



BOOK OF ABSTRACT

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I. SESSION DESCRIPTION

ID: B10b

Urban agriculture and ecosystem services

Hosts:

	Title	Name	Organisation
Host:	Dr.	Kathrin Specht	Research Institute for Regional and Urban Development (ILS), Dortmund, Germany
Co-host:	Dr.	Martina Artmann	Leibniz Institute of Ecological Urban and Regional Development (IOER), Dresden, Germany

Abstract:

Urban agriculture (UA) is increasingly proposed as an environmentally friendly practice and solution, which addresses global challenges including urbanization, public health, food security and climate change. The ecosystem services (ES) of UA can potentially have large environmental as well as societal benefits for cities, such as water regulation, improved food security, or air quality.

First studies have investigated the impacts of UA on the quantity, quality, and stability of ES provided. Nevertheless, research on ES of UA is still on an early stage. So far, research on the contribution to ES has often addressed UA as a subtype of either “green infrastructure” or “agricultural production”. Still, existing research has shown, that as highly managed plant communities, UA can exhibit high levels of biodiversity, often exceeding that of other green space areas within the city and that it differs from other green urban infrastructure (e.g. in terms of provision of food, pollination, water management, socio-cultural services).



Moreover, UA also shows distinct characteristics compared to agricultural production sites in peri-urban or rural areas and therefore potential provisioning and regulating services may largely differ.

The goal of this session is two-fold: first, to present practical examples of investigation and assessment of ES of UA; and, second, to critically review and summarize existing research on UA and their potential to support ecosystem services delivery.

Goals and objectives of the session:

- Present and discuss first examples of assessment, valuation and investigation of ES and UA
- Work towards a survey of the existing research and state of the art on ES and UA
- Discussion of gaps in current research and strategies to better understand and support UA and ES

Planned output / Deliverables:

- "Factsheet" on the state of knowledge and debate. This is supposed to be generated in form of a mini review on the topic, which is discussed and jointly developed with the session participants. This is as a direct outcome of the session.
- Working towards a "Special issue" in a peer-reviewed journal on the topic
- Establishing a first network of researchers on the topic of UA and ES

Related to ESP Working Group/National Network:

[Biome Working Groups: BWG 10 - Urban systems](#)



II. SESSION PROGRAM

Date of session: Thursday, 18 October 2018

Time of session: 8:45 – 13:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
8:45–9:00	Kathrin	Specht	ILS/IOER (Germany)	Welcome and introduction/
	Martina	Artmann		Urban agriculture and ecosystem services in a nutshell: A recent state of the art
9:00–9:15	Carla-Leanne	Washbourne	University College London (UK)	Analysing and visualising the benefits of food gardens as a green asset in Johannesburg through multi-method modelling
9:15–9:30	Marta	Hernández Arroyo	Centro de Estudios Ambientales Vitoria-Gasteiz (Spain)	Ecosystem services and social values of urban gardens: Effects on health and well-being
9:30–9:45	Martina	Artmann	Leibniz Institute of Ecological Urban and Regional Development (Germany)	From urban agriculture to edible cities– a nature-based solution for upscaling local food supply?
9:45–10:15	(Discussion)			
11:30–11:45	Baptiste	Grard	UMR ECOSYS, INRA–AgroParisTech (France)	Rooftop farming on urban waste: assessment of ecosystem services provided by constructed



Time	First name	Surname	Organization	Title of presentation
				Technosols
11:45–12:00	Kathrin	Specht	Research Institute for Regional and Urban Development (Germany)	Ecosystem services of urban agriculture in Bologna: a perception approach from the society to the manager level
12:00–12:45			Discussion	
12:45–13:00			Discussion/ Final remarks	

III. ABSTRACTS

The abstracts appear in alphabetic order based on the last name of the first author. The first author is the presenting author unless indicated otherwise.

1. Type of submission: **Abstract**

B. Biome Working Group sessions: B10b Urban agriculture and ecosystem services

Rooftop farming on urban waste: assessment of ecosystem services provided by constructed Technosols

First author: Baptiste Grard

Other author(s): Claire Chenu, Nathalie Frascaria–Lacoste, Sabine Houot, Christine Aubry

Affiliation: UMR ECOSYS, INRA–AgroParisTech, Université Paris–Saclay, 78850 Thiverval–Grignon, France

Urban farming, especially on rooftops, is a popular and growing topic in both the media and scientific literature (Specht et al. 2013; Thomaier et al. 2014). Indeed, it is perceived as an opportunity to meet some of the challenges linked to urban development worldwide especially regarding ecosystem services. However, quantitative evidence concerning ecosystem services aeded (Aerts et al. 2016). Moreover, little attention has been paid to date to the growing medium of green roofs, i.e., Technosols. A better understanding of the influence of Technosol choice and its links with ecosystem services is required in order to maximize the environmental benefits of urban rooftop farming. Since March 2012 a pilot project called T4P (Parisian Productive rooftoP, Pilot Experiment) was conducted on the



rooftop of AgroParisTech University in Paris. Three experimental devices with different types of Technosol were installed. Different types of measurement were realized: yield measurements (quantity and quality), Technosol characterization and leaching characterization (quantity and quality). We then performed a comparison of several ecosystem services expected from Technosols in terms of food provisioning (food production), regulation of water runoff (quantity and quality of runoff), recycling of organic waste and potential carbon storage. We identified indicators of ecosystem services (e.g., yield, annual mass loss of mineral nitrogen or carbon) and compared their measured values to reference situations (asphalt roof, green roof, and cropland) as well as between experiments. Our analysis shows the multifunctional character of Technosols made of organic waste and located on urban rooftops, while the ecosystem services approach appears to be promising to evaluate and devise constructed Technosols as a component of green infrastructures.

Keywords: Urban agriculture, ecosystem services, Technosol, green roof and rooftop farming.

2. *Type of submission:* **Abstract**

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

Ecosystem services of urban agriculture in Bologna: a perception approach from the society to the manager level

First author: Esther Sanyé-Mengual, Kathrin Specht

Other author(s): Thomas Krikser, Giuseppina Pennisi, Francesco Orsini, Giorgio Prosdocimi Gianquinto

Presenting author: Kathrin Specht Research Institute for Regional and Urban Development (ILS)

Affiliation: University of Bologna, Research Institute for Regional and Urban Development (ILS), Italy

During the last decades, the expansion of Urban Agriculture (UA) over European cities has been remarkable. UA has gained multiple functions and been used as a tool in the design of more sustainable cities, where the provision of environmental and socio-cultural ecosystem services (ES) has become a central discourse. Diverse studies have focused on the



quantification of the ES provision by different types of UA in cities of developed countries (e.g., “food provision”, “biodiversity”) and some authors have also studied the perceived ES provision by users and gardeners (e.g., UA in Barcelona). However, little attention has been paid to the perception of the society as a whole. This study attempts to provide new knowledge in the evaluation of ES of UA by assessing how the provision of ES by UA in Bologna (Italy) is perceived from the point of view of the society of the managers of specific case studies. A non-monetary evaluation of the ES via a Likert-scaled survey was performed, including 14 environmental ES and 12 socio-cultural ES. The survey was compiled by the general public (n=280) and one manager for each case study (n=6). The expected results will provide data on perceived ES of UA from a global conceptualization in the society to the specific perception of managers of different types of UA. Results will be compared to data from the available literature to identify similarities and differences for different study areas and UA types.

Keywords: ecosystem services, urban agriculture, social perception, urban sustainability, urban Green infrastructure

3. Type of submission: **Abstract**

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

From urban agriculture to edible cities– a nature-based solution for upscaling local food supply?

First author: Martina Artmann, Katharina Sartison

Affiliation: Leibniz Institute of Ecological Urban and Regional Development (IOER), Leibniz Institute of Ecological Urban and Regional Development (IOER), Germany

Despite social, environmental and economic benefits of local food supply (peri-)urban agriculture (UPA) is under threat from urban expansion. To emphasize the importance of UPA for sustainable development, we advocate to appreciate UPA as nature-based solution (NbS) contributing to a range of societal challenges. By conducting a systemic review of 166 academic articles focusing on empirical case studies in the global north, our study argues that UPA as NbS contributes to climate change mitigation and adaptation, food security, biodiversity and ecosystem services, agricultural intensification, resource efficiency, urban renewal and regeneration, land management, public health, social cohesion, and economic



growth. The value of UPA is its multifunctionality supplying provisioning, regulating and cultural ecosystem services to a broad variety of population groups (e.g., elderly, children, immigrants, urban planning). The results show further that urban ecosystems includes a mosaic of different forms of UPA such as peri-urban farming, community gardens, aquaponics and rooftop gardens. The question arises: How can UPA be up-scaled to increase local food supply and ecosystem services? In this regard, the study reflects further on the concept of edible cities which aims to use (public) urban spaces for the provision of food to improve the quality of urban open spaces, promote urban participation and contribute to the future viability of cities. In the second part of the presentation this study will present results from expert interviews from three German case studies: Andernach as front-runner city as well as Haar and Munich as followers. The interview results will reflect on the multidimensional benefits and ecosystem services provided by edible cities as well as drivers and constraints when implementing the concept. Based on the results, the study will present an integrative assessment to evaluate the implementation and impact efficiency of edible cities which can be applied for different forms of UPA.

Keywords: urban food supply, urban ecosystem services, multifunctionality, systemic solution, integrative assessment

4. *Type of submission: Abstract*

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

Urban agriculture and cultural ecosystem services – cases from Hungary

First author: Bálint Balázs, Fanni Bársony

Affiliation: Environmental Social Science Research Group, Corvinus University of Budapest, Hungary

This presentation is bringing together two research strands from Hungary: one looking at urban community gardens as UA sites that promote democratic and collaborative practices. Knowledge co-production is taking place in the gardens at least in two ways: firstly, there is advanced learning on practical problems related to food provisioning. Secondly, knowledge is created at a more abstract level around ecological concerns. The other research strand is about the practice of food self-provisioning, its extent and sociocultural embeddedness in Hungary. In both case examples community building, sharing and cooperation are vital



characteristics of the food provisioning activity. In the presentation, it is questioned how environmentally friendly practices are promoted in the two different contexts. The presentation will build on the available survey and interview data of Hungarian researchers on these themes to point out how cultural ESs contribute to constituencies of wellbeing in UA.

Keywords: urban agriculture, cultural ecosystem services, food self-provisioning

5. *Type of submission:* **Abstract**

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

Analysing and visualising the benefits of food gardens as a green asset in Johannesburg through multi-method modelling

First author: Carla Washbourne

Other author(s): Samuel Lane, Eliana Camargo Nino, Kanako Okano, Bo Peng, Irvanu Rahman

Affiliation: University College London, United Kingdom

Green Infrastructure (GI) is an increasingly popular framing in urban planning and design, with many cities now using GI initiatives to tackle a range of environmental and social issues. This research project focussed on food gardens as a GI asset which can provide multiple ecosystem services. The research took a systems approach to analyse the role of food gardens and their benefits. It was undertaken with the Gauteng City-Region Observatory and contributes to understanding the GI opportunities in Johannesburg. The project used problem solving theory to understand the social-technical system around food gardens in Johannesburg. It collected qualitative and quantitative data through interviews and surveys of policy makers, experts, and farmers in Johannesburg, as well as looking for existing research, reports and spatial data. The project synthesised relevant literature, which informed the creation of a causal loop diagram (CLD). The project team then engaged with various stakeholders through semi-structured interviews, resulting in the completion of a multi-criteria decision analysis, and online surveys. This stakeholder engagement, along with spatial analysis, then refined the CLD. Spatial analysis included identifying the locations of food gardens registered in the City of Johannesburg, assessing how the location of current food gardens supports communities and where critical gaps remain. Together, the CLD and spatial analysis have the potential to provide policy makers with key information



about why investing in food gardens, as a GI asset, is important and provide some insight into where further investment could be made. The project concluded with recommendations for policy interventions including: land use policy support, simultaneous institutional and technical assistance within funding programs, establishing creative financing and taxation and strengthening food gardens for poverty alleviation.

Keywords: Urban agriculture, green infrastructure, qualitative system modelling, multi-criteria decision analysis, spatial analysis

6. *Type of submission:* **Abstract**

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

Urban agriculture and ecosystem services in a nutshell: A recent state of the art

First author: Kathrin Specht, Martina Artmann

Other author(s): Esther Sanyé-Mengual

Affiliation: Research Institute for Regional and Urban Development (ILS), Leibniz Institute of Ecological Urban and Regional Development (IOER), Italy

Urban agriculture (UA) is increasingly proposed as an environmentally friendly practice and solution, which addresses global challenges including urbanization, public health, food security and climate change. UA can potentially have large environmental as well as societal benefits for cities, such as water regulation, improved food security, or air quality. First studies have investigated the impacts of UA on the quantity, quality, and stability of ES provided. Nevertheless, research on ES of UA is still on an early stage. So far, research on the contribution to ES has often addressed UA as a subtype of either “green infrastructure” or “agricultural production”. Still, existing research has shown, that as highly managed plant communities, UA can exhibit high levels of biodiversity, often exceeding that of other green space areas within the city and that it differs from other green urban infrastructure (e.g. in terms of provision of food, pollination, water management, socio-cultural services). Moreover, UA also shows distinct characteristics compared to agricultural production sites in peri-urban or rural areas and therefore potential provisioning and regulating services may largely differ. This paper critically reviews existing research on UA and their potential to support ecosystem services delivery.



Keywords: urban agriculture, ecosystem services, urban sustainability, urban green infrastructure

7. *Type of submission:* **Abstract**

B. Biome Working Group sessions: [B10b Urban agriculture and ecosystem services](#)

Ecosystem services and social values of urban gardens: Effects on health and well-being

First author: Marta Hernández–Arroyo, Irene Iniesta–Arandia

Other author(s): Erik Gómez–Baggethun, Carlos Montes del Olmo

Affiliation: Centro de Estudios Ambientales Vitoria–Gasteiz, Spain, University of Córdoba, Spain

Green infrastructure can provide nature-based solutions to important sustainability challenges in urban areas, including aspects of social inclusiveness, climate change adaptation, health and well-being. As part of the urban green space network, allotment gardens have shown to hold potential to improve citizen's health and wellbeing through the provision of ecosystem services and through their social and cultural values, especially during crises. This research examines the influence of urban gardens in the wellbeing of gardeners by characterizing and valuing the ecosystem services provided by urban gardens and related agro-ecological practices. Our results draw on semi-structured interviews and a survey conducted among 162 informants in 20 urban gardens of Madrid, Spain, where urban gardens experienced a boom after the financial crisis on 2008. We conducted a socio-cultural valuation of ecosystem services combining qualitative and quantitative data. From our results we identify 18 services provided by urban gardens, including provisioning, regulation and cultural benefits. The latter are the most abundant and the most highly valued by gardeners. The study highlights ecological and social values of urban gardens, that have been under-recognized in urban planning and management of urban green spaces. We conclude with a set of policy recommendations for making a more active use of urban gardens as tools to increase health and well-being in urban areas.

Keywords: ecosystem services, well-being, green commons, urban resilience, green infrastructure