Urban Agriculture Europe

Frank Lohrberg
Lilli Lička
Lionella Scazzosi
Axel Timpe
(eds.)

jovis

Contents

Preface

8 Urban Agriculture Europe: Agriculture Interacting with the Urban Sphere

1

Phenomenon

16 Introduction

18 1.1 Can Agriculture Be Urban?

22 1.2 From Urban Food Gardening to Urban Farming

30 1.3 Urban Agriculture from a Global Perspective

Case Studies

39 **Barcelona**
Outstanding Agricultural Diversity in a Dense and Small Area

47 **Ruhr Metropolis**
A Polycentric Hotspot of Urban Agriculture

2

Governance

56 Introduction

58 2.1 Exploring the Diversity of Actors in Urban Agriculture

64 2.2 Governance of Urban Agriculture Initiatives: Insights Drawn from European Case Studies

71 **Warsaw**
Challenges for Urban Agriculture

3

Business

80 Introduction: Urban Agriculture Has an Economic Dimension

82 3.1 It Is a Business! Business Models in Urban Agriculture

92 3.2 Creating Added Value: Societal Benefits of Urban Agriculture

102 3.3 I Am Not an Urban Farmer. Am I?

107 **Milan**
An Agricultural Metropolis: Top-down and Bottom-up Initiatives

4

Space

116 Introduction

120 4.1 Agriculture in Urban Space

126 4.2 Urban Agriculture Goes Green Infrastructure

138 4.3 Urban Agriculture and Cultural Heritage: A Historical and Spatial Relationship

5

Metabolism

166 Introduction

170 5.1 From Waste to Value: Urban Agriculture Enables Cycling of Resources in Cities

174 5.2 Mending the Metabolic Rift: Placing the ‘Urban’ in Urban Agriculture

178 5.3 Urban Agriculture Practices on the Metabolic Frontier: Cases from Geneva and Rotterdam

Case Studies

149 **Sofia**
A City with Urban Agriculture Potential

157 **Geneva**
Agriculture Integrated into Urban Planning? A Challenge

183 **Dublin**
From Horticulture to Community Culture: Diverse Visions of Urban Agriculture in the Dublin City Region

6

Agenda

192 Introduction

194 6.1 Mapping Urban Agriculture on the European Scale

202 6.2 The CAP Reform as a Chance for Urban Agriculture

208 6.3 Urban Agriculture Goes Brussels: Urban Agriculture as a Tool for the Europe 2020 Strategy

214 6.4 Urban Agriculture for Europe's Metropolitan Areas: Barcelona, Dublin, Geneva, Milan, Ruhr, Sofia, and Warsaw

Annex

220 Bibliography

226 Image Credits

228 Authors' Affiliations

230 Editors' Bios

Urban Agriculture Europe: Agriculture Interacting with the Urban Sphere

Frank Lohrberg

During the period of European industrialization, millions of people left their farms in the countryside in order to find their fortune in the city. Subsequently, as the growing cities of the nineteenth and twentieth centuries turned agricultural land into factories, houses, streets, and parks, urbanity became perceived as a notion contrary to agriculture. This process continues today, but it is showing more and more cracks. The growth limits we now face call for smart, sustainable, and inclusive urban development, and new generations of city dwellers have grown up without the notion of agriculture as something to conquer. Moreover, agriculture has become of great interest in finding new answers for how cities can master recent social, economic, and ecological challenges.

This book presents the results of the COST Action Urban Agriculture Europe, a networking project funded by the European Cooperation for Science and Technology (COST). The Action took place from 2012–2016 and allowed scholars and professionals in the domains of agriculture and urban development to exchange their knowledge. The aim was to gain deeper understanding of Europe's different forms of 'Urban Agriculture' and to develop a common language, in order to better identify and communicate the potentials of Urban Agriculture from a European perspective.

The Action structured its work along an expedition to seven places exemplary of Europe's Urban Agriculture. Combined with meetings and conferences, the Action visited the urban regions of Barcelona, Dublin, Geneva, Milan, the Ruhr Metropolis, Sofia, and Warsaw (Figure 0.1). In addition, these and other regions were examined through Short-Term Scientific Missions conducted by Action members, mainly Early Stage Researchers. Thus, a first picture of Urban Agriculture was sketched and specified by Training Schools held in Malmoe, Toulouse, Vitoria-Gasteiz, Ljubljana and Athens. In addition, more than 200 case studies were collected and made accessible online in the Atlas of Urban Agriculture Europe (www.urbanagricultureeurope.la.rwth-aachen.de). All case studies and reference cases used in this book are shown in Figure 0.2.

Based on these COST activities and existing research, an initial European approach to Urban Agriculture could be elaborated. The approach reflects Europe's unique context—in particular its high-grade and often polycentric form of urbanization, and the fact that the European Union is a policy-maker addressing almost the entire continent.

It proved to be the case that Urban Agriculture is far more than just food production in the city. A comparison with other global regions showed that in Europe, the metalevel benefits of Urban Agriculture are more important than the pure production. The agricultural domain is interested in the processes of adaptation and innovation shown by Urban Agriculture businesses, while the urban development domain seldom uses urban food as a target on its own—mostly as a tool to achieve other, non-production-oriented goals.

COST Action Urban Agriculture Europe participating country

Online Case Study in *Atlas of Urban Agriculture Europe*

Working Group meetings, conferences, and fieldwork

Short Term Scientific Mission

Training School

0.1

COST Action Urban Agriculture Europe networking activities and empirical databases

1

PHENOMENON

1.0
Introduction

Henrik Vejre, Marian Simon-Rojo

Since the creation of the city several 1,000 years ago, a distinction between the rural and the urban has developed. In very general terms, cities are hubs of commerce, trade, finance, education, administration, institutional power, and clergy. In contrast, the rural is a setting of primary production, notably of agricultural products. This distinction has never excluded the idea that agricultural activities take place in the city and on its outskirts. In fact, a surplus-providing Urban Agriculture was a basic premise for the rise of most early cities. Of course, the characteristics of this phenomenon have changed over time; European cities, agriculture has changed from the specialized production or subsistence husbandry of the fifteenth century, through the allotment garden movement of industrialization in the nineteenth century, to the community gardens and urban farming laboratories of the twenty-first century.

Today, Urban Agriculture takes place in countless cities, in all regions of the world, in many styles, and through the involvement of many different kinds of stakeholders. So why not just leave it there? In our post-modern world—faced with challenges such as climate change, stable food supply, and increased urbanization—policymakers and the broader public need insight and sound understanding to guide public policy in this domain. It is our conviction that Urban Agriculture may contribute significantly to the twenty-first century's resilient cities and regions, but its integration in urban and territorial policies is not devoid of conflicts.

We need systematic insight into the characteristics of Urban Agriculture in order to reveal its actual performance and its potential for planners, policymakers, environmentalists, and economists, as well as for farmers, citizens and the general public. Designing future cities and redesigning existing ones without taking Urban Agriculture into consideration will prove insufficient.

As chapter 1.1 points out, there are a number of challenges when it comes to gaining deeper insight into the characteristics of Urban Agriculture. It can hardly be seen as a sector of its own, with its extreme variation, which makes it at least as diverse as traditional rural agriculture. Urban Agriculture is sometimes performed by informal institutions,

Simon Coveney
T.D. and Minster for Agriculture, Food and the Marine, Minister for Defence, Ireland

'Even though the concept of Urban Agriculture as a term is relatively new to policy makers, the actual thinking behind it about using natural resources in an urban environment in a different way, in a healthier way, in a way that promotes a better understanding and education around how food is produced, where it comes from. I think that debate is taking place.'

Urban Agriculture is not the same in a developing country metropolis of the twentieth century as in a medieval European city of the thirteenth century. Intense industrialization and territorial specialization broke the connections between the city and its agrarian hinterland. Since the end of the twentieth century, a new interest in reconnecting periurban farming to the city has taken over and resulted in new models of farming incubators. Inside larger

there is often a lack of statistics, and operations may be carried out by illegal actors; very often the urban variation of agriculture is performed on very small areas. In addition, the creation of an overview of Urban Agriculture—its activities, its performances in terms of production and services, its actors, and its broad role in the urban metabolism—has to take into account that it is a highly dynamic phenomenon, constantly changing in terms of its composition, functions, and actors involved. By concentrating on six crucial 'dimensions', the specifics of Urban Agriculture are revealed.

Taking up Chapter 1.1's general reflections, in Chapter 1.2 we offer an initial European typology covering different characteristics of Urban Agriculture from the 'food gardening' level to the 'urban farming' level. Thirteen types are elaborated in order to approach the phenomenon using a common language, which is especially needed in Europe with its high diversity of languages, knowledge, and cultures.

To better understand Europe's role in Urban Agriculture, Chapter 1.3 provides a glimpse of other global regions, namely North America, Sub-Saharan Africa, Cuba, and Japan. It turns out that Urban Agriculture in Europe is highly inspired by experiences abroad, but at the same time, that other global regions have also benefited from European innovation. Thus Urban Agriculture is a truly global concept in an increasingly urbanized world.

1.1

Can Agriculture Be Urban?

Henrik Vejre, Sebastian Eiter, Verónica Hernández-Jiménez, Frank Lohrberg, Isabel Loupa-Ramos, Xavier Recasens, Dona Pickard, Lionella Scazzosi, Marian Simon-Rojo

Urban Agriculture contributes significantly to sustainable cities (Mougeot 2005). Yet precise knowledge of its qualities and quantities lags far behind our understanding of the general agricultural sector. Thus, more comprehensive information is needed to impact policies and strengthen the sector, to encourage the participation of local actors, to make land available, and to eliminate regulations obstructing the cultivation of farm products within cities. This chapter deals with the basic characteristics of Urban Agriculture, and serves as a general introduction to the concept.

The Concept of Urban and Rural

The apparent contradiction embedded in Urban Agriculture may have its roots in a modern binary interpretation, which holds that areas are either rural or urban. For instance, mainstream census data divide the population into these two segments (see www.census.gov). With a philosophical point of departure, a discussion of what is urban and what is rural gives more room for interpretation and in the contemporary discourse, the concepts are merging (see Schaeffer et al. 2014).

The urban/rural lifestyle dichotomy can be traced back to the Ancient Romans (Rykwert 1988). The urban system deals with trade, industrial production, education, and the presence of legal systems and administration (see Bairoch 1988). In contrast, the rural system is associated with the production and supply of food, energy, and fibers.

Classic nineteenth-century urbanites defined themselves as the opposite of rural farmers. Although these two groups were supposed to differ in education, economy, and culture, they were deeply interdependent. Their relationship has changed over time, and today it is blurred by the globalization, industrialization, and specialization of the agricultural sector. Modern farmers produce for the world market, while buying their own food in the supermarket, with their families working or studying in the city.

Nevertheless, the use of the term 'urban' in relation to agriculture must imply some contrast to the rural. Basically, a rural area is an area outside the urban—a definition created by and reflecting the opinion of those in the urban realm (Schaeffer et al. 2013). Europe's urban areas are widespread and include a variety of green and periurban spaces. Furthermore, the patterns of urbanization vary strongly. Even though many urban areas are planned with clear boundaries, other regions are characterized by sprawling, undefined urban areas (Kabish and Haase 2011).

The Concept of Agriculture

Agriculture is the practice of producing food, fuel, fibers, or fodder in an organized manner. It may be viewed as a contrast to nomadism and hunter-gatherer cultures. Agriculture is often confined to an economic unit—a farm (originally from Latin *firma*, meaning a contract-organized economic unit). Farms may be privately or publicly owned, and run by individuals or collectives. Agriculture is extremely diverse, yet a few characteristics are shared by every agricultural activity: the dependency on land and biological systems, human labour, and investments in production facilities.

Cities and Agriculture —An Ancient Marriage

From the earliest records of urban life, agricultural activities have taken place in urban areas (Green 2012). In pre-industrial cities, urbanites possessed domestic animals and managed small farms or garden plots. The larger farms primarily took care of their food supplies in closed nutrient cycles with periurban agriculture. With the Industrial Revolution, concepts such as garden cities and allotment gardens emerged (Crouch and Ward 1988; Burchardt 2002), providing opportunities for the city dwellers to produce food themselves. Urban Agriculture today builds on a long history; however, the motivation and concrete farming models have changed in recent years. Current tendencies indicate that Urban Agriculture is adapting to the new urbanity of fast-growing megacities and may well experience a renaissance in coming decades (McClintock 2010).

The Dimensions of Urban Agriculture

As a point of departure for this book's discussion, a number of approaches to Urban Agriculture are examined. Key dimensions are identified that characterize Urban Agriculture and distinguish it from mainstream agriculture in rural areas.

1. *Where* does Urban Agriculture take place?
   A *spatial* dimension.
2. *What* does Urban Agriculture *produce* (food/non-food)?
   A *functional* dimension.
3. *Why* does Urban Agriculture take place?
   A *motivational* dimension.
4. *Where* are the products from Urban Agriculture consumed?
   A *market* dimension.
5. *How* did Urban Agriculture *come into being*?
   An *origin* dimension.
6. *Who* performs Urban Agriculture?
   An *actor* dimension.

The Spatial Dimension

The spatial dimension relates Urban Agriculture to its location in space—i.e., the proximity to an urban area. Urban Agriculture takes place in all urban contexts, from the built-up downtown areas to the open space of periurban areas (Yokohari et al. 2000; Jackson-Smith 2008). The gradual transition from urban to rural implies a definitional problem related to the location of the urban-rural border (Lichter and Brown 2011). There is an ongoing discussion about where the so-called urban shadow fades, and where the 'deep rural' begins. The urban shadow has been defined as the land under the influence of a given urban area. Cities exert a strong influence on their surrounding countryside by impacting cultural, social, and economic conditions, and by extracting resources (Tacoli 1998). Commuters work in the city while residing in the countryside. The city attracts commerce and retail, extracting activities from the neighbouring areas. Drinking water may be pumped to the city from large tracts of land, competing with other uses such as agricultural irrigation. Urban areas may influence hydrology in downstream areas far away from the city by creating peak floods. Hence, urban areas impact their surroundings both directly and indirectly.

This spatial dimension is a key characteristic of Urban Agriculture. An urban farm must respond to the presence of the city and adapt to the frame of conditions that the city dictates, but it can also take advantage of this location (Zasada 2011). Urban farms must give way to new suburbs and infrastructure, yet the easy access to infrastructure constitutes a benefit. Farms may be isolated from the rural community and networks, but they thrive through the close contact with huge markets of relatively wealthy consumers. These are examples of the conditions urban farmer have to respond and adapt to, and how they take advantage of the city.

The Functional Dimension

In many cases, production divides urban from rural agriculture. Most rural farms have production as the primary aim. However, the case may be different for Urban Agriculture; this is because service functions—such as landscape features, recreation, education, and health—may be considered paramount to production, or the urban farm may have a broader production scope and be more flexible in establishing new activities.

In this regard, new urban functions of agriculture arise from its integration in the metabolism of the city—i.e., the flow of matter and energy (see Tornaghi 2014; and Chapter 5 in this book). Urban Agriculture may play a crucial role in the handling and circulation of water and nutrients and contribute to solutions for waste disposal, by acting as a sink for organic waste or slightly polluted water.

regions, hobby farmers also turn their attention to animals; raising sheep or hens is popular in Reykjavik. In this context, the Master Plan of Reykjavik declares its intention to encourage Urban Agriculture; it emphasizes the idea of fostering people to grow food at home in their own gardens. However, this is an exception thus far, and almost no public policy in Europe covers family gardens.

Allotment Gardens

An allotment garden is an area subdivided into small plots, which are rented under a tenancy agreement. They usually stem from municipal initiatives on public land and their regulation is highly formalized, sometimes following specific regional or national laws. They may be managed by an organized group, or even established as an allotment garden association. If so, taking part in an allotment implies membership in this organization. Allotment gardens emerged in the eighteenth century to cope with urban poverty, and the First World War prompted their expansion.

In many Northern, Western, and Central European countries, allotment gardens are common and have a long tradition. In general, their functions have shifted from self-provision to leisure, although legislation or local rules may specify a minimum area for food production. After the collapse of communist regimes, allotment garden structures have changed dramatically in many former Eastern Bloc countries. In the Czech and Slovak Republics, some gardens disappeared due to pressure to build new residential or business areas.

Meanwhile, allotment gardens in Western Europe have reinvented themselves. The idea of coping with famine has been replaced by a focus on healthy food and in socially and physically active environments. In France, the UK, and Germany, allotment waiting lists have re-emerged after decades of decline in many cities. They are not immune to the influence from community gardens, and increasingly they include common spaces, educational activities, and celebrations. This openness to social alternatives also results in allotments renting larger plots not to individuals or families, but to associations or groups that tend the allotment collectively (e.g., Beaulieu Park, Geneva). Allotments are seen as a good option for underused area: for example, abandoned abandoned parts of school gardens (Geitmyra Parsellhagelag, Oslo), or land classified as suitable for construction but not developed yet (Granada).

Some allotment gardens specifically target social problems—for example, in Portugal (Hortas Sociais Coimbra), Spain, Greece, or Estonia. At the same time, in those areas where the public supply of allotment gardens is limited, private entrepreneurs and farmers have identified a niche and an increasing number of private allotments are emerging, for a relatively prosperous target group.

Educational Gardens

Educational gardens offer a teaching tool addressing the production, processing, and consumption of foods and their environmental impact, with a high potential for raising public awareness and spreading environmentally and climate-friendly gardening ideas and practices. They may be gardens located in educational institutions that provide garden-based learning to their community (schools, kindergartens, etc.), or gardens developed by environmental or social centres that offer educational services to visitors. School gardens are the most common form.

Educational gardens can be embedded in public policy at the municipal level. Their establishment depends primarily on the personal engagement of teachers and public support. There is an increasing number of municipal programmes for educational gardens—for example, in Utrecht, Zaragoza, and Lisbon. In the Czech Republic, food gardening was integrated into the primary school curriculum. Hence, they were widespread. The change of regime in 1989 led to a decline, however, they have been re-emerging recently. Toulcův Yard in Prague is an exemplary practice.

Therapeutic Gardens

The basic healing effects of gardening and agriculture are applied through therapeutic gardens. They are typically located inside the city, at physical and mental health care institutions. They can be used for the treatment of mental disorders, autism, Alzheimer's disease or cerebral paralysis, addiction to

drugs and alcohol, etc. Contemplative therapeutic gardens are more common than those with production and active practices. There are still few examples, but much can be learned from those successfully implemented, like the Vegetable Therapeutic Garden, initiated by the social care service of the Municipality of Kifissia (Greece). The therapeutic garden of San Camillo Hospital in Venice, Italy, is the first therapeutic garden in Italy designed specifically for neuron-rehabilitation of patients in wheelchairs or with physical disabilities. Thanks to special tubs designed specifically for food gardening, they can actively participate in planting, caring for and harvesting fruits. This is not only a physical activity. Major benefit is derived from contact with a variety of plants and flowers carefully chosen to stimulate the sight, smell, and touch, awakening the senses and thus with them memories and emotions.

Community Gardens

Community gardens typically emerge as bottom-up initiatives and are tended collectively. They are not only about growing vegetables, but also about growing social networks, building meeting places, and establishing a sense of community. Their collective character is therefore essential. The community itself establishes the rules and organization.

Because production is not the focus, location is more critical than size. Most of them are small and embedded in the city—usually in public, sometimes vacant spaces. An agreement with the authorities or owners is negotiated; nevertheless, they are not always legalized. Most of them are oriented towards organic production and increasingly include composting facilities. Educational and cultural activities are an essential part of their programme.

Community gardens can meanwhile be found in cities all over Europe. In France, there is a charter that states their basic principles of solidarity, as well as intergenerational and intercultural exchange. While not as explicit, similar principles apply to most community gardens elsewhere. In Spain, the anti-austerity movement '15-M' and its social demonstrations in 2011 fostered the reclaiming of urban spaces for collective purposes. After a few years, the local network in Madrid has made it possible that the establishment of a community garden in almost every neighbourhood is underway. In other countries, public institutions make use of the community garden scheme. There are projects in public green areas and promoted by the municipality—for example, in Rotterdam (Spoortuin) or Stuttgart (Stadtacker Wagenhallen)—or by NGOs encouraging new initiatives, as in Prague or Sofia. Purists suspect that community gardens cannot be externally initiated, but the concept is evolving and adopting new forms.

Squatter Gardens

Squatter gardens make use of idle land for growing fresh food. Most of them are driven by individuals—usually poor people, mostly migrants—who claim land where they expect no problems. There are also examples of squatter community gardens, family gardens, or even local food farms. Because of the lack of formalization and thus illegal (or extralegal) nature of these activities, it is extremely difficult to find them registered in statistics, and they are not subject to public policies either. In appearance, they can vary from very small plots inside built-up areas, to extensive areas kept free of development—for example, due to the risk of flooding.

Urban Farming

Multifuncionality in urban areas has been associated with farm diversification strategies, mainly addressing urban demands for recreation and tourism. Over the years, urban farms have expanded the provision of services and goods and now include landscape management, environmental measures, land rental, and direct marketing.

The farms, which have adapted their business strategies to an intra- or periurban location can be subdvided into two main groups. One implies the provision of on-site services, like leisure and educational farms or therapeutic and social ones. The other includes local food farms and environmental farms that provide benefits through material or environmental flows, connected to the urban metabolism and to the urban environment.

2.2

Governance of Urban Agriculture Initiatives: Insights Drawn from European Case Studies

Charlotte Prové, Denise Kemper, Salma Loudiyi, Cyril Mumenthaler, Sofia Nikolaidou

Towards an Understanding of Urban Agriculture Governance

Urban Agriculture initiatives can serve manifold urban purposes, such as greening, food security, food accessibility, food literacy, job skills training, employment, and community-building. As Urban Agriculture occurs in many places, takes many forms, and involves a diversity of actors, the processes of Urban Agriculture development create novel demands on policies, urban planning, and other institutions. Thus, governance of Urban Agriculture requires the identification of tools that can orchestrate creative new strategies for managing the urban region, employing multiple actors, levels, and sectors (Healey 2004).

Over the last few years, there has been a growing consensus that a shift from top-down managerial 'government' to more inclusive, adaptive and multilevel 'governance' is essential for the sustainable management of social-ecological systems, especially in times of climate and global change (Folke et al. 2005; Mayntz 2005; Pahl-Wostl 2009). However, the adaptive governance processes that would guarantee a diverse and multipurpose Urban Agriculture in the urban landscape are still weak. This can be explained by slow and complex political processes that do not respond immediately (or adequately) to social change (Healey 2004). Because initiatives in many cases have a novel quality, they are often labelled as experiments without the prospect of integration into the urban fabric. Additionally, research has only rarely focused explicitly on Urban Agriculture governance or the practical reality of implementing such initiatives. As a consequence, a meta-analysis that could embrace the richness of Urban Agriculture, and inform both initiatives and the public officials who can potentially support them does not yet exist.

The chapter starts with the adaptive governance proposition above and addresses how governance principles can be effectively and efficiently shaped. With reference to Davidson et al. (2006), governance processes will ideally have to be legitimate, transparent, accountable, inclusive, and fair. However, this approach first requires an exploration of current governance processes (Böcher 2008). Through an analysis of structures and processes (Rijke et al. 2012; Pahl-Wostl 2009), the focus is on the practical reality of initiatives. The following question is then raised: what are the characteristics of governance processes within Urban Agriculture initiatives?

An Inclusive Perspective Drawing on European Cases

While categorizing initiatives remains a somewhat arbitrary undertaking, an inclusive perspective is outlined here. This means that, complementary to the typology described in Chapter 1.2, the emerging initatives of Urban Agricuture are analysed more broadly. As such, initiatives were selected ranging from guerrilla gardening to local food strategies implemented by public departments. On the one hand, efforts initiated at the level of local government can be very diverse in terms of role, partnership, products, and services delivered. They are also usually an important organizer in networks. Their support could play a significant role in the

Stakeholders

Government	Civil Society	Market
International Level	NGOs	For-profit Farming
National Level	Non-profit Farms/Organizations	Farmers' Associations
Regional Level	Funders	Private Actors
Local Government	Artists	Entrepreneurs
Government-led Organizations	(Public & private) Educational Institutions	Funders
Government-led Institutions	Religious Institutions	Distributors
	Individuals	Vendors
	Volunteers	

2.2.1
Stakeholders in Urban Agriculture initiatives

sustenance of bottom-up initiatives. On the other hand, informal initiatives like guerrilla gardening provide useful insights into contentious issues such as access to land, stakeholder involvement, and project legitimation. We base the analysis of Urban Agriculture governance on a broad collection of different initiatives and their stakeholders—rather than focusing on a narrow typology—and hope to uncover adaptive governance processes. Figure 2.2.1 above illustrates the diversity of actors (potentially) involved in Urban Agriculture.

Data was collected from twenty-eight different initiatives throughout Europe from 2013 to 2015. The authors have brought additional cases into the analysis to widen the scope of our survey. The structures and dynamics of each case were systematically explored and differences and similarities highlighted. Based on insights drawn from these cases a range of governance characteristics emerged. These have proven to be essential for the understanding of Urban Agriculture governance processes within a European context.

The Diversity of Governance in Urban Agriculture Initiatives: Forging a Framework

The governance characteristics are forged into a conceptual framework with three levels of complexity that impact governance processes: the wider urban context, external governance characteristics, and internal governance characteristics. External governance characteristics comprise partnerships, legitimation processes, and public policies. Internal governance characteristics are the initiative's objectives, scale, time frame, stakeholders, power relations, and resources—more specifically, land, funding, and knowledge.

The framework is discussed below in more detail, yet it is worth noting here that there is a dialectical element to this model. The characteristics outlined are interdependent and mutually influential. This means, for instance, that the project objectives will define to a certain degree which partnerships are forged. Ideally, these characteristics should be taken into account simultaneously to fully grasp the governance processes. The novel aspect of the framework is that it is comprehensive in its approach. It can be used as a tool to understand underlying dynamics and to respond to the specific requirements for the sustainability of initiatives.

The Urban Context

A few aspects of the context influencing the development of Urban Agriculture include the following factors: climate, politics, geography, economics, cultural values, and urban-rural linkages. In this analysis, stark differences between Northern and Southern Europe emerged. Generic differences occured in societal demands, levels of institutionalization, and overall objectives. Generally speaking, in Northern European countries preservation and development of green spaces are often the most pressing issues, while in Southern Europe Urban Agriculture is more often a response to food insecurity, poverty, or social exclusion. This underlines the importance of including the context, as well as the complexity in developing governance processes from a general European perspective.

3.1

It Is a Business! Business Models in Urban Agriculture

Jan Willem van der Schans, Wolf Lorleberg, Óscar Alfranca, Elisabete Alves, Gunilla Andersson, Paola Branduini, Lea Deborah Egloff, Giulia Giacchè, Avigail Heller, Kristine Herkströter, Denise Kemper, Galina Koleva, Pedro Mendes-Moreira, Andre Miguel, Luís Neves, Oleg Paulen, Dona Pickard, Mariá José Prados, Bernd Pölling, Xavier Recasens, Bruno Ronchi, Andreas Spornberger, Axel Timpe, Biancamaria Torquati, Helene Weissinger, Hans Wydler

Hidden Champions

Public opinion and decision-makers in Europe often reduce Urban Agriculture to community gardening activities. It is in fact more—as proven by numerous enterprises and projects all over Europe. While most Urban Agriculture promoters focus on the societal and ecological benefits of projects, economic dimensions remain understudied—or even neglected. However, well run urban farms are, or can become, the 'hidden champions' of an urban green development strategy. The collaborative work of twenty-six scientists from eleven countries, joined in the COST Action's working group 'Entrepreneurial Models of Urban Agriculture', found a range of diversified and successful business models in enterprises and projects. It identified among them five business strategies as potential blueprints for innovation. Successfully applied, these strategies make enterprises and projects economically competitive under conditions, where 'agribusiness as usual' would not have a chance.

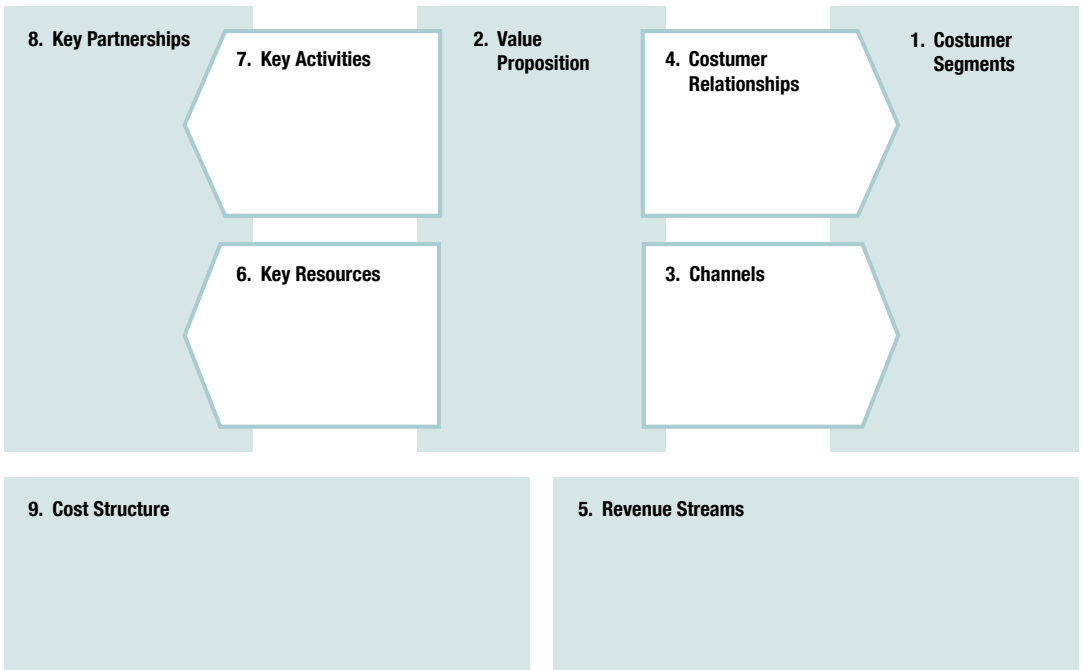
Mapping Business Models

Business models or entrepreneurial models describe 'the rationale of how an organization creates, delivers and captures value' (Osterwalder and Pigneur 2009). They represent the 'design of organizational structures to enact a commercial opportunity' (George and Bock 2011) and explain 'how value is created for the customers and how value is captured for the company and its stakeholders' (Henriksen et al. 2012). They consist of interlocking elements, which, combined, create values: for example, identifying customer value propositions, profit formulas, key resources, and key processes (Johnson et al. 1996). A practical approach for visualizing and characterizing business models—known as the CANVAS business model—was developed by Osterwalder and Pigneur (2009). For mapping business models in Urban Agriculture, the CANVAS model is considered to be simple and understandable, without oversimplifying entrepreneurial activities (Pölling and Lorleberg 2013). It specifies which customer segments are served, what value is being created, what activities are carried out, and which resources and strategic alliances are needed (Figure 3.1.1).

One of the first applications of the CANVAS model to Urban Agriculture was conducted by the Green Deal on Urban Agriculture research project (Green Deal Stadslandbouw) in the Netherlands (Nationale Federatie Stadsgerichte Landbouw 2013). Its report identifies three strategies that Urban Agriculture initiatives (can) use to survive: differentiation, diversification and low cost. In its more recent innovative forms, Urban Agriculture in Europe also draws from other sources. It can sometimes be interpreted as a manifestation of 'the new economy'—i.e., the 'share economy' (Jonker et al. 2014) or the 'experience economy' (Pine and Gilmore 1999). These perspectives were the basis for the commons and experiences strategies (van der Schans 2011).

Differentiation

A differentiation strategy is based on creating distinctions from conventional supply chains, the ordinary supermarket, or the HoReCa (hotel/



restaurant/cafe) channel. The main way Urban Agriculture is distinct from conventional food chains is its absolute transparency with regards to the origin, the place of production, and the conditions under which the food is produced. Typical examples are Dammstorps Handelsträdgård AB (www.dammstorp.se) on the edge of Malmö (Sweden), focusing on organic apples, ornamental plants, and potted flowers; or wine farms in the Barcelona Metropolitan Region (Spain), like Alella Vinícola SL (www.alellavinicola.com), which applies the differentiation strategy to selected regional varieties and their quality policy (Figure 3.1.2).

As a trend, differentiation responds to food safety scandals and ambiguities in the global food system. Urban Agriculture can distinguish itself in terms of products by growing other species ('specialties'), heirloom vegetables, ethnic vegetables, and more perishable but also more tasteful varieties (i.e., varieties that are more difficult to transport over long distances). This could also include 'super-fresh', vulnerable leaf crops—such as baby leafs, cresses, herbs, or even freshly slaughtered animals (Figure 3.1.3). Offering products with proper and competent advice, personal contact, and a high service level are also successful approaches; this also applies to stressing the seasonal nature of the offer, as opposed to year-round availability. This can include organizing harvest festivals or workshops where the excess production is processed.

Differentiation can be realized by keeping not only production, but also processing and distribution in one's own hands; this is known as vertical integration, and is typical in wine production.

By controlling several steps of the supply chain, one may be able to create more profit, or at least maintain better control over the distinctive character of the product—for example, by artisanal methods of preparation, and different ways of packaging and presentation. These forms of processing often require tremendously increased labour. However, urban farmers may be in a good position to solve this issue because they can rely on their families,

3.1.1
The CANVAS business model visualizes a business model by analysing nine structural elements.

3.2

Creating Added Value: Societal Benefits of Urban Agriculture

Bernd Pölling, Óscar Alfranca, Elisabete Alves, Gunilla Andersson, Paola Branduini, Lea Deborah Egloff, Giulia Giacchè, Avigail Heller, Kristine Herkströter, Denise Kemper, Galina Koleva, Wolf Lorleberg, Pedro Mendes-Moreira, Andre Miguel, Luís Neves, Oleg Paulen, Dona Pickard, Mariá José Prados, Xavier Recasens, Bruno Ronchi, Andreas Spornberger, Axel Timpe, Biancamaria Torquati, Jan Willem van der Schans, Helene Weissinger, Hans Wydler

Societal Benefits of Urban Agriculture: What about the Economics?

The agricultural sector generates multifunctional outputs and externalities for the economy, society, and environment—also in urban regions. Urban Agriculture is 'a permanent and dynamic part of the urban socio-economic and ecological system, using typical urban resources, competing for land and water with other urban functions, influenced by urban policies and plans, and contributing to urban social and economic development' (FAO 2007: xi). The most important function is of course the production and supply of a wide range of food and non-food agrarian products. 'Besides … food production, society increasingly expects agriculture to contribute to environmental and landscape services, water management and flood control, social care and cohesion' (van Huylenbroeck et al. 2007: 5). Authors describing societal benefits of Urban Agriculture emphasize social, cultural, landscape, and ecological aspects, while direct and indirect economic contributions are usually absent in discussions. So, what about the economics of Europe's Urban Agriculture?

Approaching the Economic and Other Societal Benefits

There are many publications focusing on the societal benefits and multifunctionality of agriculture in general—and of Urban Agriculture in particular. Most of them focus on local case studies or on specific functions or benefits, but overarching qualitative and quantitative analyses are widely missing. Social and ecological functions and benefits offered by agricultural activities are dominant in discussions, but only scant attention is paid to the economic contributions and values of Urban Agriculture. The following assessments and examples from different urban regions in Europe address this knowledge gap. The added value to society, the environment, and cultural heritage by Urban Agriculture is also considered. A survey, which was based on a standardised questionnaire scheme, specifically asked about the societal effects of Urban Agriculture and provides authentic and quantitative data from more than ten European countries. The investigation and analysis of societal benefits aim to assess Urban Agriculture's multifunctionality and integrate the economic dimension into ongoing discourses. The survey covered a wide range of Urban Agriculture types—ranging from community and family gardening (urban food gardening), to commercial agriculture and horticulture (urban farming). More precisely, it addresses information and data on an ordinal scale about production value, paid and non-paid jobs (volunteers), educational and social activities, managed green open space, agrobiodiversity, as well as the maintenance of cultural and natural heritage (Figure 3.2.1). These societal benefits of Urban Agriculture have been summarized in bar graphs for a clear visualization. The eight indicators of societal benefits focus mainly on four added values: economy, society, environment, and cultural heritage. This differentiation is primarily used to group the case studies, although overlays and mixed forms between the value groups are often not the exception but the rule; this supports the multifunctionality of Urban Agriculture.

Indicators	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Production Value (€/a)	</= 1,000	> 1,000 - 5,000	> 5,000 - 20,000	> 20,000 - 100,000	> 100,000 - 500,000	> 500,000
Paid Jobs (full-time equivalent/a)	None	< 0.25	> 0.25 - 1	> 1 - 5	> 5 - 10	> 10
Non-paid, Full-time Jobs (full-time equivalent/a)	None	< 0.25	> 0.25 - 1	> 1 - 5	> 5 - 10	> 10
Educational Activities (person-hours/a*)	None	< 100	> 100 - 1,000	> 1,000 - 5,000	> 5,000 - 10,000	> 10,000
Social Activities (person-hours/a*)	None	< 100	> 100 - 1,000	> 1,000 - 5,000	> 5,000 - 10,000	> 10,000
Managed Open Space (ha/a)	None	</= 0.1	> 0.1 - 1	> 1 - 10	> 10 - 50	> 50
Agrobiodiversity (varieties/races cultivated/kept)	1	> 1 - 5	> 5 - 10	> 10 - 20	> 20 - 30	> 30
Cultural/natural Heritage (maintenance costs in €/a)	None	</= 5,000	> 5,000 - 20,000	> 20,000 - 50,000	> 50,000 - 100,000	> 100,000

*Educational and social activities: the unit 'person-hours' measures the time a person receives these specific educational or social services.

Economic Power, Jobs, and More: Economic Added Value

3.2.1
Indicators and Values of Societal Benefits

According to estimates by the Food and Agriculture Organization of the United Nations (FAO), 800 million people around the world are engaged in Urban Agriculture, of which 200 million are commercially active (2007). Six per cent of the global cropland is located within cities exceeding 50,000 inhabitants (Thebo et al. 2014). Furthermore, 60 per cent of irrigated and 35 per cent of rain-fed croplands worldwide are located in these cities, which are embraced by twenty-kilometre buffers. These surveys strongly place the economic dimensions of Urban Agriculture on the agenda: Urban Agriculture plays a non-negligible role for urban economies—in particular, by generating turnover, profit, and jobs in the agricultural sector, but also in the entire agribusiness up- and downstream within the value added supply chain. Results of the survey reveal individual spotlights on the economic importance of Urban Agriculture throughout Europe. A lot of urban farms are primarily profit-oriented, but—deliberately or casually—also cause additional societal benefits. Turnover, profit, and jobs are generated here through a variety of production systems, marketing concepts, and provision of services. Production values of more than half a million Euro per year and the creation of more than two jobs—sometimes more than ten full-time jobs—is not unusual. Moreover, urban food gardening projects that are not initially profit-oriented also have the potential to create jobs in gardening, administration, acquisition, etc.

Hof Mertin, situated in Dortmund (Germany), is an example of a profit-oriented farm that is diversified and increasingly adapted to the city (Figure 3.2.2). The farm cultivates more than 100 hectares of farmland, of which about forty hectares are for strawberry production and three hectares for apple orchards. While these fruits are sold through direct sales, the remaining farm products (rapeseed, cereals, and cattle) are sold on the regular commodity market via associations, cooperatives, and other traders and processors. Hof Mertin is continuously adjusting its business to changing urban conditions and demands. Recently, the farm has started trials with table grapes and plans to increase fruit diversity with peaches and apricots. Since the past few years, the farm has offered gardening plots—for a seasonal rent—to people living in the vicinity,

4.2

Urban Agriculture Goes Green Infrastructure

Axel Timpe, Agata Cieszewska, Jan Supuka, Attila Tőth

The paradigm of landscape as the space of interaction between man and nature is changing. In the period of general wealth and abundance of food and energy, which began with the Industrial Revolution, landscape was regarded as the scenery for human leisure and nature perceived as existing only in fragile remnants that needed protection. Recent insights into processes like energetic and material resource consumption and climate change have shown the high degree of interdependence between man and nature. Human life depends on the planet's natural capital and this capital has to be carefully managed and developed to sustainably fulfil human needs. The idea of man using nature reappears and our landscapes can no longer be reduced to 'scenery' that requiring a conservationist approach. The European Commission takes up this new relation to nature in its communication Green Infrastructure (GI)—Enhancing Europe's Natural Capital (2013a, 2013b). The Commission defines Green Infrastructure as '…a strategically planned network of natural and semi-natural areas … designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces … and other physical features in terrestrial … areas. On land GI is present in rural and urban settings' (2013a: 3). Green Infrastructure is a major occupation in planning policies, on the European, the regional, and the local levels. It can be considered one of the major tools for achieving the EU Biodiversity Strategy 2020 (2011) as well as smart, sustainable, and inclusive growth defined by the Europe 2020 Strategy (2010). For meeting these targets, we have to replace the deep-rooted planning paradigm based on single-purpose land uses with a new model of multifunctionality. In an integrated vision of landscape, respecting its productive output as well as its social and ecological functions, agriculture has an important role to play. However, agriculture's productive function for the provision of food, energy, and raw materials is not its only contribution to Green Infrastructure. Where agriculture is oriented towards the urban system and citizen (see Chapter 1.2) or situated in urban space (see Chapter 4.1), it has the potential to contribute many more benefits (Figure 4.2.1). The European Commission has set the task of integrating the semi-natural spaces of Urban Agriculture into the spatial network of Green Infrastructure, through appropriate design and management strategies. This chapter presents the benefits contributed to Green Infrastructure by Urban Agriculture and shows how Urban Agriculture can enhance Green Infrastructure through placemaking.

Benefits of Urban Agriculture for Green Infrastructure

Green Infrastructure provides society with a range of multiple benefits simultaneously, which are often referred to as ecosystem services. These services can be structured in several groups: provisioning services, regulation services, cultural services, and habitat services. But which contributions can Urban Agriculture bring to Green Infrastructure? Figure 4.2.1 summarizes the benefits of Green Infrastructure as defined by the European Commission (2013b: 4–5) in groups proposed by the research group The Economics of Ecosystems and

ES Benefits Group (Ecosystem Services—TEEB 2015)	**Green Infrastructure Benefits** (European Commission 2013b: 4–5)	**Possible Contribution of Urban Agriculture**	**Especially Relevant Urban Agriculture Types** (cf Chapter 1.2)
Provisioning services	Multifunctional, resilient agriculture and forestry	Providing food, fibre, and biomass and enhancing pollination	Local food farms
	Investment and employment	Employment in agriculture, investment in agricultural enterprises and buildings, productive and maintained land as contributions to a better local image	All urban farming types
Cultural services	Tourism and recreation	Broad range of recreational activities proposed on farms and in gardening associations, farms and gardens as a destination	Leisure farms, family gardens, allotment gardens, community gardens
	Education	Agriculture as a teaching resource and 'natural laboratory'	Educational farms and gardens, experimental farms, cultural heritage farms
	Health and well-being	Farm work and gardening as activities for physical and mental health, access to healthy local food	All urban gardening types, social farms, therapeutic farms
Regulation services	Enhanced efficiency of natural resources	Maintenance of agricultural soil fertility, pollination through urban beekeeping,	All types
	Climate change mitigation and adaption	Cooling effect of agricultural areas, carbon storage in soils	All types
	Water management	Groundwater recharge and purification under agricultural soils, stormwater retention	Many types, especially environmental farms
	Land and soil management	Reduction of soil erosion, maintaining/enhancing soil's organic matter, increasing soil fertility and productivity, mitigating land consumption, fragmentation and soil sealing	All types
	Disaster prevention	Flood hazard reduction through stormwater retention and agricultural polders, erosion control	All types
Habitat	Conservation benefits	Maintenance of agrobiodiversity, maintenance of agricultural habitats	Environmental farms, cultural heritage farms
	Low-carbon transport and energy	Short chain food provision, local bioenergy from agriculture	Local food farms

4.2.1

Benefits Urban Agriculture can bring to Green Infrastructure

4.3

Urban Agriculture and Cultural Heritage: A Historical and Spatial Relationship

Paola Branduini, Raffaella Laviscio, Lionella Scazzosi, Jan Supuka, Attila Tóth

The relationship between the city and agriculture has a long history: the agricultural landscape around cities has always been a place of food production and recreation. Before the globalization of the market during the second half of the twentieth century, rural surroundings were the daily food supplier for city dwellers. Vegetables, fruits, cereals, and animal products were sold in the markets located in the main squares of the city.

Sergio Bonriposi

President of Cascina Cuccagna citizens association, promoter of the first social reuse of a historic agricultural building in Milan

'As callous citizen I perceived the countryside as an undefined space that begins where urban construction, cement, asphalt and shops end. Everything changed when the first farmers markets in Milan made me think and I began to consider the country as a source of food. I began to perceive the countryside as the place created by the wonderful infinite combination of seeds, earth, water, and light. It was as if my eyes could embrace the whole world, rather than my little piece of reality essentially made of walls.'

In the nineteenth century, the north horticultural fields (Huerta) of Seville supplied the markets at the gates of the historical wall (Valor Piechotta and Romero Moragas 1998; also Figure 4.3.1); the vegetables of Hurepoix reached the market in Paris Les Halles via the Arpajon tramway; and every morning horticultural farmers brought fresh products and milk from outside the bastions of Milan to Verziere square, behind the Duomo cathedral.

Historically, the countryside not only had a productive function, but was also a recreational area. At the end of the nineteenth century, cycle excursion guides were published for Parisians who wanted to enjoy the rural amenities (Csergo 2004). Milanese people in the 1930s are shown on a boat promenade in the agrarian landscape along the Navigli, Milan's agricultural and commercial water channel (Figure 4.3.2). Since former rural areas have been absorbed by expanding cities, Urban Agriculture may now be carried out where it had been for centuries. Today, some of these areas are of historic value and tie the agricultural production closely to cultural heritage issues.

Cultural Heritage: From Outstanding to Everyday Landscapes

The concept of cultural heritage has been elaborated by a number of institutional and non-institutional bodies at different levels, such as UNESCO, the Council of Europe, and ICOMOS. Cultural heritage is a complex concept that involves tangible and intangible components, as well as historical and contemporary values (UNESCO 1972 a). Tangible heritage pertains to the material elements of the agricultural landscape, to their historical authenticity and their physical permanence through time. Intangible heritage pertains to the significance attributed by people to places, techniques, and skills that have enabled the creation of landscapes and to features dictated by economic and behavioural factors. The 'aesthetic value' pertains to aspects perceived by human senses and cultures (UNESCO WHC 2013; Laviscio and Scazzosi 2014).

4.3.1
Plan of Seville in 1890. Horticultural fields (in green) provide vegetables for the city.

All of these values enhance people's lives and benefit society because they contribute to a sense of place. Historically, this has been cited as a justification for preservation in a number of different documents (ICOMOS 1931, 1964; UNESCO 1972 b; ICOMOS Australia 1999). In these documents, 'cultural significance' is defined as an important characteristic of place, because it brings '… aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups' (ICOMOS Australia 1999: art. 2).

It is common to associate cultural heritage with outstanding landscapes; UNESCO recognizes many rural landscapes as World Heritage sites, defining them as an 'organically evolved landscape' and, more precisely, a 'continuing landscape … which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time' (UNESCO WHC 2013: art.10 ii).

However, cultural heritage is also linked to everyday landscapes and even to abandoned areas. The European Landscape Convention defines a 'landscape' as a product of the action and interaction of natural and/or human factors (Council of Europe 2000: art. 1), underlining people's perception. It equates landscape to the whole territory, including 'natural, rural, urban and peri-urban areas' (ibid.: art. 2), and 'concerns landscapes that might be considered outstanding as well as everyday or degraded

Geneva.8 Agro-urban park Bernex

A strong tendency is the diversification of production and services. In the same farm, there could be field crops, poultry farming, grapes and wine making, as well as agricultural services for municipalities (roadside maintenance, forestry works, composting, spreading lime quarries, etc.), or organized events.
In terms of alternative business models, Urban Agriculture is in some cases restricted by the legal system. Currently, almost all non-urban-adapted farmers fulfil the criteria to get financial support (direct payments from the federal state), but urban farmers only occasionally (depending on their cultivated surface, location, and professional statute) benefit from support.

Experiences

Budé Farm is a little farm situated in the centre of Geneva's agglomeration. This farm has been transformed by the thrust of the city over the countryside. The farm originally belonged to the family De Budé, who yielded it to the canton of Geneva and a promoter in 1952. Since then, the principal activities have been selling agricultural products and food production.
It is both a public space and a productive space with crops and a marketplace. A high school and other buildings surround the farm. This situation at the centre of the city makes this project very particular and gives it the specific function of linking the city and countryside. It is a good example of cohabitation between residential neighbourhoods and farming. The land belongs to the canton of Geneva and is situated on a public park. The cultivated surface is only about 0.5 hectare, so the major part of the farm's income, about 90 per cent, comes from the direct sale of agricultural products from the Geneva area. Farmers organize a market, open three days a week, in an old barn in the Budé farm. Products (mainly vegetables, but also meat, fish, cheese, bread, etc.) from the Geneva region, the Lake Geneva area, and organic farming are preferred, but foreign products are also sold.
The canton of Geneva is currently involved in a strategy to transform the public space around the farm in order to diversify and enhance its agricultural production.
It is an example of a bottom-up initiative that is now supported by local and regional authorities.

The Agro-park project in Bernex-Confignon is situated in the middle of a new and important urban development on the outskirt of Geneva. Here, 150 hectares of agricultural area will be used for urbanization. Out of the three planned public spaces, one has been dedicated to agriculture.
This urban agro-park project is conceived as a public space, assigned as a green area in the same way as traditional parks but

Geneva.9 Budé farm and neighbourhood

with an agricultural vocation. This park is intended to be a 'demonstration' farm with a few hectares of crops, a shop selling local agricultural products, and recreational areas for the public.
The agro-park is the result of an urban planning competition organized by the canton of Geneva. It is an example of a top-down initiative initiated by the canton. The award-winning project, by Verzone Woods Architects, is called Fertile Park. The implementation of Geneva's first agro-park is not yet certain; on the one hand, the whole Bernex development project is challenged by the federal government because of its impact on the agricultural zone; on the other hand, with the legal planning framework not being conceived to allow professional farming in constructible areas, very specific solutions for this type of Urban Agriculture project are still in discussion.

Conclusion

Currently, one of the most important challenges for Urban Agriculture in Geneva is the relationship between land pressure and land planning. Agriculture has been protected until recent years, both as part of federal policy (subsidies, protection of agricultural land) and in the context of the Geneva urban region (protection of the green belt). This protection is significantly challenged due to the development needs of the Geneva region. The farmlands on the edge of town are virtually the only space available for the development of compact urbanization. Thus, in the Geneva region, there are two critical questions: How can the region be urbanized with the smallest impact on agriculture? How can farmers be helped in adapting to urban needs and potentials?

5.1

From Waste to Value: Urban Agriculture Enables Cycling of Resources in Cities

Thomas Nehls, Yan Jiang, Conor Dennehy, Xinmin Zhan, Luke Beesley

The flow of matter, water, and energy in cities is mainly characterized by the consumption of goods—food, industrial products, and raw materials—that are supplied from outside the city. After consumption, waste materials leave the city. Such 'linear metabolism' systems often incur great economic and environmental costs at the input and output stages. Such linearity has been identified as one of the largest challenges facing urban sustainability (Girardet 1996). Creating a 'circular metabolism' would lead to a reduced reliance on raw material inputs and to reduced economic and ecological costs for the transportation, treatment, and disposal of waste materials. The aim to transform chains into cycles can only be reached by the re-introduction of primary production (autotrophic assimilation) into cities.

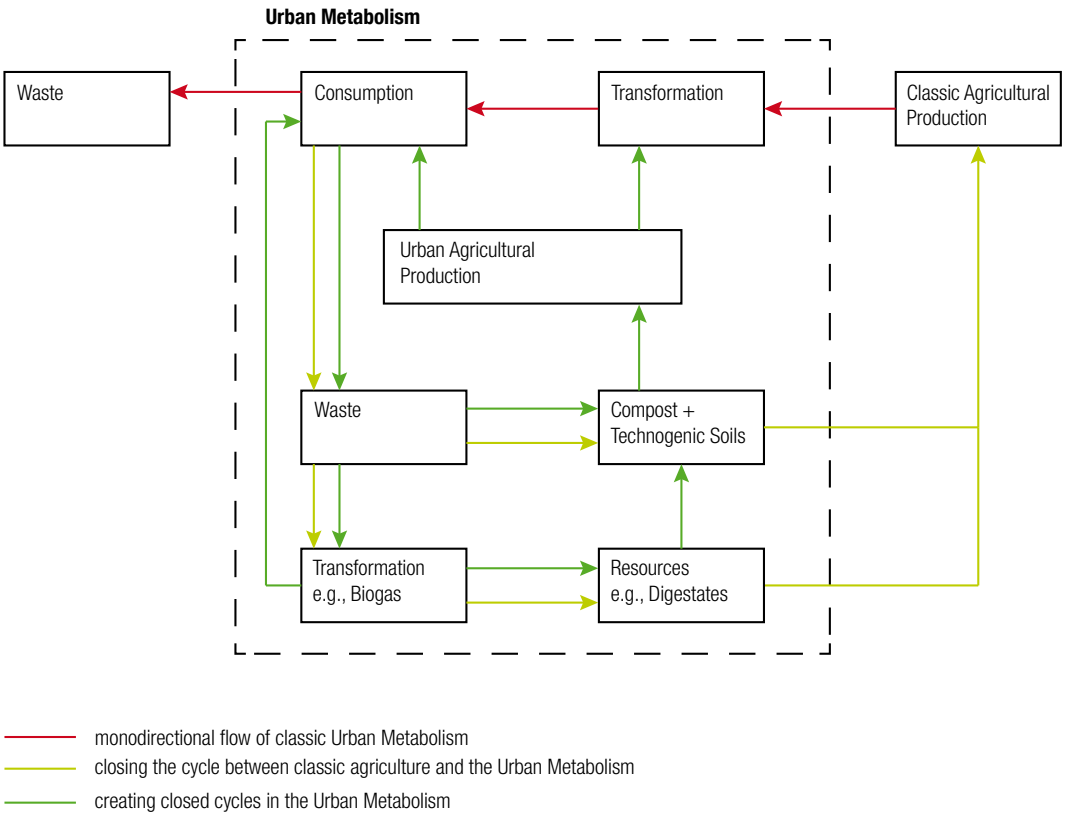
Urban Agriculture Redirects Material Flows in Cities

Urban Agriculture, understood and designed appropriately, can be well positioned between the catabolic chains (the step-by-step decomposition of complex molecules into elements for gaining energy) and the anabolic chains (construction of complex molecules from elements and smaller molecules) of the urban metabolism. Urban Agriculture can thus help to redirect straight chains of water, energy, and matter (indicated by the red lines in Figure 5.1.1) into more circular flow patterns imitating natural ecosystems (indicated by the green lines in Figure 5.1.2). In such an approach, soils or growing media act as the terminus of catabolic chains and are the main compartment for mineralization, storage for the resulting mineral nutrients, and the starting point for the anabolic chains, namely plant growth (Nehls et al. 2014).

There are multiple environmental, social, and economic benefits to be gained from circulation of resources in cities. This increased ecological resilience is exemplified by passive cooling through plants and increased water storage. Social benefits include participation, education, creation of jobs, intercultural communication, and—strategically interesting—an increased resilience to economic and political crises as well as natural hazards through the production of food and fuels. Urban in contrast to rural agriculture, aims to capitalize on the excess supply of nutrients, water, and energy, as well as space (not obviously) and labour in cities. It profits from short supply chains of these undervalued resources to areas, where they could be useful—for example, as fertilizers.

Material Flow Management

Primary production utilizes water (rainfall, groundwater), energy (solar radiation, artificial light), and nutrients (soil, air, rainfall), which results in the depletion of resources wherever this production occurs. After consumption of goods, resources accrue in the city, resulting in a net accumulation of nutrients and water from where they are not returned to their original source. As such, waste is often transported out of the city to be disposed of in the aforementioned classically linear way. Resources are thus essentially lost from both urban and rural land. Conversely, these wastes, inorganic as well as organic, could be used directly or composted to build



new soils ('Technosols') or to amend existing soils to enhance production. Now, the resources are kept cycling in the Urban Metabolism (marked green in Figure 5.1.1). Urban wastes—including food residues and sewage sludge—can also be transformed to gain energy and mineral resources by burning, gasification, and anaerobic digestion. For instance, through anaerobic digestion, organic matter from biodegradable waste is decomposed and converted into biogas and digestate, which is the solid/fluid resource generated. Biogas can be used directly for heating, or to produce electricity and heat using the combined heat and power generation technology. The digestate can be applied as a fertilizer in the city but also exported back to rural land.

In urban areas, wastes can be used to create growing media in sealed, built-up areas without access to open soils. Figure 5.1.1 indicates the special relevance of soils and growing media in resource cycles. Urban Agriculture introduces a combined recycling and production chain into the Urban Metabolism. To analyse material flows and usage in a well-defined system (Brunner and Rechberger 2003), the 'Material Flow Analysis' (MFA) can be used (Schandl et al. 2002). The European Union (Eurostat 2001) formulated a methodological guide for material analysis at the national level. Based on mass conservation, an MFA can be used to assess the characteristics and efficiency of the metabolic system, by quantifying the input, output, storage, consumption, and transformation of materials. However, an MFA cannot describe the functional differences of various materials. Reference materials processed by Urban Agriculture systems are listed in Figure 5.1.2. Not all of the materials apply to all of the Urban Agriculture systems. For instance, livestock is a common feature of Urban Agriculture in Eastern Europe, Central and South America, as well as in Asia, but it is not very common in North America and Western Europe. Based on the results of MFAs, measures can be taken to improve the materials circulation and waste recovery rates.

5.1.1
The role of Urban Agriculture in an ideal resource circulation system. The red lines mark the existing, predominantly linear resource chains; the green lines indicate resource circulation through Urban Agriculture. The systems indicated in green are responsible for the biological primary production.

Dublin.6 Aspects of horticulture industry, Fingal, North Dublin

Dublin.7 Flavours of the Fingal County Show

food available, there is only a low proportion of Irish products offered and even fewer local products. There are plans to change this in the future. According to the co-op personnel, farmers get a fairer deal than they would in the supermarkets (Weissinger 2013).

The Lifeline project is a community-led campaign to revalue the disused Midland Great Western Railway by addressing themes such as sustainable food systems, urban biodiversity, green transport, health, recreation, and waste management. A first product, Lifeline Soap, has been produced and contains over 50 per cent waste ingredients sourced locally.

Conclusion

The recent economic crisis has brought into sharp relief an emergent trend toward Urban Agriculture in developed countries, including Ireland. While disparate urbanites derive utility value in terms of production of food for consumption, there are also ancillary benefits that are indirectly derived from Urban Agriculture: the promotion of social capital; enhancement of community solidarity; the redefinition of public space; rehabilitation for marginal groups; and the inculcation of an alternative developmental vision built around the principle of sustainability and healthier lifestyles. The unmet demand for more 'grow your own' opportunities in the city and its hinterland is indicative of the ancillary benefits.

Dublin.8 Allotments in the Dublin periphery

Dublin.9 Reusing urban land

6.2

The CAP Reform as a Chance for Urban Agriculture

Informal dialogue with Ricard Ramon i Sumoy (Directorate General for Agriculture and Rural Development of the European Commission, DG AGRI, Brussels) conducted by Sonia Callau and Frank Lohrberg

Europe's Common Agricultural Policy (CAP) is one the world's most powerful instruments to steer the evolution of farming. In 2013, a new reform was agreed, fixing rules and regulations for the period 2014–2020. As the CAP focuses on classical agricultural production and on the rural parts of Europe, Urban Agriculture is not its issue. However, the new CAP is offering implicit chances for Urban Agriculture, including better support of small and family businesses, local food, short supply chains, and cooperative initiatives.

In 2013, Ricard Ramon participated in a COST Action Urban Agriculture Europe steering group meeting in Brussels. He gave a presentation on the main elements of the new CAP and discussed with the participants the linkages between the future agricultural policy and Urban Agriculture. Two years later, with the new CAP fully in place, we continue this discussion in the form of an informal dialogue.

Since 2011, Mr. Ricard Ramon has worked as an analyst at the Unit E1 Policy Analysis and Perspectives within the Directorate-General for Agriculture and Rural Development. He has extensive experience in rural development policy, both at the EU and regional levels, and in the past has been involved in several projects on periurban agriculture. In the dialogue, he expresses his own opinions and approaches, which do not necessarily represent the views of the institution where he currently works.

Mr. Ramon, when was your initial experience with Urban Agriculture?

In 2002, as an advisor in EU affairs at the regional level, I had to deal with the specific problems of the agricultural spaces in the Barcelona metropolitan area. In the period 2004–2006, as a regional official, I had the chance to participate in the creation of the network of the European periurban regions called 'PURPLE'. In the creation of this platform, we had an important discussion on the role of agriculture in the cities and periurban areas and the need to approach the territorial challenges associated with this reality at the EU level. Between 2006 and 2011, as an official at the European Commission in charge of the management of the Spanish Rural Development Programmes, I was in touch with certain regions with large urban centres, which tried to explore the potentialities of the new European Agricultural Fund for Rural Development (EAFRD) to improve the links between rural and urban areas.

The COST action focuses on Urban Agriculture and its potentials for the sustainable development of cities. We are aware that there are already policy concepts targeting periurban agriculture, but we are working with a broader approach in order to address intraurban agriculture activities as well. They are mostly on a small scale, but have high potential for social and economic added value. In our view, linking the intraurban food gardening with periurban farming leads to a notion of Urban Agriculture that offers high innovation for both the cities and agriculture. How do you

see the concept of Urban Agriculture in relation to the current challenges faced by EU agriculture?

EU agriculture is facing certain challenges, and Urban Agriculture—in a broad sense, as defined in your project—has a particular role to play. First, EU agriculture, as a key part of the global food system, is confronted with the food security challenge; Urban Agriculture, being developed in the most fertile soils next to the large consumer centres, is indeed in a privileged position to guarantee food availability in the future. At the same time, the new emerging consumption patterns in the EU—in particular for local products and organic production—clearly reinforce the role of Urban Agriculture as a key supplier to the new societal demands. Secondly, we are confronted with a set of environmental challenges—due to the pressure on existing resources, climate change, etc.—which will force us to increase efficiency and produce more with less. Intra- and periurban farming systems have an important role to play in this transition towards a 'sustainable intensification' model, in which we need to increase yields while reducing the environmental impact.

How do you see Urban Agriculture with regards to the structural challenges and the territorial imbalances that are facing European agriculture?

EU agriculture plays an important territorial role and is a key economic driver of the rural areas. In fact, we should not forget that rural areas cover 90 per cent of the EU's territory and farming manages 50 per cent of the EU's land. We should be able to promote a smooth development of all the areas and guarantee the preservation of the diversity that characterizes EU agriculture. In this sense, Urban Agriculture should not be seen in isolation, but integrated in the broader territorial development, and we should be able to encourage integrated approaches to the economic development of both rural and urban areas.

However, with regard to the structural dimension, Urban Agriculture is indeed very distinctive (more fragmented, with different age patterns), and facing stronger competition for resources (land or human capital) with other sectors.

In 2004, the European Economic and Social Committee (EESC) adopted the 'Opinion on Agriculture in Peri-urban Areas'. Some of the conclusions were about the need for instruments to guarantee the use of periurban land and the need for the creation of management bodies to promote and mobilize periurban agricultural areas. Are these objectives still valid?

The EESC's 2004 report played a role in the promotion of the periurban dimension at the EU level. In particular, it helped to increase awareness of agriculture's role in the relationship between the city and its countryside. Probably the most innovative element of this opinion was to ask for the establishment of new management tools to protect periurban farmland. This report, as well as some other first initiatives on periurban areas, was promoted in a context of relatively 'low' agricultural commodity prices, lack of public awareness of food security concerns, and a positive economic environment. One decade later, the economic and political context has changed.

Since the 2007–2008 food crisis, we have entered a new era of high commodity prices and food security has re-entered the political agenda at both the international and local levels. In addition, the economic crisis has changed the interaction between different sectors in many regions, and modified the competition for different resources. Furthermore, consumption patterns have changed. Today, many cities go far beyond land planning and are promoting integrated food strategies.

I think that the EESC 2004 opinion anticipated the challenges and problems and was very innovative with regards to policy interventions; but one decade later the reality has changed so much, that the objectives outlined at that time would have to be updated.

The reality has also shown that local patterns are very different, and the types of actions and policies required in every region or city also vary. Your project should help to explain these complex and different realities.

The EESC opinion mentioned the need to establish a 'European Observatory for Peri-urban Agriculture' and to draw up the 'Charter on Peri-urban

Ricard Ramon
2014

6.3

Urban Agriculture Goes Brussels: Urban Agriculture as a Tool for the Europe 2020 Strategy

Frank Lohrberg, Dona Pickard, Gerassimos Arapis, Paola Branduini, Barbora Duží, Verónica Hernández-Jiménez, Galina Koleva, Raffaella Laviscio, Lionella Scazzosi, Martina Petralli

In 2010, the European Union (EU) launched Europe 2020, a ten-year strategy that aims to help with recovery from the financial crisis still affecting many countries in the EU, and to create the conditions needed for more intelligent, sustainable, and inclusive growth. In order to achieve the goals of the Europe 2020, the priorities on which Europe has selected to focus its political energy include policy fields that could directly benefit from the positive effects of Urban Agriculture: employment, social inclusion, poverty reduction, education, climate change mitigation, preservation of biodiversity, and valorization of cultural heritage. In this chapter we present Urban Agriculture as a useful tool that can contribute to positive development in these policy fields and thus to the implementation of Europe 2020's goals.

Employment, Social Inclusion, and Poverty Reduction

The policies that stimulate employment, encourage social inclusion, and aim to reduce poverty are generally related to economic and social policies. While European economic policies are linked to strict fiscal agreements across the EU, the Union does not have a binding social policy, and the national strategies on employment, social security, and development principally remain the responsibility of the Member States. However, since the last amendment of the founding Treaties of the European Union, a set of goals have been formulated that recognize the importance of social policy in the Union and integrate social rights and principles into the vision for its sustainable development. In the long term, these goals include full employment, social progress, social inclusion, and protection (European Commission 2010: articles 3 and 9). Urban Agriculture activities—from farming to food gardening—could contribute to achieving these goals, because they could be directed to create alternative employment for disadvantaged social groups and communities, help reduce poverty, and encourage social inclusion and solidarity.

In the short-term plan, Europe aims to achieve 75 per cent employment of the population between the ages of 20 and 64 by 2020 (European Commission 2014a). The ambition is to achieve higher employment in the knowledge economy, but where there is an opportunity to provide employment to unqualified or disabled people, Urban Agriculture has proved to provide economic activities that can sustain small communities and families. Urban food production is capable of generating significant employment, especially—but not exclusively—for the urban poor. Around the world, Urban Agriculture has demonstrated that it can absorb high amounts of migrant labour, provide sustained income for up to 31 per cent of all workers, and create a secondary system of employment related to marketing and processing activities (Dubbeling et al. 2010).

Alongside the economic and employment aspects, Urban Agriculture has demonstrated a capacity to enhance social inclusion of marginalized groups—such as the young, women, ethnic minorities, and the disabled—by integrating them into the urban social network. It helps build inclusive communities and provides disadvantaged groups with decent

livelihoods, which in turn prevents social problems (Gonzalez Novo and Murphy 2000). It provides advantages for women, which include low starting capital, the possibility to combine the activity with caring for children, and less travelling (Dubbeling et al. 2010).

European social policy measures also focus on poverty reduction and inclusive growth, which aims to take at least twenty million people out of poverty by 2020. Urban Agriculture is also relevant here, with its potential to alleviate food insecurity, which is often viewed as a concern for developing countries only. However, in 2012 the European Union budget for Food Aid for Deprived Persons in the Community came to €500 million, and eighteen million people in twenty out of twenty-seven Member States accepted EU food aid (Silvasti 2014:190). By providing enhanced food security to the citizens of Europe, Urban Agriculture has the potential to contribute significantly to poverty alleviation.

In view of the economic and social agenda of the European Union, Urban Agriculture can promote a true participatory approach to social development: it contributes to food security, health, job and training opportunities, and voluntary work options; strengthens social safety nets; develops a sustainable connection with nature; and actively challenges oligopolistic food distribution in favour of food democracy and alternative local food systems (ibid.:194).

Education

Education and training are also very important in EU policies and strategic documents, even though the EU respects the fact that each Member State is responsible for its own education and training systems. Since 1995, the EU has prepared strategic documents dealing with educational challenges on a general level, and recommends that Member States implement them into their national policies. The most important is the 'White Paper on Education and Training: Teaching and Learning—Towards the Learning Society', which 'stresses the importance for Europe of intangible investment, particularly in education and research', known to play 'an essential role in employment, competitiveness and social cohesion' (European Commission 1995: 1).

Europe 2020 has identified education as an essential driver for economic growth. It emphasizes sustainable, smart economic growth and promotes cooperation of various stakeholders in different sectors (EC 2010). Even though it does not include a direct reference to agriculture, such a goal is very relevant to Urban Agriculture, because it strives to promote practical implementation of sustainable development in the urban environment, connecting social and environmental dimensions through cooperation between various actors.

'Education for primary schoolchildren and people from the nearby cities is an important part of the work on our farm. We want to make people aware of the beauty of nature and invite them to act responsibly.'

Andrea Maas

Bauernhof am Mechtenberg, Essen

The Europe 2020 strategy is also aimed at the development of research and innovation, including agriculture in general. These issues are incorporated in The EU Framework Programme for Research and Innovation (2011), especially Research Infrastructures and Science with and for Society. Urban Agriculture activities are able to contribute through relevant research projects dealing with urban planning and the effectiveness and environmental aspects of agricultural production in the urban environment. This is currently done by incorporating the theme into the curricula of many European universities, as well as into the agendas of international research organizations.

On the European and UN levels, the issue of 'education for sustainable development (ESD)'—which has evolved from Agenda 21 (UNCED 1992)—is another long-term goal that could be addressed by agricultural activities. The EU Sustainable Development Strategy, last reviewed in 2009, provides an EU-wide policy framework to deliver sustainable development and stresses that ESD's role in a 'lifelong learning perspective is essential for the achievement of a sustainable society and is therefore

Authors' Affiliations

Óscar Alfranca
Universitat Politècnica de Catalunya, Departament d'Enginyeria Agroalimentària i Biotecnologia

Elisabete Alves
Fundação de Serralves, Porto, Department of Education and Environment

Gunilla Andersson
City of Malmö, Environment Department

Gerassimos Arapis
Agricultural University of Athens

Luke Beesley
The James Hutton Institute, Environmental and Biochemical Sciences

Paola Branduini
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering, Lab. PaRID

Christopher Bryant
Université de Montréal, Géographie et Environnement, and University of Guelph, School of Environmental Design and Rural Development

Sonia Callau
Barcelona's provincial council, Agricultural Spaces Department

Agata Cieszewska
Warsaw University of Life Sciences, Department of Landscape Architecture

Mary P. Corcoran
National University of Ireland, Maynooth, Department of Sociology

Michiel Dehaene
Ghent University, Department of Architecture & Urban Planning

Conor Dennehy
National University of Ireland, Galway Deptartment of Civil Engineering

Barbora Duží
Institute of Geonics of the CAS, v.v.i., Brno, Department of Environmental Geography

Lea Deborah Egloff
Zurich University of Applied Sciences, Institute of Natural Ressource Sciences

Sebastian Eiter
NIBIO - Norwegian Institute of Bioeconomy Research, Landscape Monitoring Section

Olivier Ejderyan
University of Fribourg, Department of Geosciences, Geography Unit

Giulia Giacchè
University of Perugia

Madeleine Granvik
Swedish University of Agricultural Sciences, Department of Urban and Rural Development

Avigail Heller
Ministry of Agriculture and Rural Development, Israel

Kristine Herkströter
University of Applied Sciences South-Westphalia, Department of Agriculture

Verónica Hernández-Jiménez
Universidad Politécnica de Madrid, Research Group Ecology and Landscape, Observatorio para una Cultura del Territorio

Yan Jiang
National University of Ireland, Galway, College of Engineering and Informatics

Denise Kemper
Regionalverband Ruhr, Konzeption Emscher Landschaftspark / AG Neues Emschertal

Bernard Keraita
University of Copenhagen, Denmark Global Health Section, Department of Public Health

Patricia Kettle
National University of Ireland, Maynooth, Department of Sociology

Galina Koleva
Institute for the Study of Societies and Knowledge, Bulgarian Academy of Sciences, 'Communities and Identities' Department

Sylvie Lardon
INRA & AgroParisTech, UMR Metafort

Raffaella Laviscio
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering, Lab.PaRID

Lilli Lička
University of Natural Resources and Life Sciences, Vienna, Institute of Landscape Architecture

Frank Lohrberg
RWTH Aachen University, Chair of Landscape Architecture

Wolf Lorleberg
University of Applied Sciences South-Westphalia, Department of Agriculture

Salma Loudiyi
VetAgro Sup – Campus agronomique de Clermont, UMR 1273 Metafort

Isabel Loupa-Ramos
Instituto Superior Tecnico, Lisboa, CESUR

Luis Maldonado
Universitat Politècnica de Catalunya, Departament d'Enginyeria Agroalimentària i Biotecnologia

Pedro Mendes-Moreira
Polythecnic of Coimbra - Coimbra College of Agriculture (PC-ESAC), Department of Agronomy

Andre Miguel
Cascais Municipality, Agenda Cascais 21

Cyril Mumenthaler
University of Lausanne, Institute of Geography and Sustainability

Thomas Nehls
Technische Universität Berlin, Department of soil conservation

Luís Neves
Freelance Press Advisor

Sofia Nikolaidou
Panteion University of Social and Political Sciences

Sylvie Paradis
Université de Genève, Département de géographie et environnement, UMR Metafort

Oleg Paulen
Slovak University of Agriculture in Nitra, Department of Fruit Production, Viticulture and Enology

Jorge Peña Díaz
Polytechnic University José Antonio Echeverría, Facultad de Arquitectura

Martina Petralli
University of Florence - Department of Agrifood Production and Environmental Sciences

Dona Pickard
Institute for the Study of Societies and Knowledge, Bulgarian Academy of Sciences, 'Communities and Identities' Department

Bernd Pölling
Chamber of Agriculture North Rhine-Westphalia;
University of Applied Sciences South-Westphalia, Department of Agriculture

Mariá José Prados
Universiy of Seville,
Department of Human Geography

Charlotte Prové
ILVO Institute for Agriculture and Fisheries Research, Flemish government;
Department of Agricultural Economics, Faculty of Bioscience Engineering, Ghent University

Xavier Recasens
Universitat Politècnica de Catalunya

Bruno Ronchi
University of Tuscia, Department of Agriculture, Forestry, Nature and Energy

Colin Sage
University College Cork, Department of Geography

Joëlle Salomon Cavin
University of Lausanne, Institute of Geography and Sustainability

Lionella Scazzosi
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering, Lab. PaRID

Marian Simon-Rojo
Universidad Politécnica de Madrid, Dept. Urbanística y ordenación del territorio

Jenny Sjöblom
Swedish University of Agricultural Sciences, Department of Landscape Architecture, Planning and Management

Andreas Spornberger
University of Natural Resources and Life Sciences, Vienna, Department of Crop Sciences, Divison of Viticulture and Pomology

Ina Šuklje-Erjavec
Urban Planning Institute of the Republic of Slovenia

Jan Supuka
Slovak University of Agriculture in Nitra, Department of Garden and Landscape Architecture

Barbara Szulczewska
Warsaw University of Life Sciences, Department of Landscape Architecture

Axel Timpe
RWTH Aachen University, Chair of Landscape Architecture

Chiara Tornaghi
Coventry University, Centre for Agroecology, Water and Resilience

Biancamaria Torquati
University of Perugia, Department of Economic and Food Sciences

Attila Tóth
Slovak University of Agriculture in Nitra, Department of Garden and Landscape Architecture

Jan Willem van der Schans
Wageningen University - Rural Sociology Group, Agricultural Economics Research Institute, Den Haag

Henrik Vejre
University of Copenhagen, Department of Geosciences and Natural Resource Management

Helene Weissinger
University of Natural Resources and Life Sciences, Department of Crop Sciences, Division of Viticulture and Pomology

Hans Wydler
Zurich University of Applied Sciences, Institute of Natural Ressource Sciences

Makoto Yokohari
University of Tokio, Graduate School of Engineering

Xinmin Zhan
National University of Ireland, Galway, Department of Civil Engineering, College of Engineering and Informatics

Editors' Bios

Prof. Dr. Frank Lohrberg

born in 1964, studied landscape architecture at Hanover University and won the Peter Joseph Lenné Award in 1990. Beginning in 1994, he worked at the University of Stuttgart where he received his doctorate in 2001. In 2002, he founded the office lohrberg stadtlandschaftsarchitektur, which focuses on the landscape architecture of regional open space. In 2009, he was appointed to the Chair of Landscape Architecture at RWTH Aachen University.

He is chair of COST Action TD 1106 'Urban Agriculture Europe'.

Prof. Lilli Lička

born in 1963, studied landscape ecology and landscape design in Vienna; 1989-90 practice and research in The Netherlands; since 1991 director of koselička, landschaftsarchitektur, Vienna, with Ursula Kose; since 2003, professor and director of the Institute of Landscape Architecture (ILA) at the University of Natural Resources and Life Sciences (BOKU) Vienna; In her research, teaching, design and implementation she focuses on urban open spaces, parks, historical gardens, housing and educational spaces. Recent publication: nextland, contemporary Landscape Architecture in Austria (2015)

Prof. Lionella Scazzosi

Architect, PhD in 'Preservation of Cultural Heritage', is full Professor at the Politecnico di Milano. Since 1998 consultant of the Italian Ministry of Cultural Heritage and Landscape for landscape policies. Since 2005 expert of the Council of Europe, for the European Landscape Convention. Since 2007 member of the ISCCL - International Scientific Committee on Cultural Landscapes - ICOMOS-IFLA. Scientific director of national and international researches with special focus on rural landscapes. Vice chair of the COST Action TD 1106 'Urban Agriculture Europe'

Dipl.-Ing. Axel Timpe

born in 1976, studied landscape architecture at Leibniz Universität Hannover and Université François Rabelais de Tours. In his professional practice at lohrberg stadtlandschaftsarchitektur from 2003 to 2010, he focused his work on regional open space strategies and urban agriculture/urban forestry. As a research and teaching associate at RWTH Aachen University since 2010, he has continued to work on urban agriculture, namely with the coordination of COST Action 'Urban Agriculture Europe', design studio teaching, and his doctoral research on productive parks.