environmental Agency, 2011; DG Environment, 2013), a metaphor that emphasizes the role that green spaces in or near the built environment as sources of ecosystem services (ES) (Bolund and Hunhammar, 1999; Gómez-Baggethun et al., 2013). Urban ES are direct or indirect

* Corresponding author at: Institute for Environmental Science and Technology, ICTA-ICP, Edifici Z, Carrer de les columnes, Universitat Autònoma de Barcelona, 08193 Bellaterra-Cerdanyola del Vallés, Spain. Fax: +34 935863331.
*E-mail addresses:* martacampsc@gmail.com (M. Camps-Calvet), johannes.langemeyer@uab.cat (J. Langemeyer), lcalvetmir@gmail.com (L. Calvet-Mir), erik.gomez@nina.no (E. Gómez-Baggethun).

http://dx.doi.org/10.1016/j.envsci.2016.01.007
1462-9011/

contributions of urban ecosystems to human well-being (MEA, 2005; TEEB, 2010). They include most prominently *supporting services* such as the provision of habitats for species (Gómez-Baggethun and Barton, 2013), *regulating services* like air purification, run-off mitigation, and protection against climate extremes (Baró et al., 2014; Costanza et al., 2006), and *cultural services* (immaterial benefits) such as opportunities for recreation, environmental education, and spiritual enrichment (Chiesura, 2004; Langemeyer et al., 2014). So-called 'green infrastructure' strategies to promote ES are gaining leverage in policy and planning (EC, 2013). For example, the European Commission has recently approved a Green Infrastructure Strategy that promotes green infrastructure in urban and rural areas and states that maintaining multi-functional green spaces is a key step for implementing the EU 2020 Biodiversity Strategy (EC, 2011a).

One element of urban green infrastructure that has attracted growing attention in the literature in recent years are urban gardens (Breuste, 2010). Urban gardens are urban areas where horticultural activities take place. They may cover a broad range of typologies, including school gardens, therapeutic gardens, allotment gardens, home gardens, and community gardens (Lawson, 2005). The importance of urban gardens has been emphasized on the basis of their social functionality and high intensity of use (Breuste, 2010:464), their role in building resilience (Barthel et al., 2013), and their contributions to human well-being through the delivery of ES (Breuste and Artmann, 2014; Langemeyer et al., 2016b).

Despite growing attention to urban gardens in the scientific literature, their policy appreciation remains generally poor and the case has been made that gardens are "often, disadvantaged by

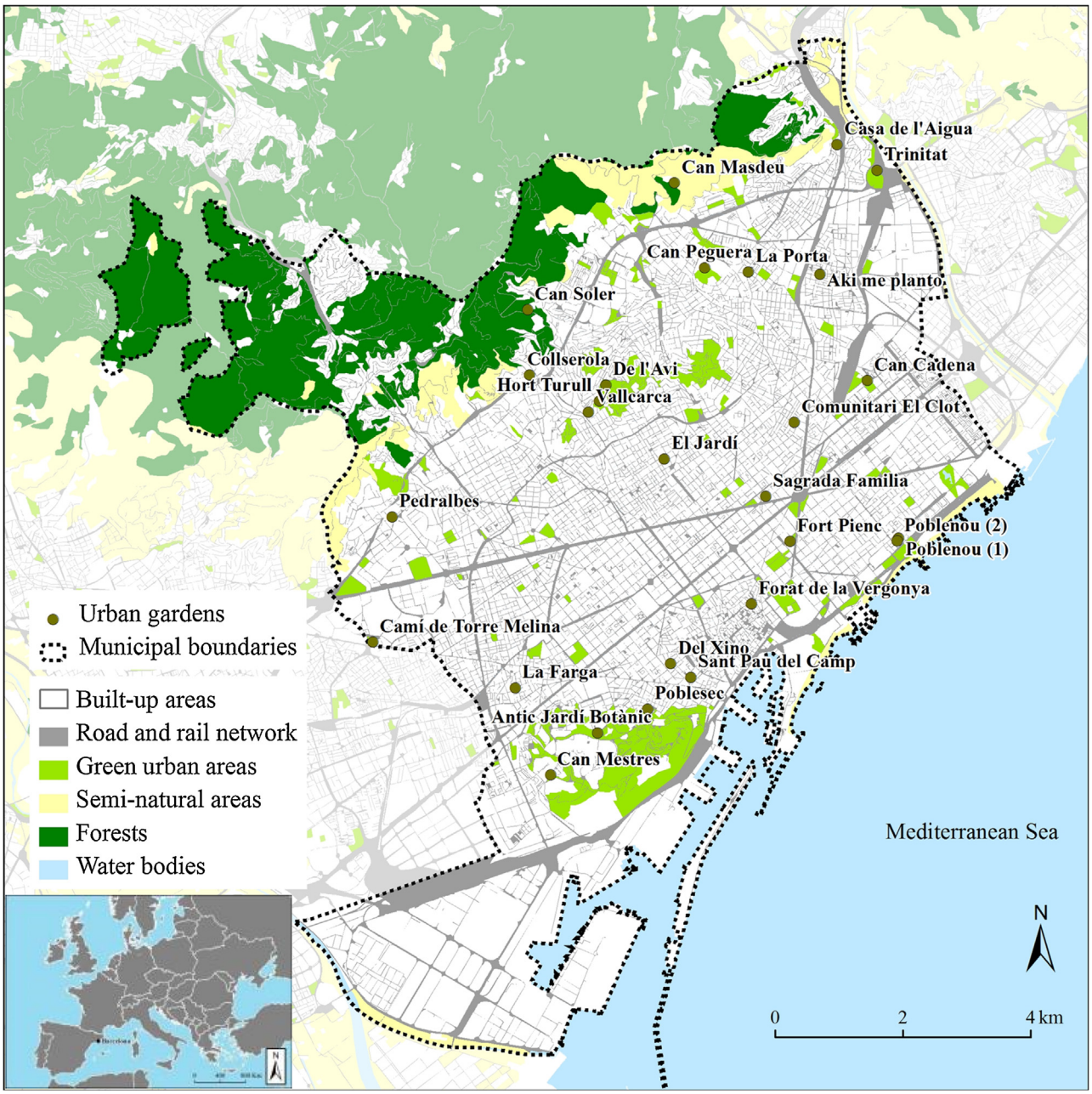


**Fig. 1.** The case study area: Urban gardens in Barcelona.
Source: own elaboration based on Natural Earth data (www.naturalearthdata.com) & EEA (European Environment Agency) (2010). GMES Urban Atlas. http://www.eea.europa.eu/data-and-maps/data/urban-atlas).

Please cite this article in press as: M. Camps-Calvet, et al., Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning, Environ. Sci. Policy (2016), http://dx.doi.org/10.1016/j.envsci.2016.01.007