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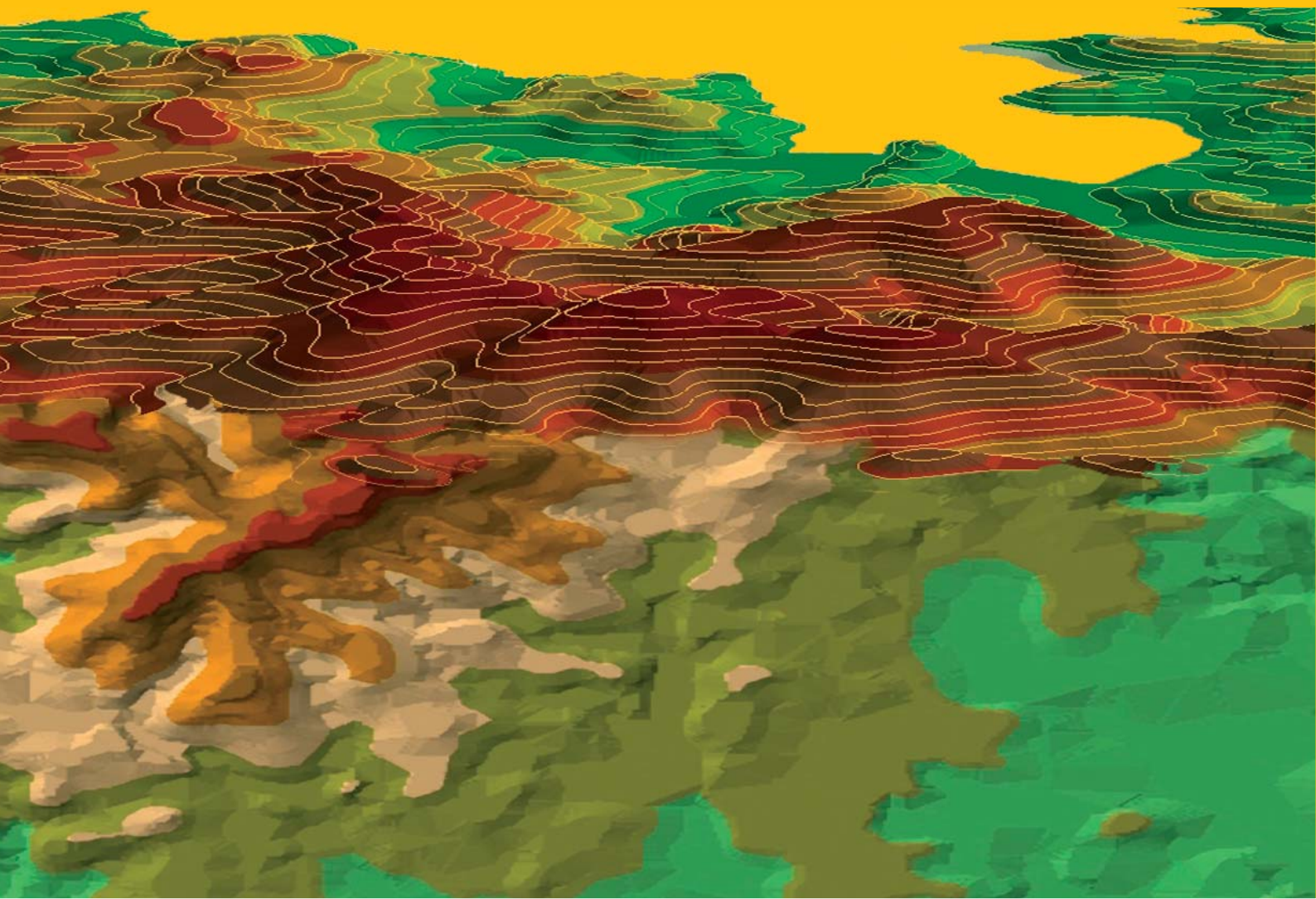




Fig 1: Different evolution of allotment gardens in Popůvky, Brno city suburban area: (a) growing vegetables, (b) conversion to permanent housing, (c) abandonment, (d) breeding domestic animals (Photo: B. Frantál)

Illustration related to the paper by B. Duží et al.

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Scientific papers:

Barbora DUŽÍ, Bohumil FRANTÁL, Marian SIMON ROJO
The geography of urban agriculture: New trends and challenges 130

Cecília DELGADO

Mapping urban agriculture in Portugal: Lessons from practice and their relevance for European post-crisis contexts 139

Marlinde E. KOOPMANS, Daniel KEECH, Lucie SOVOVÁ, Matt REED

Urban agriculture and place-making: Narratives about place and space in Ghent, Brno and Bristol 154

Bernd PÖLLING, María-José PRADOS, Bianca Maria

TORQUATI, Giulia GIACCHÈ, Xavier RECASENS,

Chiara PAFFARINI, Oscar ALFRANCA, Wolf LORLEBERG

Business models in urban farming:

A comparative analysis of case studies from Spain, Italy and Germany 166

Ina OPITZ, Kathrin SPECHT, Annette PIORR,

Rosemarie SIEBERT, Ingo ZASADA

Effects of consumer-producer interactions in alternative food networks on consumers' learning about food and agriculture 181

Nerea MORÁN ALONSO, Ícaro OBESO MUÑIZ,

Agustín HERNÁNDEZ AJA, Felipe FERNÁNDEZ GARCÍA

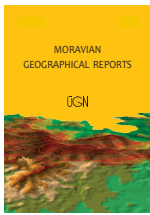
Challenges for the revitalisation of peri-urban

agriculture in Spain: Territorial analysis of the Madrid and Oviedo metropolitan areas 192

Scientific communication:

Attila TÓTH, Axel TIMPE

Exploring urban agriculture as a component of multifunctional green infrastructure: Application of figure-ground plans as a spatial analysis tool 208



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The geography of urban agriculture: New trends and challenges

Barbora DUŽÍ^{a*}, Bohumil FRANTÁL^a, Marian SIMON ROJO^b

Abstract

In the article, which is a theoretical and conceptual introduction for the Special Issue of Moravian Geographical Reports on 'New trends and challenges of urban agriculture in the context of Europe', the authors resume and review diverging issues of urban agriculture, exploring and discussing them from a geographical perspective and in a wider context of the transformation of urban and rural spaces, urban regeneration and renewal, agricultural restructuring, multifunctionality, ecosystem services, land-use conflicts and social responsibility. After the introduction that depicts a changing role of agriculture in the context of urban and rural transformations, the current research on urban agriculture in Europe is summarised and reviewed. Then the main trends and concepts of growing and expanding urban agriculture are presented and discussed with a special emphasis on the challenges these pose to geographers.

Keywords: urban agriculture, peri-urban agriculture, food production, urban farming, food gardening, Europe

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1. Introduction: Changing agriculture in the context of urban and rural transformations

Several decades ago, the connection of words 'urban' and 'agriculture' sounded a little uncommonly and grandly within the geographical research, even though food production practices, at some extent, have been long present in and nearby cities. Only recently, particularly since the 1970s, this concept came out of the shadows and became a focus for many scientific disciplines, including geography (Smit and Nasr, 1992). The main ideas acknowledge the fact that cities are not only consumers of food and agricultural products, and the fact that food production does not belong only in the rural realm (Morgan, 2009). Still, one may ask why connect 'urban' and 'agriculture' if the current character of the food system has been considered as widely globalised, regarding the recent dramatic rise of the global trade in food and agricultural products (Busch and Bain, 2004; Wiskerke, 2016).

In general, 'farmers from somewhere' grow crops and hand over their products through the food processing, distribution and supply networks to stores, where urban customers finally buy it without any context-knowledge about the origin of their food. As described further in detail below, however, times have changed and recently the whole agro-food system has undergone unprecedented changes, shaping both urban and rural realms. Also, the goal of connecting 'urban' and 'food' together rises periodically, particularly in times of

economic depression and related societal problems (Cohen and Garret, 2010; Partalidou and Anthopoulou, 2016). With regard to such matters, municipalities, urban planners, architects, researchers and individual actors involved in urban agriculture, are facing a great challenge in how to tackle these new phenomena.

Before focusing on the cities, some socio-demographic, economic and environmental processes in European rural spaces should be mentioned, especially those rural changes resulting in the realisation that as concerns food production, the rural landscape is no longer just the dominion of productive farming. In the early 2000s, the rural post-productivist transition had started to be discussed (Wilson, 2009; Almstead et al., 2014; Roche and Argent, 2015). Most authors agreed on the need to go beyond this "antipodean viewpoint" (cf. Roche and Argent, 2015) and rather preferred the better fitting concept of multifunctionality (Zasada, 2011; Wilson, 2009). This principle is also applied in the latest EU Common Agriculture Policy agenda, specifically through the placement at the core of its policy increasing sustainability and the joint provision of public and private goods (EC, 2013).

In summary, rural spaces have been experiencing a process of land use transformations, resting mainly in the decreasing proportion of agricultural land and processes of economic diversification. Thus, rural spaces are increasingly designed around alternative agricultural and various new industrial,

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commercial, tourism and leisure activities, which have driven changes in rural identities and lifestyles (Frantál and Martinát, 2013; Frantál, Pasqualletti and Van der Horst, 2014; Martinát et al., 2016; Lange et al., 2013). Not surprisingly, these trends and challenges became the core subject of previous Special Issues of Moravian Geographical Reports (e.g. Frantál, Pasqualletti and van der Horst, 2014).

After three years, we turn our attention to urban spaces and their agricultural issues, to present a new Special Issue covering the role of agriculture in urban or peri-urban environments. It seems that interesting contexts and links between rural and urban transitions have just been revealed. While recent trends in European rural spaces show that their food production role is weakening, we may observe certain contradictory trends in urban spaces.

One crucial question is whether it is a matter of a “quantitative” or rather a “qualitative” dimension. In quantitative terms, some researchers have initialised research focusing on urban food production potential. They explore what kinds of foods, where, what methods and how much food can be grown in cities, and to what extent cities might become self-reliant in food production, taking into account their climatic, environmental and spatial constraints. This part of the story comprises the most popular research subjects, particularly in the US and Canada (Grewal and Grewal, 2012; Badami and Ramankutty, 2015; Napawan and Burke, 2016). On the contrary, Sovová (2015) provides a small-scale evaluation of production potential at the gardening level in Europe. Despite this contribution, we point out that the research potential of urban agriculture goes far beyond its narrowly-conceived food production dimension. We assume that rising concerns for urban agriculture and food issues in general, are part of wider societal changes, including perceptions of food issues.

First, food has been perceived not only as some amount to fill stomachs, but also the qualitative, health, environmental, social and other aspects of food are considered. Especially after the global wave of the nutrition transition based on the shift from traditional regional products to the nutrition poor processed fast food intake, we found that it brought a new kind of so-called malnutrition (a hidden hunger), resulting in increased obesity and the incidence of so-called civilisation diseases among inhabitants in many countries (Caballero, 2007).

Further, some parts of society started to be sensitive to sustainable, regional, aesthetic and cultural aspects of food origins, resulting in the so-called ‘Slow Food Movement’ and other kinds of public engagements in the food issues (Sassatelli and Davolio, 2010; Roe, Herlin and Speak, 2016). Eventually, the perception of the citizen’s role has shifted from being just passive consumers to becoming active influencers or even participants in food issues and policy. In some regions, this has been manifested in the Food Sovereignty movement, which is defined as the “right of people to define their own food and agriculture” (Peoples Food Sovereignty Network, 2002; Patel, 2009; Sage, 2014).

Taking the preceding discussion into account, we suggest that many advanced research topics have surfaced for urban agriculture. Thus, the main aim of this Special Issue is to map the current state-of-the-art and to highlight selected important trends in urban agriculture research

conducted to date in the context of Europe. Even though urban agriculture is undoubtedly a significant phenomenon in other countries of the Global North, particularly in the US and Canada, and it still plays an important role in developing countries across the world, it would be beyond the limits of this Issue to focus on other geographical regions. Hence, in this Issue we strive to investigate and discuss urban agriculture issues primarily from the perspective of geography or the spatial distribution and organisation of agro-food systems, particularly in the intra-urban and peri-urban settings. We also take into account the role of the stakeholders involved, and especially the new kind and quality of relations between the producers and the consumers. We do not underestimate the role of the small-scale gardening dimension, as well.

2. Urban agriculture research in Europe: Shaping the agenda

Urban agriculture has been generally perceived as an engagement in food production or related activities within or nearby cities, practised by various stakeholders under different backgrounds, motivations and socio-economic conditions (Mougeot, 2006; FAO, 2007; Duží et al., 2014; Simon Rojo et al., 2015). It ranges from small scale food self-provisioning, generally known as urban gardening, which used to be practised by individuals or small group of gardeners, to a large scale urban farming being based on business principles.

To distinguish between diverse types of farms and gardens, several definitions and typologies have been introduced. They cover traditional gardens as well as new and unconventional forms, such as the community, educational, therapeutic, squatter or informal gardens/farms. One specific type comprises properly designed agricultural parks or agro-urban parks, focusing on maintaining and preserving agricultural land and activities at the urban fringes (Simon Rojo et al., 2015; Parham, 2015; Fanfani, 2013).

As a basic level, Simon-Rojo et al. (2015) purposefully distinguish three main types and set up urban food gardening as a small scale, mainly non-profit oriented gardening, conducted mainly between what they understand as urban farming and non-urban oriented farming. The first ‘ideal’ type takes advantage of the proximity to the city, building strong connections and offering local products and services to urban residents.¹ The second one – a quite opposite type – includes all the conventionally managed farms, which are located nearby cities, while their production and supply chain is oriented mainly on national or international markets. Empirical research shows, however, more diverse realities. Farms report a high diversity and complex patterns of farm production and output-related linkages, depending on different factors than just location near the city (Pangbourne and Roberts, 2015).

There is no doubt that the basic role of urban agriculture rests primarily on food production and the assurance of food security, together with its health and nutrition aspects. In this respect it has been conceptualised by the key institutions and researchers, such as the Food and Agricultural Organisation of the United Nations (FAO), World Health Organisation (WHO), Resource Centres on Urban Agriculture and Food Security (RUAF Foundation) and others (Mougeot, 2006;

¹ Closer look at the concept of peri-urban multifunctional farms has been at the website of Wageningen University, see: <https://www.wur.nl/en/newsarticle/Animation-on-strategies-for-Urban-agriculture-revenue-models-1.htm>

FAO, 2007; de Zeeuw and Dreshsel, 2015; de Zeeuw and Dubbeling, 2009; Gerster-Bertanya, 2013). Besides the mainly social and economic aspects of food production, urban agriculture has been recognised in a much broader, multifunctional context, encompassing the non-economic and other hardly quantifiable benefits (Hampway, 2013). Its environmental aspects and two-sided impacts are also widely discussed (Mok et al., 2014; Goldstein et al., 2016), as well as its potential contribution to the urban green and blue infrastructure (Timpe et al., 2015) and the improvement of urban food resilience (Cohen and Garret, 2010; de Zeeuw and Drechsel, 2015).

With regard to practical applications, urban agriculture implies a strong innovation dimension. Due to limited urban space and the restrained environmental conditions, food production inside cities has brought a lot of innovative agricultural approaches, starting from the application of soilless or the intensified plant growing technologies, to the identification of new places for production, such as vacant lots, roofs, walls, brownfields, idle or under-utilised land or even underground under artificial lighting (Smit and Nasr, 1992; Solon, 2014; Osborne, 2015; Opitz et al., 2016; Mok et al., 2014). Currently, the project 'Urban Green Train' is being realised with the support of the Erasmus+ Programme across Europe. Its main aim is to promote new urban agriculture business, particularly on a micro- and a meso-scale, through educational programs oriented to urban green innovations. When we focus on other research activities and action-oriented projects in Europe, we can mention several fruitful examples, including the FOODLINK, which deals with the sustainable urban food production and consumption, PLUREL that explored peri-urban land use and urban-rural relations or SUPURBFOOD, which focused on sustainable modes of urban and peri-urban food provisioning.

Recently, two COST² Actions have explored the issue in depth. First, COST Action 'Urban Agriculture Europe' (TD1106, 2012–2016) covered several key issues of urban agriculture: dimensions and definitions, governance, entrepreneurial models, spatial visions and urban metabolisms. This scientific cooperation produced several valuable outputs, including the book 'Urban Agriculture Europe' (Lohrberg et al., 2015), or the Online Atlas of Urban Agriculture, drawing from newly created typology and covering selected case studies across Europe³. Moreover, several special issues dealing with urban agriculture are currently under preparation, including Moravian Geographical Reports (2017) and Nature and Culture (2018) journals⁴. Another COST Action 'Urban Allotment Gardens in European Cities' (TU1201, 2013–2017) focused mainly on the gardening level, particularly allotments. Besides exploring the social, environmental and other benefits of allotments, their incorporation into urban planning and urban fabric were also investigated. They valorised their research in the book 'Urban Allotment Gardens in Europe' (Bell et al., 2016).

The issue of urban agriculture has also penetrated to several conferences of geographers and sociologists where special sessions or panels were organised, such as,

e.g. XXV ESRS Congress in Florence in 2013, covered sociological issues of rural resilience and vulnerability: the rural as locus of solidarity and conflict in times of crisis or IV EUGEO Congress in Rome in 2013, introducing actual geographical concepts. Since 2012, specific conferences focusing exactly on urban agriculture called "Agriculture in an Urbanizing Society" (AgUrb) take place every three years. The first edition of AgUrb was held in April 2012 in Wageningen, covering Multifunctional Agriculture and Urban-Rural Relations. The second (Rome, 2015) focused on Reconnecting Agriculture and Food Chains to Societal Needs. Next session is planned in Brazil (2018). Also, the Association of European Schools Of Planning (AESOP) takes into account the issue of urban food planning and its annual conferences (held since 2009) organised by the Sustainable Food Planning Group always includes urban and peri-urban agriculture issue.

It is not an exaggeration to claim that urban agriculture travels around the world, visibly in the form of the exhibition called 'Carrot City: Designing for Urban Agriculture'. The main idea of this exhibition was to disseminate ideas and knowledge about the best practices in urban agriculture by exploring the connection between urbanism, design and food. The exhibition was conceived by students and faculty at the Department of Architectural Science, Ryerson University in Canada and was first held in Toronto in 2009. Since then, the initiative has expanded, wrapped up new case studies, was presented across America, Europe, Africa and Asia and also a deserved book edition (Gorgolewski, Komisar and Nasr, 2011).

The issue of urban agriculture was important during the EXPO exhibition held in Milan in 2015, setting up the theme 'Feeding the Planet, Energy for Life'. After EXPO – Milan Urban Food Policy Act – an international protocol so far signed by representatives of 152 cities from around the world who committed to developing food systems, based on principles of sustainability and social justice, including coordination of international food policies (MUFPA, 2016).

Food production and consumption in post-communist countries has also gained the special attention of social and geographical-oriented researchers due to its quite different geographical context, mainly the economic and socio-political developments during the second half of the 20th century. On the key issues of their research focus, among others, became self-provisioning activities of gardeners, exploring their motivation and measuring the level of self-provisioning. They also noticed social practices such as gifting, sharing and exchanging crop surpluses. Due to its specific character, widespread adoption and persistence over time or even various political regimes, they conceptualised this social practice as a 'quiet sustainability' (Smith and Jehlička, 2013; Smith, Kostecký and Jehlička, 2016). Their main contribution rests on the extension of the food concept which has been applied mostly by West European researchers, who tended to understand urban food production rather as a food activism, promotion of social justice and environmental sustainability (de Hoop and Jehlička, 2017). Anyway, the quiet sustainability concept

² COST is abbreviation for European Cooperation in Science and Technology, for details see www.cost.eu

³ For details see <http://www.urbanagricultureeurope.la.rwth-aachen.de/online-atlas.html>

⁴ Urban Agriculture, feeding cities, food and landscapes also became the subjects of Special Issues in other Journals, such as International Planning Studies (2009), Journal of Agricultural Sustainability (2010) or Landscape Research (2016)

has brought a deeper understanding of gardening, which has been widely practised for a very long time within the specific culture of former socialist Central and Eastern European countries.

Currently, challenging research questions are related to changing conditions for urban gardeners and farmers in post-communist countries in the light of their transition to market-based economies from the nineties to present. Contradictory factors, such as the impacts of globalisation on the one hand and the penetrating influence of alternative food ideas (for example alternative food networks, farm markets etc.) from the rest of Europe to a post-communist environment on the other hand, place this region into a unique position. The situation has been reflected from some points of view by Spilková and Perlín (2013), Spilková and Vágner (2016), Benedek and Balazs, (2016) or Gibas et al. (2013). One quite interesting application of not old fashioned, but still beneficial theories seems to be the geographical concept of 'travelling theory' (Said, 1983 in Fendrychová, 2015) applied by Fendrychová in research on the emergence and development of farmers' markets in Prague. According to Fendrychová (2015), several different concepts have been travelling from diverse 'western' contexts to the post-socialist countries and thus brought mutual interaction, as well as their clash with the specific local context.

3. Current urban agriculture trends and concepts: A challenge for geographers

Researchers from different academic backgrounds and specialisations have introduced some new terms and concepts to reflect new trends in urban agriculture (or the food issue in general), which started to permeate into multiple disciplines. Most of them reflect new, alternative, locally or regionally sustainable and environmentally sound models of food production, supply and consumption. Some concepts became quite trendy – dealing with the geographical proximity and establishing new forms of relationships among farmers and consumers who may partly share a responsibility for agricultural outputs or even straight forwardly contribute to food production, generally known as 'locavores'.

We can specifically mention local food systems (Holloway et al., 2007; Kirwan et al., 2013; Hiroki, Garnevska and McLaren, S., 2016; Kneafsey et al., 2015), short supply chains (Mundler and Laughrea, 2016), alternative food networks – AFNs (Renting, Marsden and Banks, 2003; Maye, 2013) and community supported agriculture – CSA (Hvitsand, 2016). These new approaches – roofed under the sustainable development concept – have been incorporated into urban municipal strategies in the form of urban food strategies and resilient urban food systems (Moragues et al., 2013; De Zeeuw and Dreschsel, 2015, Sonnino, 2016). Some European cities have already set up and started to implement urban food strategies, namely Milan, London, Malmö, Ghent or Vitoria. The participative approach is applied in the case of planning new agricultural parks in the peri-urban areas (Roth et al., 2015; IPR, 2015; Fanfani, 2013).

The geographical or spatial aspect (territoriality, urban – peri-urban – rural space) plays an important role in mapping and conceptualising urban agriculture. The first question is, which perspective is more feasible to apply specifically in peri-urban spaces or simply the city fringes – urban-centric ones or perspectives from rural/ agricultural geography,

considering the fact that these spaces are under development pressures and they experience conflicts between different land uses (Wästfelt and Zhang, 2016), or to overcome both of them and grasp them as a 'third space', drawing new synergies between the urban and rural processes and features (Fanfani, 2006 in Fanfani, 2013). A big challenge rests on the integration of peri-urban agriculture into spatial planning with respect to its potential for improving ecosystem services, cultural heritage, urban sustainable development and implementation of new, participatory forms of land use planning (Simon Rojo et al., 2014; Grete Swensen and Jerplsen, 2008). In this respect, the concept of agricultural parks has been discussed, being developed and applied in several European peri-urban areas, including the first "swallows" in the Czech Republic (Fanfani, 2013; Roth et al., 2015; IPR, 2015).

The second challenge rests on exploring the meanings of the local or the regional and how they can be measured (Donald et al., 2010), together with the market-based context, i.e. the availability of potential suppliers or purchasers (Pangbourne and Roberts, 2015). In this sense, several methods and concepts have been introduced, the simplest one of which suggests food miles, measuring the distance from 'farm to plate' (Coley, Howard and Winter, 2009). A more complex concept of foodshed was developed and applied mainly in American cities. It represents the geographical area from which a population's food may be sourced, or it can cover more attributes, such as the agricultural methods used, the sustainability aspects, et cetera (Feagan, 2007).

Other new concepts have emerged to connect food production and landscapes, such as for example the Urban/Local Foodscapes (Morgan and Sonnino, 2010; Sonnino, 2013; Roe, Herlin and Speak, 2016), the Continuous Productive Urban Landscape (CPUL), a concept introduced and developed by Viljoen and Bohm (2014) or the Edible (Urban) Landscapes, Foodspace (Parham, 2015) or even the Edible City (de la Salle and Holland, 2010 in Cohen, 2011).

Associated with the question of environmental and food justice, we should mention the contradictory concept of food deserts that points out the dark side of ineffective food production and planning and can feasibly show to demonstrate geographical representation. Food deserts are generally defined as parts of the country/city with the lack access to fresh fruit, vegetables, and other healthful whole foods (Whelan et al., 2002).

Many authors who incorporate productive landscapes into cities and understand them as an essential element of sustainable urban infrastructure, contributed to the development of new idea recently applied in urban planning – food urbanism. Besides that, calls for a new theoretical synthesis in urban food studies aiming to reconnect food, health, nature and politics of the urban food movement are emerging (Morgan, 2015). In this way, some geographers tried to summarise and conceptualise this new field of research at least partially as an alternative food geography (Wiskerke, 2009) or new geography of food security (Sonnino, 2016).

Finally, we have to mention some quite underestimated and adverse aspects of urban agriculture hidden in the enthusiastic wave of urban agriculture. First, the cities in their current forms are still not so favourable and clean places to live. More specifically, they suffer from a certain level of air pollution and soil contamination from previous

as well as current activities. These concerns stem from the fact that urban or peri-urban soils may be contaminated to some extent, particularly the vacant soils or lands located near industrial sites or near roadways loaded with heavy traffic, also organic waste as a potential source for compost might then contain some traces of health and environmental risk substances (Nehls et al., 2015; Säumel et al., 2012; Schwarz et al., 2016). Second, urban agriculture may also contribute to the improvement of but also to the deterioration of urban environments, and it contributes to the increase of carbon footprint if not planned and practised wisely and in an environmentally friendly way (Mok et al., 2014; Duží et al., 2014). We point out that even though there is a strong motivation to produce the local food, we should not underestimate some environmental and health circumstances connected with specific urban or peri-urban conditions.

To sum up, the current linking stream is unexceptionable: starting from individual, fragmented activities, urban agriculture has been already included in city or regional planning, coherent strategies connecting sustainable development, local food systems and new forms of municipal or regional development strategies. Understanding that agriculture and food production are shifting from an anonymous production and becoming more familiar, while people want to know who their farmer is and where the food comes from. Myriad of grass-root initiatives, civil and education platforms, institutions, researchers and city councils envisioning a future of re-localisation of food production and reconnection of urban dwellers with the experience of growing vegetables and adopting healthier diets with fresh food. Daily, we can read news about how some municipalities started to promote local or organic food consumption in public institutions like schools, hospitals or offices, or actively support the complex way of local food production and consumption.

For us, the researchers, it is surely an exciting research agenda. It is worth exploring urban agriculture, to write about it or put it into practice, isn't it? For geographical research, the most attractive aspect is its spatial organisation, i.e. the location and spatial distribution of agricultural activities within the urban space, its durability and feasibility, the real or potential clashes over land use and the overall question dealing with the level and extent of re-localisation of the food system – whether to count with some form of administrative, physical boundaries or placeless – abstract scale. Another aspect for consideration is to what extent is feasible and sustainable to become local? How can geographers contribute to the mapping of this phenomenon? How can the food issue be implemented into urban planning?

Thus, geography and especially the geographers of food received “fresh food”, and a new impulse for conducting fruitful geographical research. On the other hand, despite its current huge wave of enthusiasm, there is a strong need to apply a sober-minded research approach. Some authors pointed out that the local production should not be realised at any cost and that the climatic, environmental and other consequences should be taken into account seriously (Mok et al., 2014; Goldstein et al., 2016). The crucial questions then are “Under which climatic and other conditions and on what scale can the urban agriculture be realised?” and “What kind of impacts and unintended consequences might result from its spatial expansion?”

4. Special issue of MGR on “New trends and challenges of urban agriculture in the context of Europe”

The papers collected in this volume address many of the core issues in the urban space (landscape) – agriculture nexus, from questions about what the urban agriculture is for, and who has what stake in particular patterns of economic developments related to agriculture, to measures of efficiency, problems of scalability, place making, justice and right to the urban space, and questions of producers-consumers interactions and knowledge production.

In the first paper, Cecília Delgado suggests that urban agriculture social economy enterprises and the utilisation of vacant urban land can be a driving force of the post-crisis urban agriculture sustainable development in European cities, if being supported by proper public policies. The provided in-depth analysis of a sample of Portuguese urban agriculture initiatives revealed that the effective urban agriculture initiatives are led by young entrepreneurs, making a positive use of social networks, being committed to social and economic values, which expanded successfully generating jobs in the time of the crisis. The Portuguese development can be an example for other European cities as well.

The spatial dimension of urban agriculture from the perspective of the cultural meaning of lived experience, the value of place (and the place attachment) and emerging social conflicts over the future of urban allotment gardens (considered as a symptom of broader power dynamics and the public right to space) are grateful research subjects not only for sociologists and ethnographers but also for human geographers. In the second paper, Marlinde Koopmans, Daniel Keech, Lucie Sovová and Matt Reed try to bring these two topics together, viewing them as two co-constitutive forces that shape the places of urban agriculture. They analyse three case studies in different European cities (Bristol, Brno and Ghent), using a spatial lens that exposes important tensions as inherent characteristics of urban agriculture and they conceptualise them as tensions within two space-narratives, namely abstract space and concrete place.

Existing research studies have shown that the complexity of urban agriculture is hardly compressible into classic business management models. In the third paper, Bernd Pölling, Maria-José Prados, Bianca Maria Torquati, Giulia Giacchè, Xavier Recasens, Chiara Paffarini, Oscar Alfranca and Wolf Lorleberg propose a new management model called Business Model Canvas (BMC) which should be more useful for understanding the complexities of urban agriculture development. Based on a comparative analysis of case studies from Spain, Italy and Germany, they point out how farm enterprises have to adjust to different urban conditions by stepping into appropriate business models aiming to stay competitive and profitable and how the Canvas business model can be useful to analyse their organisation and performance, both economically and socially.

Consumer-producer interactions and collaboration have been considered a characteristic feature of so called alternative food networks. More general concepts for describing these interactions are, however, lacking. In the fourth paper, Ina Opitz, Kathrin Specht, Annette Pierr, Rosemarie Siebert and Ingo Zasada propose an analytical framework relying on six domains of consumer-producer interactions, which are then applied for investigating the effects of interactions on consumers' learning about agriculture and rurality. Based

on the findings from guided interviews with consumers and producers of selected alternative food networks in Germany they suggest that the participation in alternative food networks enhances consumers' learning about food and agricultural production, where specific food networks are characterised by specific learning channels and contents.

It has been widely acknowledged in the literature that the classical urban-rural dichotomy is no longer valid taking into account the ongoing suburbanisation, urban sprawl and related phenomena. The urban development has generated a range of peri-urban transitional areas in which urban and rural land uses are mixed in a fragmented land mosaic. Based on a comparative analysis of the long-term evolution and land use changes in the Southern Madrid and Oviedo metropolitan areas, Nerea Morán Alonso, Ícaro Obeso Muñiz, Agustín Hernández Aja and Felipe Fernández García in the fifth paper attempt to detect opportunities and provide policy implications for the revitalisation of peri-urban agriculture.

In the last paper, Attila Tóth and Axel Timpe would like to contribute to the existing geographical research by new inspiration in the form of application of figure-ground plans or figure-ground analysis, which is a widely used analytical tool in the landscape architecture and landscape planning. Using the Urban Atlas as a data source, the authors present and discuss the application of figure-ground plans in combination with complex land-use maps for spatial analysis of urban agriculture as a component of multifunctional urban green infrastructures in selected European cities. The presented results demonstrate the scale and diversity of metropolitan regions and different spatial patterns of urban agriculture at the regional level and in central urban areas.

It seems the presented studies well represent a combination of the scientific view of academic researchers on the subject, trying to find out spatial and economic patterns and theoretically conceptualise the problems of urban agriculture developments, with a rather practical view on daily interactions between actors and stakeholders of urban agriculture providing potential readers with important implications for spatial planning and local governance.

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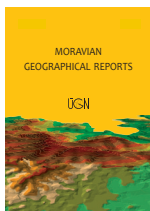
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Mapping urban agriculture in Portugal: Lessons from practice and their relevance for European post-crisis contexts

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Abstract

A significant sample of twenty-nine Portuguese urban agriculture (UA) initiatives is analysed in this article. It argues that emerging initiatives are relevant for shifting from a post-crisis approach to one that is more developmental. This multi-level analysis finds that UA in Portugal: embraces allotment gardens, urban farms and short food chains; deals primarily with vegetables and fruit; takes place predominantly on public and institutional land; and is championed by municipalities and to a lesser extent by civil society initiatives. UA is predominantly a metropolitan phenomenon. Furthermore, activities are organised around three pillars: production of food; simple processing and distribution; and a significant set of capacity building and training activities. UA is recent phenomena in Portugal, and it has expanded quickly since the 2008 economic crisis. The paper explores in-depth four innovative short food chains from the sample of initiatives. They are led by young entrepreneurs, make positive use of social networks, are committed to social and economic values, and expanded successfully in generating jobs at the time of the crisis. These examples strongly suggest that UA social economy enterprises are a driving force behind integrated sustainable development approaches in European cities, if and when supported by public policies.

Key words: urban agriculture; short food chains; post-crisis Europe; Portugal

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1. Introduction

Debates over the relationships between Urban Agriculture (UA) and cities have increased over the past two decades. Cruz and Aguila (2000) defined this relationship in terms of economic value and the circulation of resources and products, emphasising the role of small-scale production on empty and abandoned plots through their integration into the local agricultural chains. Several years later, Mougeot (2015) proposed various levels of integration of urban agriculture into the urban economy and ecology based on four strategies: (1) the land rent of urban agriculture production; (2) the value chains of urban agriculture; (3) the multiple functions of urban agriculture production sites; and (4) the physical connectivity of urban agriculture production sites by improving resource utilisation.

In spite of the passionate and extensive debate among academics and some practitioners, Urban Agriculture has been neglected for decades by both urban and agricultural policy makers – as urban planners treated agricultural land as potential building ground and agricultural policies focused on rural areas (Lohrberg, 2016). Portugal is no exception. For long time food has been forgotten in city planning (American Planning Association, 2007), and far from urban

agendas (Pothukuchi and Kaufman, 1999). Nevertheless, integration of food into urban planning is an emerging topic (Morgan, 2014) all over the world in spite of it still being underappreciated (Cabannes and Marocchino, 2016).

Being a broader issue and interdisciplinary field, UA requires a clear scope. From an urban planner's perspective, UA might be considered as a driver to:

1. propose alternatives to existing land use plans and vacant plots;
2. legitimise existing occupations through integration into the local agricultural chain;
3. provide municipalities with sustainable and long-term local development solutions, based on the economic and social empowerment of communities;
4. generate jobs and increase income; and
5. strengthen multi-level governance and deepen citizen participation mechanisms through collaborative processes.

Remarkably, conventional definitions and prevailing international approaches to UA are slowly being called into question in Southern European countries such as Portugal, due to emerging and innovative UA initiatives (Wascher

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et al., 2015). Existing definitions are vague, however, and UA remains a confused and broad topic. In Section 3, selected UA definitions will be presented in order to discuss the limits to framing a UA State of the Art. The first contribution of the present paper is precisely to propose a conceptual framework for engaging critically with UA, supported by the following research question: To what extent do current definitions of UA reflect and value emerging and innovative UA initiatives, beyond a vision of UA for subsistence and poverty mitigation? Our assumption is that prevailing conceptions of UA need some adjustments in order to reflect local social and economic innovations.

Since J. Innes (Innes and Booher, 1999; Innes and Booher, 2010) and P. Healey (Healey, 2004; Healey, 2006) proposed collaborative planning theory in the 1990s as a new planning-development paradigm that, in a nutshell, considers policy planning as a social process, i.e. involving actors from the local population as well as technicians and decision makers, among others, in a systematic approach, many practitioners have found their ideas too abstract and difficult to relate to their concerns (Goodspeed, 2016). One problematic issue is that the theory does not sufficiently reconcile local agreements with external perspectives or account adequately for issues of power (Huxley and Yiftachel, 2000, Fainstein, 2000). This is particularly relevant in Southern European countries, such as Spain, Portugal and Italy, where governments recognise the significance of new democratic approaches even if citizen participation is seldom achieved in practice (Schaap et al., 2009).

The second contribution of this paper is to an ongoing theoretical debate, framed by the following research question: To what extent is collaborative planning theory adequate for understanding and facilitating the development of UA programmes. The current integration of UA in Portuguese cities is fragile, as will be discussed further. A related theoretical question is framed as follows: Can collaborative planning theory help bridge the gaps between diverse and unbalanced stakeholders in the processes and support long-term transformative change? This topic is critical, as the development of cities cannot be achieved without governments working with communities (Rauscher and Momtaz, 2015). This paper advocates for a collaborative planning theory approach as a way to develop a common vision on UA integration at the city-wide scale, even though our experience in working with Portuguese municipalities and local associations shows how limited is the level of mutual understanding.

In order to develop and scale up UA in Portugal, a State of the Art formulation is necessary, including mapping out existing and disappearing initiatives. This paper maps out and analyses a significant sample of Portuguese UA initiatives, based on a set of 29 cases selected by key stakeholders from national associations, academia, municipalities, local champions, and gardeners with a long involvement in food issues. Multi-level perspective theory (Geels, 2011) helps to explain what is currently happening in Portugal. On the one hand, the 'regime', which refers to the dominant mind-set of UA practice, promotes large projects of allotment gardens, but on the other hand there are young social entrepreneurs using innovative means to address societal challenges, including mass unemployment and the failure of the welfare state.

At this point we arrive at the third and final research question of this paper: How can crisis-induced initiatives represent an opportunity to integrate UA with the city in the

long-term? Our central argument is that UA in Portugal is a burgeoning field that has been rapidly expanding as a result of the effects of the 2008 socio-economic crisis. In addition to a consistent number of allotment gardens promoted by some institutions and municipalities, a significant number of extremely creative initiatives that share in common values with the social and solidarity economy, are consolidating, showing that UA is an important opportunity. Our theory, based on the lessons learned from the mapping of the UA Portuguese initiatives, is that the UA innovative short food chains can be drivers for sustainable urban development and the integration of UA with the city (Mougeot, 2005, Mougeot, 2015).

The rise of initiatives concerning food and UA, which have started to spread across various Portuguese cities, calls for a place for UA on the national agenda. This reflects a tremendous need and presents a unique opportunity to deepen the debate, and to develop broader understandings of the specificities and trends of UA in Portugal as short food chains.

The next section presents an overview of the State of the Art of Portuguese UA in the context of the economic crisis and the solidarity economy, based on a literature review, as well as a brief explanation of Portugal's historical development in relation to other European countries. Section 3 illustrates how the methodology for this research was developed and the data selected. An in-depth discussion is based on 29 initiatives selected by a relevant set of key informants (Section 4). Out of this target universe, four cases of short food chains are surveyed in detail, as they represent an alternative to the conventional mainstream allotments initiatives. More importantly, when taken in their diversity they are particularly interesting in bringing primary answers to the three research questions introduced previously. Finally, in Sections 5 and 6 we discuss the findings and their contribution to the theoretical and conceptual debates, including the previous research questions.

2. Theoretical background: Urban agriculture in Portugal from gardening to socio-economic development

This paper is part of a larger research and development project on the role of UA and Urban Planning Policies in Portugal as drivers of city development that began at the end of 2014. Briefly, the process so far has included the following elements: a scoping study on urban agriculture and the refinement of research questions; the design of research instruments; identification and selection of empirical cases; case study visits; interviews with relevant actors and key informants; data processing and analysis; dissemination of results in scientific journals; and feedback to engage actors locally, nationally and internationally.

The economic crisis that struck Portugal in 2008 brought about a significant increase in allotment gardens (Delgado, 2015). According to the Portuguese national report to Habitat III (Branco, 2016) in 2013, 16 out of a total of 18 districts have allotment garden initiatives, which together constitute 27 hectares of *hortas urbanas*. The crisis also spurred a huge campaign launched by the Portuguese State emphasising the potential of social entrepreneurs (Casaqui, 2015). Existing data from the National Statistics Institute (INE-CASES, 2013) show an increase of the number of social organisations in Portugal dealing with food, such as the Fruta Feia (Ugly Food) Cooperative that will be analysed

further below. In 2010 the number of social organisations for all sectors amounted to 55,000, and increased to 61,000 in 2013. Paid jobs generated in this sector increased from 5.5% in 2010 to 6.0% in 2013, which illustrates the development of the Portuguese social economy.

The first formal Portuguese allotment garden opened in 2003, before the crisis, led by LIPOR (Lipor, 2017), a municipal waste management enterprise based in Porto Metropolitan Area that is active in eight municipalities today. One year later, Coimbra Municipality and its University together transformed an informal community garden close to a low-income neighbourhood into a formal, regulated space. Also Funchal Municipality (CMF, 2015) on Madeira island, started a formal programme of allotment gardens in 2005, which is active today in 23 city spaces, with the majority created after the 2008 crisis and involving more than 900 families. This national process culminated in the first and only national and international conference on UA organised by Seixal Municipality in 2011 (Lança, 2011), which brought together 250 researchers and practitioners. The conference took place in the context of high levels of unemployment (Pascual, 2015) and pressure from low income groups searching for means of producing food (Luiz and Jorge, 2011, Cabannes and Raposo, 2013, Delgado, 2015).

In 2011, Lisbon Municipality began an ambitious programme called “Parques Hortícolas Municipais” (CML, 2016) which today comprises 25 urban spaces, involving more than 500 families. Information is not currently available to assess how many farmers are practising UA with or without formal status. A continuous practice of small-scale subsistence agriculture remains in place in Portugal, however, primarily in rural and peri-urban areas.

A review of the literature on Portuguese Urban Agriculture mainly draws on PhD and Masters theses, bringing some light to several squatter gardens, such as Horta do Monte in Lisbon and Quinta das Musas in Porto (Santos, 2011), Vale de Carnide in Lisbon (Cardoso, 2012) and Oeiras, on the outskirts of Lisbon (Saraiva, 2011). There also exists literature on allotment gardens in Lisbon (Ramos, 2011, Gonçalves, 2014, Cancela, 2014), and some specific cases on the Lisbon outskirts such as Cascais (Abreu, 2012) and Seixal (Rodrigues, 2012) to name a few. Even with a limited number of cases, this allows us to precisely understand that Portuguese UA is focused on food production for self-consumption among informal or formal frameworks, and is mainly located in the metropolitan areas of Lisbon and Porto. So far, a key lesson is the absence of UA from a city food system approach that connects producers, distributors, processors, retailers, formal and informal markets, restaurants, institutional food services and waste management (Raja et al., 2016).

2.1 Portugal in an historical European context

In northern European countries, UA has been shaped by industrialisation (Crouch and Ward, 2007), as well as the wars and crises in the 20th century (Bryant et al., 2016). After the First World War, countries such as Britain and Germany developed specific allotment gardens programmes as a response to food crises. Portugal’s relatively late industrialisation, as well its absence from the Second World War, help to explain why formal allotment gardens were not part of municipal policy in the last century.

Another European process occurred roughly ten years after the First World War, in 1926 when several countries established the Federation of Allotment Gardens in

Luxembourg, an organisation that today comprises over 3 million people from 14 countries (Coin de Terre et des Jardins Familiaux, 2014). Portugal and other Southern European countries, however, are not part of it.

At the beginning of the twentieth century, Portugal was predominantly a rural society and the primary sector employed 60% of the work force (Ferraz, 1975). The country was marked by a late industrialisation process, mainly concentrated around Lisbon and Porto (Teixeira, 1993). In addition, Portugal’s dictatorial period from 1933 until 1974 explains the slow process of urbanisation that only began to accelerate in the 1980s, driven by Portugal’s entry to the European Union in 1986. This marks the start of the societal changes and new patterns of consumption in cities that constitute the frame for UA expansion described in this paper.

With the beginning of massive urban development through the 1980s, Portugal turned its back on agriculture. Unsurprisingly, since the integration of Portugal into the European Union, urban agriculture was neither a key issue in debates nor a supported sector. This means that today Portugal has an unbalanced food system, needing to import food to supply its own needs (FAO, 2017).

2.2 Portugal slowly returning to agriculture

A turning point happened during the 2000s, when local food systems and urban agriculture in Portugal began to benefit from European Programmes such as Leader+, which ran between 2000 and 2006 and supported the PROVE programme (2006). PROVE is a national, emblematic short food chains enterprise-oriented initiative, connecting producers directly with consumers (PROVE, 2017), and it will be referred to further below. European research programmes such as Cost Urban Allotments Garden in European Cities (2012–2016), and Cost Urban Agriculture Europe (2012–2016), which integrated Portuguese teams and initiatives, played a significant role in connecting Portuguese UA initiatives and debates with those taking place in other European countries (Bell et al., 2016, Lohrberg et al., 2016). Still, the process takes time and needs a lot of UA advocacy. Such processes are being conducted by the Portuguese non-governmental organisation, OIKOS, on the Milan Urban Food Policy Pact (OIKOS, 2017). This international protocol aims to engage cities around the world, particularly Mayors, for the development of just and sustainable urban food systems (MUFPP, 2015). In approximately one year, 137 member cities from over the world, including several European cities, joined the Pact; so far none of them are Portuguese. Nevertheless, 30 cities showed interest in a public event organised at the beginning of 2016 by OIKOS.

2.3. Urban agriculture integration into the urban economy

It is not possible to understand how Portuguese UA is integrated into the urban economy in terms of distribution and consumption, given the lack of national data. Members of the social or solidarity economy sector, however, including consumers cooperatives such as Fruta Feia (Fruta Feia CRL, 2017) and ADREPES, a non-governmental organisation that leads the PROVE programme, are emphasising the need to have a closer look at this sector.

The concept of social economy and social entrepreneurship is relatively new. Its origins can be recorded in the 1980s in the USA, and its arrival in Portugal happened in the first decade of the 21st century (Quintão and Parente, 2015),

with the first social economy law appearing in early 2013 (Law No. 30/2013). Interestingly, the topic emerged in 2011 when Portugal was hit by a dramatic economic crisis and lack of liquidities, which led to the signature of an MOU (Memorandum of Understanding) with the so-called “Troika” composed of the International Monetary Fund (Pascual, 2015), the European Central Bank and the European Parliament. As a consequence, these three institutions took over the economic sovereignty of the nation and spearheaded harsh austerity (economic and social) measures from April 2011 to May 2014 – as a condition to respond to the country’s request for external financial aid.

The four short food chains initiatives analysed in this paper are examples of food solutions that came from the economic enterprise sector but others can be given, such as the national programme RE-Food that collects food waste from restaurants and other local food establishments and distributes it to local populations, all through voluntary service, at more than 30 distribution points covering the Portuguese territory. Another example are the open-air organic street fairs managed by the national organic association Agrobio that exists in several Portuguese cities. These initiatives were not listed by the group of key informants, which clearly illustrates the need for a conceptual debate on a definition of UA that would include such initiatives.

3. Methodology and data collection

The first challenge comes from the lack of a widely-accepted definition that would help delineate the contours of UA, although some existing international definitions are generally accepted by the scientific community and most stakeholders. Despite variations among definitions, one useful example states: “(UA is) the growing of plants and the raising of animals within and around cities, embedded in – and interacting with – the urban ecosystem. Including the use of urban residents as labourers, use of typical urban resources, direct links with urban consumers, direct impacts on urban ecology, being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans.” (RUF, 2006). From the territorial perspective, UA definitions agree that UA is located in urban and peri-urban areas, i.e. not strictly related to the urban core (Mougeot, 2000, Mougeot, 2005, RUF, 2006, FAO, 2009, Zeeuw and Drechsel, 2015, Lohrberg et al., 2016). Currently, only RUF’s (2006) definition stresses the need for UA to compete for land with other urban functions and being influenced by urban policies and planning, despite the international recognition of its importance.

There is a converging standpoint in terms of UA being part of the urban system, and conducted by and for urban actors. Additionally, some definitions introduce animal raising or aquaponics production (Veenhuizen, 2006), an issue that does not find a consensus between authors. Finally, a new trend can be found in the later Cost publication Urban Agriculture in Europe (Vejre and Simon-Rojo, 2016) concerning biological production-related issues.

This brief presentation of UA’s conceptual definitions illustrates the problem: UA is a diffuse entity, i.e. not defined by quantitative dimensions; unstable, i.e. it changes through time; boundless, i.e. different definitions are prioritising diverse topics, e.g. from land planning to animal raising or aquaponic production; plus it is locally specific, e.g. only Cost UA European definition considers organic production as a

key issue. In conclusion, UA lacks a conceptual framework, which is itself a methodological challenge concerning making any UA State of the Art assertion.

3.1 The target universe of urban agriculture in Portugal (29 selected cases)

In order to substantiate or contribute to the national and international debates and in spite of the limitations presented by definitions of UA, this research project began with the perceptions of twelve key stakeholders, in order to obtain their reflections on UA in Portugal. The stakeholders were selected from four sets of actors: [a] members of institutions and networks with a national coverage; [b] scholars and academics; [c] workers from the public sector; and [d] members of grassroots and local civil society organisations.

The main aspects of this exploratory phase of the research are as follows:

- half of the interviewees were representatives of the most prominent and active organisations with national coverage, namely the National Portuguese Network of Urban and Peri-urban Agriculture, the National Association of Landscape Architects, the National Association of Organic Agriculture, the National Association of Horticulture, and the National Champion of the Prove Program;
- interestingly, the scholar from the Environment Department of Nova University in Lisbon was also a practising urban gardener engaged in local actions;
- the public sector interviewees came from the Ministry of Agricultural Regional Directorate for Lisbon and the Tejo Region, as well as two representatives from the Lisbon and Sesimbra (Lisbon Metropolitan Region) local governments; and
- finally, two champions from Lisbon-based local organisations (Horta do Mundo and AVAAL) completed the set.

The interviews were conducted between October and December, 2015. To select key informants a reputational process (snowball) of sampling was used (Atkinson and Flint, 2001; Biernacki and Waldorf, 1981), i.e. each interviewee suggested three new relevant actors, resulting in a stable network of twelve actors. The participants were gender-balanced and ranged from 40 to 60 years old. A semi-structured interview covering several UA dimensions was conducted. In addition, participants were asked to indicate initiatives that they felt were paradigmatic models of UA in Portugal. From the key informants’ indications, a consolidated list was created. This list comprised 29 projects and programmes.

The 29 cases from the key informants (see Tab. 1) are only a sample of the universe of UA initiatives in Portugal; in other words, they represent the target population of concern in this project, effectively illustrating this exploratory research in that it is not representative of all the initiatives in progress. Regardless, these cases together constitute a unique empirical collection of significant initiatives to map out a first UA profile for the country, and they are consistent enough to ignite a debate based on such primary information from relevant national UA stakeholders.

The full investigation of the 29 cases was developed by the author between January 2015 and December 2016, using a variety of methods and tools to gather and consolidate the non-systematic data: a) systematic and repeated web site visits; b) site visits; c) in-depth interviews of key informants

and practitioners and farmers involved; d) occasional exchanges with producers, consumers, supporters and partners; and e) networking activities and participation in seminars on urban agriculture-related events in order to get better insights on initiatives. These different research activities generated a climate of trust with several of the programmes and initiatives, and this opened up the possibility to complement information and verify accuracy when necessary. The boundaries between research and a citizen's involvement in a small country such as Portugal are difficult to establish.

Given the extreme diversity of the projects and initiatives that were part of this composite list, one of the challenges for the research was how to define analytical categories that would be sensitive enough to capture the diversity of situations. At the same time, such an analytical tool should highlight elements that would help sketch out a Portuguese UA profile with some accuracy, grounded in evidence and hard facts.

3.2 Proposed multi-dimensional analysis

The heterogeneity of the 29 UA initiatives identified corresponds with the diversity of the key national informants that were invited to establish the reference list. A multi-dimensional analysis was designed, starting with a long list of dimensions that were tested on the existing cases. The information that was available and the quality of results led to differentiation between two levels: the first level is intended to define a stable platform of dimensions that can easily be used as comparative tools with other country profiles. In order to do this a combination of RUAF and Cost Action UA in Europe key dimensions were used, covering:

1. typology of UA initiatives;
2. territorial scale and locations; and
3. what is being produced and distributed.

The second level is specific and local: an in-depth Multi-Dimensional Analysis with the aim of generating and understanding Portuguese UA's specificities. It covers five dimensions:

1. land for UA;
2. leadership and partnership;
3. asset mapping;
4. duration; and
5. activity patterns.

This second level was tailored to the very nature of the 29 cases. This was a contribution to the establishment of initiative-based UA profiles in specific locations.

4. Results: A preliminary national urban agriculture profile

4.1 First multi-dimensional level

4.1.1 Typology of UA initiatives

The cases can be organised into the following typology (see Tab. 1): Allotments Gardens; Programmes and Projects; Short Food Chains; Urban Farms; Others.

a. Allotments gardens (15/29)

According to Simon-Rojo et al. (2016), urban food production encompasses agricultural activities with low economic emphasis on material outputs, while using the production of food for achieving other, mostly social,

goals. Broadly this is true for the majority of cases in this study. Further analysis will highlight how this category is heterogeneous, however, and deserves to be unpacked.

The leisure allotments that are now part of 25 Lisbon public parks (Ramos, 2011, Gonçalves, 2014) (case 2) and the recently opened AVAAL (case 4), a two-hectare allotment site in a large middle class development (Cancela, 2014), share very little in common with grassroots initiatives close to low-income social housing at the peripheries of cities (cases 11 and 13). Such social housing areas are struck by poverty and social exclusion and cultivating food remains an activity for subsistence. Most of the cases falling into this category are managed by local government authorities, a few by institutions and foundations, and only one can be identified as a community-led initiative (case 13) on non-regularised land (Cabannes and Raposo, 2013).

b. UA programmes and projects (6/29)

These programmes and projects focus mainly on capacity building, training and education rather than production. They are promoted by an interesting array of groups of individuals, institutions, or public bodies that have started to invest resources into UA such as a public bank (case 16), a cultural foundation (case 18), and a municipality (case 20) that promotes business-oriented capacity building.

c. Short food chains (4/29)

These projects highlight primarily the economic dimension of UA (Lordleberg, 2016) as they refer to commercial food distribution. Four innovative initiatives fall under this category and are of a radically different nature when compared with the others. In the context of Portugal they are at the cutting edge of addressing food issues. They broadly fall under the category of the social and solidarity economy, and promote direct or short distribution circuits between local producers and mostly urban customers. Their originality and potentials, quite in tune with the European evolution of UA, will be examined in depth in section 4.

d. Urban farms (3/29)

Urban farming refers to intentional business models taking advantage of proximity to the city (Simon-Rojo et al., 2016), again emphasising UA's economic dimension. The productive farms all work with vulnerable and excluded groups (inmates, disabled people), and are located in Lisbon and neighbouring cities. They attempt to sell and distribute the products cultivated beyond self-consumption, in order to generate income towards self-sufficiency, as is the case of Cercica (case 28) or Setúbal jail (case 12) (Almeida, 2012).

e. Others (1/29)

Loja dos Produtos Rurais (case 29) is a gourmet shop located in Lisbon selling products from various regional producers from the region, and currently closed. One key informant mentioned it as one of the references of new trends of UA.

4.1.2 Territorial scale and location

The map in Figure 1 gives an overview of the locations of the 29 selected initiatives. They can be organised roughly into three different scales:

- a. Very few have reached national or multi-city coverage – Programa PROVE (case 22) is an exception as it established short distribution chains between 137 small-scale producers and 7,000 consumers living in the main cities of the country, primarily in the Lisbon and Porto Metropolitan Areas. A second initiative, Fruta Feia

Portuguese nomenclature	English translation	Starting year
<i>Allotment Gardens (15)</i>		
(1) Horta à Porta – LIPOR, Porto Metropolitan Area	Allotment Garden at your Door	2003
(2) Parques Hortícolas de Lisboa	Lisbon Horticultural Allotment Park	2011
(3) Hortas de Cascais	Cascais Allotments Gardens	2011
(4) Horta AVAAL, Lisboa	Assoc. for Development of Lisbon High Allotment Gardens	2015
(5) Hortas de Guimarães	Guimaraes Allotments	2008
(6) Hortas Urbanas de Vila Franca de Xira	Vila Franca de Xira Allotments	2010
(7) Hortas do Centro Hospital Conde Ferreira, Porto	Conde Ferreira Hospital Allotments	2015
(8) Parque Hortícola da Quinta da Várzea, Sesimbra	Horticultura Park Varzea Allotment Gardens	2011
(9) Hortas de S. João, Almada	S. João Allotment Gardens	2013
(10) Hortas de Vila Nova de Gaia	Vila Nova de Gaia Allotmen Gardens	2013
(11) Horta do Ingote, Coimbra	Ingote Allotment Garden	2004
(12) Hortas do Funchal, Madeira Island	Funchal Allotment Gardens	2005
(13) Hortas na Cova da Moura, Amadora	Cova da Moura Allotment Gardens	2003
(14) Hortas Bairro Boavista, Lisboa	Boavista Neighbourhood Allotment Gardens	2014
(15) Hortas Urbanas da Moita	Moita, Allotment Gardens	2015
<i>Programs and Projects (6)</i>		
(16) Horta da Caixa Geral de Depósitos, Lisboa	Bank Foundation	2015
(17) Projeto Horta Integrada, Lisboa	Integrated Allotment Garden Project	2013
(18) Hortas da Fundação de Serralves, Porto	Serralves Foundation Allotment	2011
(19) Programa da quinta para o prato, Palmela	From farm to plate Program	2012
(20) Hortas Empresariais, Loures	Loures Business Allotment Gardens	2011
(21) Horta do Baldio, Lisboa	Wasteland Allotment Garden	2014
<i>Short Food Chains (4)</i>		
(22) PROVE, Portugal	Taste Program	2006
(23) Cabaz do Peixe, Sesimbra	Fish Basket	2015
(24) Fruta Feia, Lisbon & Porto Metropolitan Areas	Ugly Fruit	2013
(25) Biovivos, Lisbon, Porto & Faro	Organic Greens	2014
<i>Urban Farms (3)</i>		
(26) Projeto Semear, Lisboa	Growing seed Project	2015
(27) Horta Prisão de Setúbal	Jail Farm	2012
(28) Cercica de Cascais	Training Centre for Disable People	2006
<i>Others (1)</i>		
(29) Loja Produtos Rurais, Lisboa	Rural Products Shop	2014

Tab. 1: Typology of UA initiatives

Source: author's elaboration based on information from local actors and key-informants (2017)

- (case 24), collects fruit and vegetables that are rejected by the corporate sector through a large network of producers that covers a large portion of the territory. However Fruta Feia only distributes the collected food in Lisbon and Porto Metropolitan Areas;
- While UA in Portugal is dominantly a metropolitan phenomenon, this map clearly indicates the concentration of initiatives taking place partially or exclusively in Lisbon and Porto Metropolitan Regions, the most densely populated areas of the country; 22 out of the 29 in Lisbon and 7 out of 29 in Porto. Lisbon and its region is by far the most active UA region;
 - There exist limited but growing UA activities in secondary cities. On the one hand, PROVE is active in secondary cities from North to South. Interestingly enough other cities such as Coimbra, Guimarães have developed specific allotment programmes. A special reference needs to be made also to Funchal Municipality, Capital of Madeira Island, for its long-standing and multi-location programme, for the promotion of allotments for self-consumption; and
 - Smaller towns and villages – No programmes or initiatives that would take place in smaller human settlements were indicated by the key informants. As for the secondary cities, or even metropolitan areas, there are examples of small- or medium-sized initiatives, but these are isolated or simply at an early stage. The topic deserves future attention.

4.1.3 What is being produced and distributed

UA in Portugal deals primarily with traditionally consumed vegetables: green leafy (salads, cabbages, etc.), roots and tubers (potatoes), and tomatoes (Delgado, 2016). To a much lesser extent fruit and flowers are being considered, despite programmes such as Fruta Feia and PROVE that distribute a large variety of fruits produced locally. Some allotment gardens have also introduced orchards with some success.

Healthy micro greens (case 25) have largely expanded and are being distributed in various cities as high quality products. They are a unique example of diversification of UA products towards new market niches. Another original initiative is the distribution of local fish (case 23).



Fig. 1: Location of the 29 UA initiatives in Portugal
Legend: (1) Horta à Porta – LIPOR. PMA, (2) Parques Hortícolas de Lisboa, (3) Hortas de Cascais, (4) Horta AVAAL, Lisboa, (5) Hortas de Guimarães, (6) Hortas Urbanas de V. Franca Xira, (7) Hortas Hospital C. Ferreira, Porto, (8) Parque Hortícola da Quinta da Várzea, Sesimbra, (9) Hortas de S. João, Almada, (10) Hortas de Vila Nova de Gaia, (11) Horta do Ingote, Coimbra, (12) Hortas do Funchal, Madeira, (13) Hortas Cova da Moura, Amadora, (14) Hortas Bairro Boavista, Lisboa (15) Hortas Urbanas da Moita, (16) Horta da Caixa G.D. Lisboa, (17) Projeto Horta Integrada, Lisboa, (18) Hortas da Fundação de Serralves, Porto, (19) Da quinta para o prato, Palmela, (20) Hortas Empresariais, Loures, (21) Horta do Baldio, Lisboa, (22) Programa PROVE, Portugal, (23) Cabaz do Peixe, Sesimbra, (24) Fruta Feia. LMA and PMA, (25) Biovivos, (26) Projeto Semear, Lisboa, (27) Horta Prisão de Setúbal, (28) Cercica de Cascais, (29) Loja Produtos Rurais, Lisboa
 Source: author's elaboration (2017)

4.2 In-depth multi-dimensional analysis

4.2.1 Land for urban agriculture

The results of the analysis of the ownership of land where UA initiatives are taking place reinforces the idea that the majority of UA occurs on public land (14 out of 29 cases) and institutional land (11/29) such as hospitals, foundations, universities or prisons. To a lesser extent UA initiatives are developed on privately-owned or rented land (5/29), mainly by PROVE and Fruta Feia farmers. It is important to note that renting land remains relatively rare as land for UA remains quite expensive in peri-urban areas. Lastly long-term initiatives such as LIPOR (case 1) and Funchal (case 12) take place mainly on public land (Delgado, 2015), but also on private and institutional land, showing that established initiatives are expanding through heterogeneous land ownership regimes.

4.2.2 Leadership and partnerships

The data gathered clearly indicate that the public sector and local municipal governments are spearheading the referred initiatives and programmes (14 out of 26 cases). Civil Society Organisations with different thematic foci including ecology, healthy food and permaculture registered in second place (7/26), followed by institutions (3/26), private companies (1/26) and informal groups (1/26), such as Horta Integrada (case 17). Programmes and initiatives with clear partnerships and multi-actor processes are still quite limited: four were identified out of the 14 with public leadership and one out of the five spearhead by Civil Society Organisations.

4.2.3 Asset mapping

Each initiative was “unpacked” in order to identify their assets, i.e. the number of distribution points, the number of fairs, the number of allotment gardens or the number of peri-urban productive units involved in supplying short food chains. Portuguese UA is quite heterogeneous and covers an extreme diversity of situations which can be summarised as follows:

- concentration of productive assets in two programmes – PROVE with its 170 registered producers and Fruta Feia with its 107 producers, are by far the largest initiatives in the country when considering their productive capacity;
- multiple-asset initiatives (from 10 to 50) – A second position refers to programmes such as Lisbon Horticultural Parks (case 2) that comprises allotment gardens and other UA-related activities in 25 Parks in the city itself, excluding the metropolitan region. Another emblematic case is Horta a Porta, (case 1) taking place in 8 municipalities of the Porto Metropolitan Region. It is promoted by LIPOR, a waste management public enterprise, and supports the use of compost in 50 allotments located in these 8 municipalities; and
- A majority of single assets initiatives - the most frequent situation (18 cases out of 29) refers to projects taking place in one municipality only and they are quantified here as “single asset” initiatives. Information on the number of families involved in the case of allotments, or size of land cultivated is still scarce and deserves further research in the future.

4.2.4 Duration and consolidation through time

Exploring the trajectories of the 29 referred initiatives through time is extremely fruitful for sketching out and understanding UA in Portugal (see Fig. 2). The first

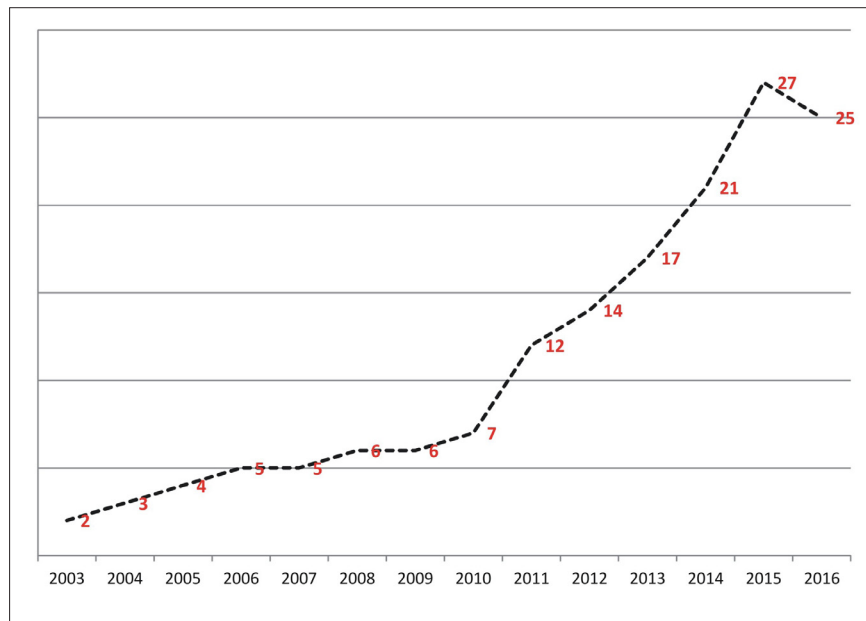


Fig. 2. Evolution of number of UA active initiatives per year

Source: author's elaboration based on information from local actors and key-informants (2017)

observation is that these initiatives have been steadily growing over the past 15 years, since the first one was formalised in 2003. Three periods can be identified and for each the challenges have been quite different.

The three periods are as follows:

- a. there was a slow emergence of initiatives before the peak of the 2008 socio-economic crisis (2003–2008) – Figure 2 indicates that the number of initiatives steadily grew from two in 2003 to seven in 2008. Most of these initiatives still exist today, in fact many have expanded. They clearly indicate that despite difficulties and lack of supportive policies, they have gained resilience. This is notably the case for emblematic programmes such as LIPOR (2003). Interestingly, some of these pioneering initiatives are not located in Lisbon and Porto. They are found in places that were facing rapid urban expansion but close to rural areas and traditional agricultural initiatives such as Maia in Porto Metropolitan region (case 1), and in Cascais in Lisbon Metropolitan region (case 28) or in secondary cities such as Funchal, capital of Madeira Island (case 12), and in Coimbra (case 11);
- b. post-2008 swift expansion of experiments and programmes (2008–2015) – a second period corresponds to quite a remarkable expansion of initiatives of all kinds according to our typology and covers the period stretching from 2008 to 2015. They resulted, by and large, from the effects of the crisis on Portuguese cities and primarily Lisbon and Porto Metropolitan Regions. In just seven years the number of referred initiatives jumped from 6 to 27. Several of them started their planning process before 2008, a period that was already marked by growing social and economic inequality;
- c. slight decrease in the number of initiatives and possible stabilisation (2015–today). The third period mirrors the reduction of the number of initiatives that passed from 27 in 2015 to 25. The various initiatives that did not continue through time were primarily small-scale, dependent on one champion and that did not survive when the champion disappeared or some local conflict

was aroused. This is the case for Horta da Caixa Geral de Depositos in Lisbon (case 16), Programa da Quinta para a Mesa (case 19) and Loja Produtos Rurais (case 29), all of them located in Lisbon Metropolitan Area.

4.2.5 Activity patterns

This initiative-based UA profile explains (see Fig. 3) the nature and intensity of activities developed through the 29 initiatives. The activities developed can be organised into three different groups corresponding to what is being carried out day-to-day:

- a. Growing Food (22 out of 29 cases) – the first set of activities relates to growing food, either for self-consumption, as in the case of allotment gardens, or for subsequent distribution (case 22);
- b. Food processing and distribution (10/29) – many less initiatives, some projects are integrating food processing and distribution into their practices. One can say without any doubt that UA in Portugal is still essentially a primary industry that deals with unprocessed vegetables and fruit. Packaging, marketing, branding, and publicity are quickly being integrated by various initiatives, however, primarily the social enterprises involved in short circuit food chains;
- c. Capacity building, training and support (22 out of 29 cases) – one important finding in this research was the importance of a wide range of activities falling under capacity building, awareness raising, and training in multiple forms (technical, scientific, social, organisational and management). This third group corresponds to 22 of the cases and therefore is of a similar importance to growing food. This particular result is important, as it was very little perceived by the key informants when asked: “How would you define UA in Portugal?” Some of the initiatives focus essentially on training (case 18), but almost all the initiatives with public leadership include mandatory workshops on, for instance, organic production and composting. This is the case for the LIPOR programme, Lisbon Allotments Parks, and Cascais allotments gardens (Abreu, 2012); and

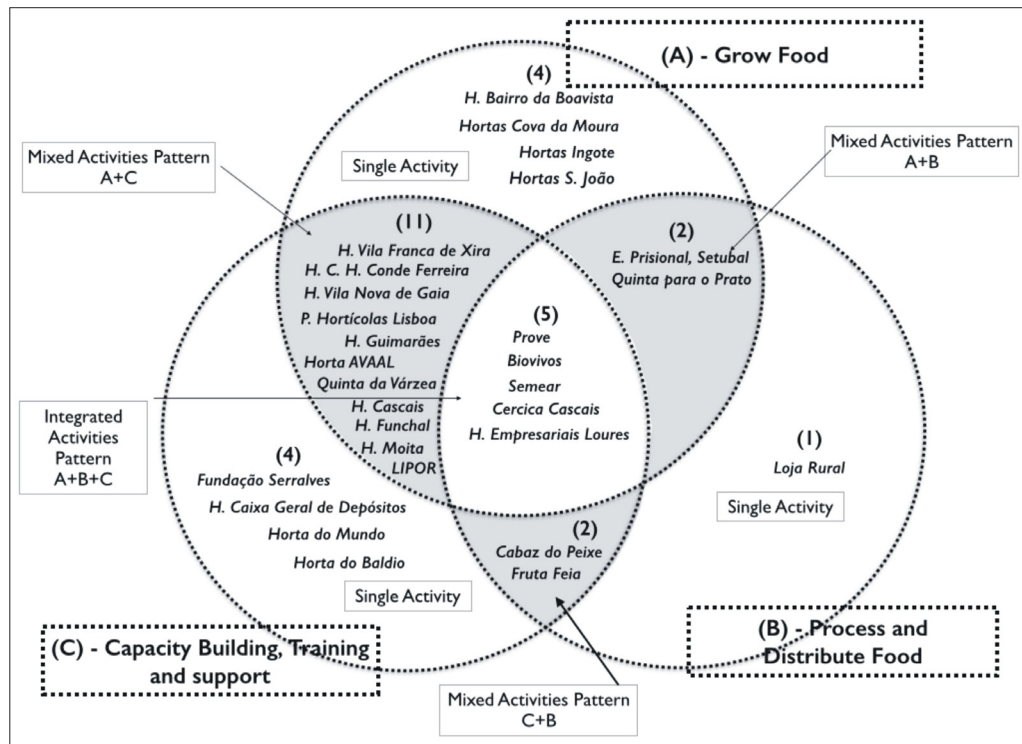


Fig. 3: UA initiatives per activity
Source: author's elaboration (2017)

- d. Single, mixed and integrated activities patterns –another finding resulting from the analysis is that three patterns can be identified in UA in Portugal (see Fig. 3). Single activity patterns (d – 9 out 29), meaning that the initiative is oriented only towards one activity;
- e. Mixed activity patterns (16 out of 29), i.e. merging two activities and
- f. Integrated activities patterns (5 out 29), what means that the initiative is incorporating the three activities, growing food, processing and distributing food plus capacity building, training and support.

4.3 Creative answers from the social and solidarity economy sector

This section presents the results of an in-depth exploration into the four short food chains initiatives (Moustier and Renting, 2015) that were identified as an emerging category of UA Typology in Portugal (see Tab. 1). They represent illustrative case-studies as defined by (Flyvbjerg, 2006) of short food chains, targeting urban consumers primarily from Lisbon and Porto Metropolitan Areas. Short food chains initiatives have been emerging in Portugal primarily from young social entrepreneurs (George and Block, 2011) such as João Henriques, today CEO and owner of Biovivos enterprise (Biovivos, 2017), and Isabel Soares, mentor and current CEO of Consumers Cooperative Fruta Feia (Fruta Feia CRL, 2017). Another young woman, Catarina Grilo was the mentor of Cabaz do Peixe, a Community Supported Fish Distribution initiative that is currently run by the local Fishermen's Association (Cabaz do Peixe, 2017). The fourth initiative, PROVE, is promoted by ADREPES, a national

association managed by a young team of professionals and activists. Each of these projects is generating new job opportunities (see Tab. 2) in a country recently hit by the crisis where youth employment is a major issue. All together they indicate that some forms of UA, with a strong emphasis on social economy and the environment, have the ability to grow in periods of crisis recovery and to contribute to job creation (Mougeot, 2015). Each one of these four initiatives deserves a closer look, as they are significantly different from the others in the current UA landscape:

- Initiative 1 – PROVE¹: Creating jobs and bridging the rural-urban divide (case 22)

Since 2006 PROVE has been promoting new forms of short marketing chains between small producers in peri-urban areas and urban consumers. Local action groups, under a national leadership, ADREPES (Maciel, 2016), reinforce the local business capacity of small producers, making full use of the internet to generate sales of fresh local vegetables and fruits. Nowadays, the programme involves 132 producers, half of them female, and 7,000 consumers. It's a win-win situation for producers who obtain a fair price for their work and consumers who conveniently receive fresh produce either at home or in their work places. Currently there are 118 distribution points: 41 in the Lisbon Metropolitan Area, 37 in the Porto Metropolitan Area and an additional 40 spread out primarily in secondary cities throughout the country.

- Initiative 2 – Fruta Feia²: Adding social value and reducing food waste (case 24)

Fruta Feia arose in 2013 from a national project run by Gulbenkian Foundation that aims to support innovative young social entrepreneurs. The cooperative focuses on

¹ The project received several awards: European Enterprise Promotion Awards – EEPA (2016); among others

² The project received several awards: Gulbenkian Foundation (2013); Terre de Femmes (2014); Agriculture Innovation – Bank Foundation (2014); António Sérgio Cooperative – Social Innovation (2014)

challenging market inefficiency by changing consumption patterns and creating an alternative market for fruits and vegetables that are rejected by the suppliers of main food chains and supermarkets. In doing so, they give value to food that would otherwise become waste and bring additional resources essentially to small-scale farmers that have very limited opportunities, if any, to sell fruits and vegetables that are rejected by the dominant corporate distribution system for being too small or of irregular shape. The way Fruta Feia operates is straightforward. Every week two teams work directly with local producers, gathering from their farms big, small, or misshapen products they cannot sell. Even if the cooperative does not have an organic focus, it only works with local farmers whose agricultural practices are environmentally friendly. No more than 70 km are covered between the farmer and the consumer pickup points which makes it possible to eat vegetables on the same day they were harvested. Once vegetables are collected and brought to distribution points, they are sorted and organised into baskets by a large number of volunteers from the community or other committed citizens. Later in the day they will be picked up by consumers from the vicinity, and it is remarkable to observe that many of them, for instance in downtown Lisbon, are elderly or poor, and suffering from the effects of gentrification and the massive touristification of the country. Most of delivery points in the Lisbon and Porto Metropolitan Areas are predominantly historical buildings belonging to established local organisations. Each delivery point counts approximately 250 consumers and the amount of distributed food from each distribution point means that each week, about 2 tonnes of fresh and nutritious fruit and vegetables were not turned into waste and are consumed.

- Initiative 3 – Cabaz do Peixe³: Between the sea and the city, delivering fish protein and reducing fish waste (case 23)

Cabaz do Peixe started supplying fish in 2015, after almost five years of planning and struggling to create partners' awareness and find new space in existing public policies and practices, and to mobilise financial support, primarily for trucks and facilities. The original idea comes from Catarina

Grilo, mentor of the process and volunteer from the Nature Protection League (Liga para a Proteção da Natureza), a relatively small national association. Inspired by similar processes in Canada, Catarina convinced an association of local fishermen that a market-oriented short food chains would bring them an additional source of income.

In 2014, the project received financial support from PROMAR – an EU/Public programme for fisheries, which was implemented in 2015. The project reduces fish waste, as one third of the basket sold to consumers includes non-commercially valued species and improves environmental sustainability. In addition, another explicit objective is to tighten relations between fishermen and conscious consumers. In roughly one year, the project has attracted more than 300 consumers. Each week, over 100 boxes are delivered to 7 different points: 3 of them in Lisbon, located 45 kilometres away from the fishing port, and the remaining 4 closer to the port itself. The fish is processed in seawater, and then placed in boxes with sea ice, guaranteeing the quality and freshness that distinguishes this product. The Association of Local Ship-owners, a non-profit organisation, manages the project. So far, two new jobs were created.

- Initiative 4 – Biovivos⁴: Tiny urban spaces can produce simple, healthy and nutritious food (case 25)

Biovivos was created by João Henriques, a young designer strongly driven by a humanist mission, who spent 12 years working on innovative solutions for Urban Agriculture, primarily rooftop greenhouses in Lisbon's city centre. In 2014, he started working on a new niche area, focusing on highly nutritious and healthy food. He is now producing three micro-greens: peas, sunflower, and wheat grass in a 32 m² green house located in Lisbon's Parque Holanda. The micro greens are ready to sell in 1 to 2 weeks, which means a huge turnover. Each week 3,500 green pots are sold mainly to Organic shops and restaurants in Lisbon within a 20 km radius. Some are distributed by a private company that supplies Porto in the north and Algarve regions in the south. Both regions could become productive centres in the near future. With this undersized greenhouse, the

	PROVE	Fruta Feia	Biovivos	Cabaz do Peixe
Starting date	2006	2013	2014	2015
Products	Vegetables and fruits	Fruits and vegetables	Microgreens	Fish
Production location	Peri-urban	Peri-urban	Urban	Peri-urban
Distribution location	Urban and peri-urban	Urban	Urban	Urban
Number of consumers	7,000	2,500	20 + 50	+ 300
Distributions points	118	7	16	7
Sales per week	7,000 baskets	2,100 baskets	800 pots	100 baskets
How distribution is made	Van	Van	Van	Van
Distance (max.) from production to distribution	Up to 50 km	Up to 80 km	Up to 20 km	Up to 50 km
Jobs created full/part-time	132 + producers	8 + producers	2	2

Tab. 2: Basic comparative data on four Portuguese short circuits' initiatives
Source: Local teams. author's elaboration (2016)

³ The project received two awards: Terre de Femmes – Honourable mention (2015) and BPI Agriculture (Bank Foundation - Honourable mention (2015).

⁴ The project received one award: Portugal Green Award – Honourable mention (2015).

project was able to create two full-time jobs and one part-time job. João wants to expand sales in other cities in order to open new productive centres as close as possible to customers. Soon, he should realise one of his dreams, as a new partnership with Porto University and Porto Oncology Hospital should allow production of micro greens for cancer patients who need them most.

4.4 Cross-sectional analysis of the four initiatives

Table 2 highlights the main dimensions of PROVE, Fruta Feia, Biovivos and Cabaz do Peixe. With the exception of PROVE, all them are quite new in the Portuguese UA landscape. Interestingly, PROVE and Fruta Feia give continuity to UA Portuguese mainstream products, vegetables and fruits, whereas Biovivos and Cabaz do Peixe are breaking norms with new products: high-standard healthy food (Biovivos) on the one hand, and fish protein on the other (Cabaz do Peixe), clearly introducing innovation and creativity into the UA Portuguese landscape.

The significant number of producers involved in PROVE and Fruta Feia testify that short food chains are creating jobs and supporting the local economy in peri-urban areas. Fruta Feia and PROVE together are weekly supplying almost 10,000 urban consumers, quite a high number in a country of less than 10 million inhabitants (INE, 2017). This means that they need a constant supply from peri-urban areas in order to satisfy urban consumers' demand. Biovivos and Cabaz do Peixe work with perishable products, as such their territorial scope so far and their consumers markets are comparatively smaller. Nevertheless, Cabaz do Peixe quickly managed to conquer a significant market with 100 fish boxes distributed in Lisbon and Setubal municipalities.

The UA short food chains initiatives described here cannot be isolated from a new culture of social enterprises emerging in Portugal. This is probably a distinctive feature that links all four initiatives and makes them unique. Interestingly, these four food-related initiatives are part of a broader movement of creative industries supported by organisations such as IES, Social Business School founded in 2008 (IES, 2017), CASES – Cooperative António Sérgio for Social Economy (CASES, 2017), or Foundation Padre António Vieira (IPAV, 2017). They work in partnership with several organisations including the Portuguese Government, Municipalities, foundations from the banking sector, Cooperatives, Universities, and other organisations from the social economy sector. By the end of 2016, this huge social economic wave gave rise to a national platform, GEOfundos, which brings together national and international funds to support projects and entities from the social economy sector.

5. Discussion: How mapping Portuguese UA contributes to the debate

How significant are UA Portuguese mapping results for the discussion of the previously defined research questions?

Let's go back to our first research question in the UA conceptual definitions debate: Are current UA definitions sufficient to recognise emerging and innovative UA initiatives and to nuance the UA vision of self-consuming production for poverty mitigation? Well, the question should be split into two parts. From one side, our results are confirming that, by and large, the urban agriculture profile as informed by the selected 29 initiatives fits

relatively well within conventional definitions proposed by Mougeot (2000) or by RUAF (2006). Some adjustments and comments, however, need to be made to highlight current specificities:

- UA in Portugal is much more about production, i.e. the growing of plants and their distribution and self-consumption, than business;
- UA in Portugal is still essentially a phenomenon found predominantly in large metropolitan areas with some outreach to the key secondary cities, as such a gap can be identified as an opportunity for expansion and for scaling up that either the current promoters and/or the UA champions could take into consideration;
- UA as a sector is relatively young in Portugal when compared with other countries that are part of the European Federation of Allotments Gardeners. The analysis clearly indicated that all initiatives were less than 15 years old. The explanation comes from Portugal's late urbanisation, among other reasons referred in Section 2. Just as in the northern European countries, however, allotments remain at the core of urban agriculture and are its dominant feature, with municipalities playing a pro-active role;
- The recent expansion of allotment gardens seems to reflect the need to address social exclusion and even hunger as a result of the socio-economic crisis. This is relatively different from northern European countries where most allotment activities are leisure-related (Prové et al., 2016);
- Land rent for UA production (Mougeot, 2015) – or as expressed in the RUAF UA definition: "Competition for land with other urban functions" – is still limited and essentially led by private sector initiatives. This limited competition comes probably from large quantity of urban voids, i.e. available municipal land that can be turned into garden allotments by municipalities, and a still limited size of UA in the country. This shows that UA integration into the city (Mougeot, 2015), has room for improvement;
- The integration of the value chains of UA production is still limited, despite the four innovative short food chains described here. Additionally, the limit today is that the initiatives are still very raw, rooted in unprocessed food products such as vegetables and fruits and do not consider the complete food chain. In consequence, the processing of what is being produced as food and non-food products, e.g. compost, is still extremely weak;
- Concerning the multiple functions of UA production, the activities patterns analysed are showing an interesting trend on capacity building, training and support. Yet integrative solutions can go much further than this, raising the debate on how UA is perceived by decision makers, a problematic issue, given the top-down decision approach Portuguese system; and
- Physical connectivity of urban agriculture production sites by improving resources utilisation is poor – assets mapping is showing that initiatives are expanding through a replication model based on production (case 1) without a food system approach that considers new resources exploitation. This is clearly a Portuguese challenge that prevents a sustainable development of UA integration.
- These results confirm how problematic it is to define a boundless issue along with the limits of a UA definition concerning the multiple ways UA can be integrated into the city (Mougeot, 2015), and its contribution to

the urban and social economy. Based on the mapping of Portuguese UA, it is clear how the processing and food distribution activities within UA are neglected in spite of its huge relevance for urban consumers, e.g. Fruta Feia, with more than 2,100 weekly urban consumers, or even Cabaz do Peixe with its 100 basket weekly distribution. It is also obvious that those four innovative short food chains are creating jobs within an economically adverse context, again a forgotten UA output.

Therefore, our first contribution to UA's conceptual debate results from the in-depth multi-level analyses proposed in Section 3. UA conceptual frameworks need to be reformulated in order to gather data that can inform political decisions, as well as be locally specific as city and country background can differ significantly.

Results obtained so far also help to clarify the theoretical debate introduced earlier: To what extent is collaborative planning theory adequate to understand and facilitate the development of UA programmes? First, the multiple origins of UA leaderships are quite positive even if these actors established very few working connections between themselves. Second, the lack of communication among municipalities and citizens, civil society and organisations is the biggest challenge UA has to address in order to scale-up in future. Furthermore, this is a key point for understanding present difficulties of a systemic approach to UA, either in cities or at the national level. Portugal's lack of networking skills as mentioned by Franco (2015) and unbalanced stakeholders power can not guarantee that a Collaborative Planning approach will succeed, at least in a short- or medium-term scenario. This is a topic that calls for more in-depth research. Third, this looseness of relations might explain the limited lobbying capacity of the sector and its limited impact on more supportive public policies. It might explain as well the lack of integration within the European federation of Allotments Gardeners. This is one challenge for the future development of UA in Portugal and certainly a difference with growing trends in other European countries.

Lastly, our third research question: How crisis-induced initiatives can be a starting point and an opportunity to integrate UA into the city in the long-term? Again two different streams can be perceived from mapping out UA Portuguese initiatives.

On the one hand, the recent reduction of initiatives can be explained by some positive signs of economic recovery, which are now being felt and have released the pressure on food needs. Further research on this issue could be one of the tasks carried out by a strongly-needed national research programme on UA that does not exist at the moment. These observations certainly raise the issue of how to avoid volatility but one of our conclusions so far is that very few projects closed down and most of them have shown a remarkable level of resilience, which is quite promising. Potential lessons can be drawn from here and serve for both the expansion of the sector in Portugal and beyond. They do raise, however, a more fundamental theoretical and practical issue on how to shift from crisis-induced urban agriculture to a permanent social and economic activity within a sustainable development approach.

On the other hand, our results also show a post-crisis emergence of creative urban agriculture and food initiatives that are little known and that are potential avenues to feed cities differently in Portugal and beyond. By and large they are part of the digital era and rely for most of their

activities on social networks to keep consumers informed and events spread out and on ICT-using consumers platform applications (PROVE, Fruta Feia and Cabaz do Peixe). All these innovative processes are heavily supported by social networks, which give them national and in some cases international recognition and exposure. They are collectively breaking the paradigm of vertical, top-down decision making, that is common in Portugal. They are different from most emerging creative industries as they have quite a strong social and environment commitment, grounded in fair prices for producers and consumers; food waste reduction (Fruta Feia); healthy food at fair price (Biovivos); market opportunities for undervalued commercial species (Cabaz do Peixe) and job creation in peri-urban areas (PROVE). Although they represent a niche (Geels, 2011), what is remarkable and interesting from a research and theoretical perspective is that such initiatives are paving the way for UA to shift from an answer to the effects of the crisis in Southern European countries, towards a fully-fledged sector for a sustainable and just local development, making creative use of social networks and ICTs, already highlighted in the early 1990s by Jac Smith (Levenston, 2010). In summary such initiatives can contribute to establish positive bridges to research and exchange on how public policies could contribute to building better and longer-term food systems in Europe.

6. Concluding remarks and policy implications

The 29 UA initiatives analysed corroborate Portugal's vibrant UA landscape. In particular they highlight the relevance of innovative short food chains for shifting from UA as an immediate response to crisis to a more integrated UA with a long-term perspective, for at least three reasons:

- they demonstrate the positive role of ICT and the Internet on UA growing popularity and expansion;
- some of them might lead the way to a positive UA future scenario. Blooming bottom-up initiatives, even if still limited in scale, could expand while keeping their strong social and environmental commitment. Their scaling-up and sustainability, however, will largely rely on public policies; and
- they are consistent examples that market-oriented UA solutions, even without the support of public policies, can emerge and generate jobs in time of crisis, as in other European countries, regions and cities, primarily from southern European countries.

In contrast, we consider that long-term sustainable development cannot be carried out without public policy and political commitment. Results are showing the lack of communication between actors and to a certain extent even amongst municipalities and Civil Society Organisations. Why is this important? Firstly, it confirms the urgency of additional democratic approaches in order to develop UA food policies, which goes back to our theoretical background. Secondly, this confirms the need to have a political debate about UA in order to re-frame understandings of UA amongst all the stakeholders involved. In conclusion, the change from UA as a response to the effects of the crisis towards long-term, local development must be done with a clear vision of UA, within a democratic process that involves all stakeholders.

Is collaborative planning theory able to make the bridge between diverse and unbalanced stakeholders involved in the processes, and a long-term transformative change in

countries where participation is not commonly practised? This topic is critical, as developing UA policies requires political commitment, involving all stakeholders, as well as interdepartmental coordination and financial budgeting. Grounded in evidence we must say no – at this point in time, given the lack of democratic approaches in southern European countries, collaborative planning is not yet the answer. Here we stand, looking for an alternative paradigm that can respond to the challenge of connecting public power with local initiatives to create long-term integration of UA into the city. The question is still unanswered. More research must be done. New approaches such as an integrative management framework that considers UA's holistic potential for social development and economic growth, could be the foundation for establishing long-term local development solutions, based on the community's empowerment.

In the meantime, to reach this turning point and scale up, there is an urgent need to pursue research and to set up a National Urban Agriculture Observatory that would identify, map out and permanently assess UA mainstream initiatives, as well as innovative ones that are emerging from the social economy sector. This accumulated knowledge, and positive examples, could fuel urban planning policies at the European, national and local levels, and largely legitimise emergent UA initiatives that are today underrated and little known, not only in Portugal, but also across Europe. This means that proper public policies and master plans are needed. They are, in fact, a priority in order to consolidate and scale up urban agriculture in countries, regions and cities.

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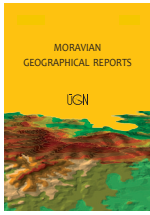
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Urban agriculture and place-making: Narratives about place and space in Ghent, Brno and Bristol

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Abstract

Despite rising enthusiasm for food growing among city dwellers, local authorities struggle to find space for urban agriculture (UA), both literally and figuratively. Consequently, UA often arises, sometimes temporarily, in marginal areas that are vulnerable to changes in planning designation. In the literature, spatial issues in relation to UA have either addressed structural questions of land use, governance and planning, or have highlighted social and personal benefits of UA. This paper aims to revisit and combine both streams of inquiry, viewing them as two co-constitutive forces that shape places through UA. The paper analyses three case studies in Brno, Ghent and Bristol, using a spatial lens that exposes important tensions as inherent characteristics of UA and conceptualises them as tensions within two space-narratives, namely abstract space and concrete place. It is suggested that UA, as a collective socio-cultural process, can transform functionally replicable spaces into unique places and thus contributes to place-making. This function should be recognised within urban planning circles, which should not only secure physical spaces to develop urban agriculture, but also create possibilities for local autonomous governance.

Keywords: Urban agriculture, space, place, place-making, urban planning, governance, Ghent (Belgium), Brno (Czech Republic), Bristol (England)

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1. Introduction

Well within living memory, many Europeans could count professional farmers within their families. This number has decreased significantly over recent decades¹. As a result, many European citizens are disconnected from agriculture and food production. Meanwhile, an increasing interest in reconnecting with farming and food cultures and practices has been observed among urban citizens (Scheromm, 2015).

In many cities, people start initiatives that relate to food production such as rooftop and community gardens, guerrilla gardening, as well as harvesting fruit trees in public parks and urban foraging walks. They get involved in urban agriculture (UA), which we understand as the growing, processing and distribution of food and other products through plant cultivation and animal husbandry in and around cities (Brown and Carter, 2003, p. 3).

The motivations for urban agriculture vary from the enjoyment of growing your own fresh and healthy vegetables, to the desire to be outdoors, as well as environmental concerns and a search for social interaction (McClintock et al., 2016; Scheromm, 2015). Apart from the individual motivations of citizens, urban agriculture is also promoted for its potential contribution to alleviate multiple urban problems, e.g. its contribution to socio-environmental justice, urban dwellers' health and nutrition, or the improvement of the urban environment (noise, dust and heat reduction, prevention of soil erosion, soil sealing, water management, providing refuges for natural organisms) (Lovell, 2010; van Veenhuizen, 2006). Many cities are initiating urban agriculture by developing local food strategies and supporting UA projects.

Simultaneously, city governments often struggle to find places for urban agriculture, both literally and figuratively.

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¹ Between 2000 and 2010 the total number of farms in the EU-15 fell by just over one fifth (– 22.8%) (http://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture_statistics_-_the_evolution_of_farm_holdings)

The problems of ‘acute land scarcity’ (Zhu, 2012), ‘high competition for land, soaring land prices’ (de Zeeuw and Dubbeling, 2009) and ‘access to urban land’ (Rogge et al., 2016; Tornaghi, 2016; van Veenhuizen, 2006) are amongst the most-quoted challenges of urban and peri-urban agriculture. The pressure on urban land results not only from spatial but also economic limitations. Constrained city council budgets raise questions about the profitability of urban farms and gardens, and more implicitly, about the meaning and value of urban agriculture in cities (Cohen and Reynolds, 2014).

Consequently, we see that urban agriculture commonly emerges on land that is designated within official planning documents for land use other than food production: green spaces, brownfields and spaces in transition between zoning categories. Food production is often located “within the cracks of the system”, in marginal urban spaces (Tornaghi, 2016, p. 2) with a temporary character. As a result, UA initiatives are vulnerable to changes in planning and other policies (Maloney, 2013; Spilkova and Vagner, 2016).

Spatial issues in urban agriculture have been approached from a broader perspective by geographers and spatial planners, addressing structural questions of land use, governance and planning (see Eizenberg, 2012; La Rosa et al., 2014; Maloney, 2013; Schmelzkopf, 2002; Smith et al., 2013; Spilkova and Vagner, 2016; Tornaghi, 2014). As early as 2002, Schmelzkopf examined a conflict over a community garden in New York. She argued that the conflict over the future of the allotment garden was symptomatic of broader power dynamics and the right to urban space (Lefebvre, 1991), a perspective that is common in this stream of research.

Another body of literature, closer to sociology and anthropology, approaches the spatial dimension of urban agriculture from the perspective of the value and cultural meaning of lived experience. Starting at the level of the individual, it explores how gardeners and other users build emotional connection to urban agriculture sites, and how people integrate these places into their everyday lives (Barthel et al., 2010; Bhatti and Church, 2001; Bhatti, 2006).

This paper aims to bring together those two streams of inquiry, viewing them as two co-constitutive forces that shape the places of urban agriculture. We use the space-place framework to investigate the replicability of urban agriculture and its functions. By analysing and comparing three cases through a spatial lens, we identify important tensions that are inherent to urban agriculture and discuss ways to make advances in how to overcome them. We do not suggest that these cases represent examples of struggles for urban land (see Blomley, 2008) or activist endeavours that confront the status quo. Instead, the analysis frames the cases as learning opportunities which offer new perspectives on urban land use and related governance mechanisms.

The article is structured as follows. The next section explores spatial perspectives with a focus on place, space and place-making. Section three describes the methodology and introduces the three cases that are analysed in this paper. In section four we discuss their role in the process of place-making and, finally, in section five, we finish with concluding remarks.

2. Theoretical underpinnings of spatial perspectives

Urban agriculture is a specific type of land use (Cohen and Reynolds, 2014). It is spatial because it reshapes a physical location and involves a “normative spatial vision”

that contributes to the construction of ideas over use of space (Purcell, 2001, p. 182). In this paper, we conceptualise tensions of urban agriculture within a theoretical framework of space and place. The terms space and place have been used interchangeably and their ontological understandings have been subject to many discussions (Agnew, 2011).

Different meanings of space/place have been exercised since the time of the ancient Greeks, who held that: “Place ... is a part of the terrestrial surface that is not equivalent to any other, that cannot be exchanged with any other without everything changing. Instead with space [place as location] each part can be substituted for another without anything being altered, precisely when two things that have the same weight are moved from one side of a scale to another without compromising the balance.” (Farinelli, 2003, p. 11 in Agnew, 2011).

Following this distinction, which is still present in contemporary theorisations of space, we use the term **concrete place** for the first meaning. Here, place is relational: “places give as well as acquire meaning in terms of what they offer morally and socially” (Agnew, 2011, p. 13). A place is socially constructed through the attribution of meanings by its users. This happens through symbols, images, ideas and feelings attached to a surrounding (Merrifield, 1993; Purcell, 2010). Place has an essential role in both personal and cultural identity (Relph, 1976, in Davenport and Anderson, 2005). The appreciation of place is therefore a more subjective one, and based on social relationships. It follows that a place is unique and almost irreplaceable, as the experience and relations it entails cannot easily be relocated.

In contrast, the second meaning, what we will call **abstract space**, is absolute, it is discursively constructed and conceived as a ‘passive receptacle’, as a thing ‘in itself’, a resource to be used and exchanged. According to Lefebvre (1991), this understanding of space is typical for urban planners, developers and architects. In this top-down perspective, space is valued by means of its functionality. Consequently, different areas are assigned for pre-defined functions such as transportation, building or public open space. This decision is, to a large extent, a pragmatic one, since spaces are understood as relatively replaceable or transferable, depending on the strategic opportunities they embody.

The conceptual framework of this paper is based on the idea that these two facets of place (i.e. on the one hand functional and inter-changeable, and on the other hand relational and unique) cannot be separated. The abstract space and the concrete space become intertwined. Places are continuously produced through the interaction and co-creation of different forces or space-narratives. Notwithstanding, these forces do not co-exist without tensions. As several authors from critical geography and political ecology perspectives point out (Barron, 2017; Eizenberg, 2012; McClintock, 2014), there is a hierarchy among the two narratives, with the more abstract space given primacy over the narrative of concrete place. The development of places is tied to administrative top-down planning mechanisms, and only in a secondary stage are spaces to become places, lived and experienced.

To overcome the primacy of the abstract space in shaping a place, the literature often refers to place-making processes (de Magalhães and Madanipour, 2002) as active appropriation processes that open up the chance for a stronger identification with one’s own living place (Franz

et al., 2008). Fürst et al. (2004) explain ‘place-making’ as a “collective process of space arrangement with the aim to advance the usage and living quality of a space and to appropriate the space in a socio-emotional way” (in Franz et al., 2008, p. 323).

In this paper, we identify the spatial forces or narratives of the abstract space and the concrete place within three cases of urban agriculture, and we explore the tensions existing between them. We then show how urban agriculture contributes to urban place-making. That leads us to suggest that practices that support this process need to be effectively institutionalised in urban planning. Although the availability of physical space resulting from UA-friendly planning is an essential precondition, we claim that it is collective place-making that truly gives spatial values to UA.

3. Methodology

3.1 Introduction of the cases

In this study, we compare three cases of urban agriculture in three medium-sized, post-industrial European cities: De Site in Ghent (Belgium), the Blue Finger in Bristol (England), and the Kraví hora allotments in Brno (Czech Republic). The three cities are, spatially and demographically, second-tier regional cities but with different municipal and historical contexts.

All three cases are examples of UA that involve locally produced and consumed vegetables. They reveal different combinations of environmental, social and economic functions, however, that result from urban agriculture practices (Koopmans et al., 2017). The main functions of De Site are social inclusion, citizen participation and the production of green space. Kraví hora has an important cultural function, it is a space for leisure and food self-provisioning (Sovová, 2015). The Blue Finger is focused on food production but has also developed a significant political meaning. While we accept that UA has multiple functions in the three cases, by using a spatial lens we explore and compare one specific function they have in common: the function of place-making. Moreover, the cases represent different

contexts in which urban agriculture is practised. Kraví hora in Brno is a traditional allotment garden. De Site in Ghent is a community space with both a community vegetable garden and allotments. The Blue Finger covers large tracts of peri-urban land, including some parcels that are cultivated by civil society groups for vegetable production. In this respect, the Blue Finger is distinctive because some of its land is functionally categorised as agricultural land already. Finally, different target groups are involved in the three case studies: from urban dwellers with high representations of elders and of young families in Brno, residents with a variety of difficult socio-economic circumstances in Ghent, to landowners and activists in Bristol.

All three cases have been the subjects of struggles for their future existence due to competing demands on urban land use. By analysing and comparing these cases from the spatial perspective, we discover similarities that allow for discussion and general remarks on the spatial context of urban agriculture. The case study areas are indicated in red on each map.

3.1.1 De Site, Ghent, Belgium

De Site is located in the Rabot neighbourhood in Ghent, a city of about 256,000 inhabitants. This densely populated neighbourhood has a relatively high percentage of Belgian residents with foreign roots and is one of Ghent’s most deprived areas.

It was here in 2003 that the city development agency acquired an old industrial site of 7 hectares (ha) and demolished the buildings, leaving only the concrete floors of the former factories in place. The city council has plans to redevelop this area, mainly with housing. Only months after the demolition was finished, the area was unofficially claimed by local residents because they felt their area lacked public space. Later, a number of local civil society organisations and residents secured the council’s approval and financial support to use 1 ha of the brownfield site as a temporary public space, which they called De Site (‘the site’). The organisers presented their idea to the city council as an alternative strategy to engage people in the redevelopment process of the area.

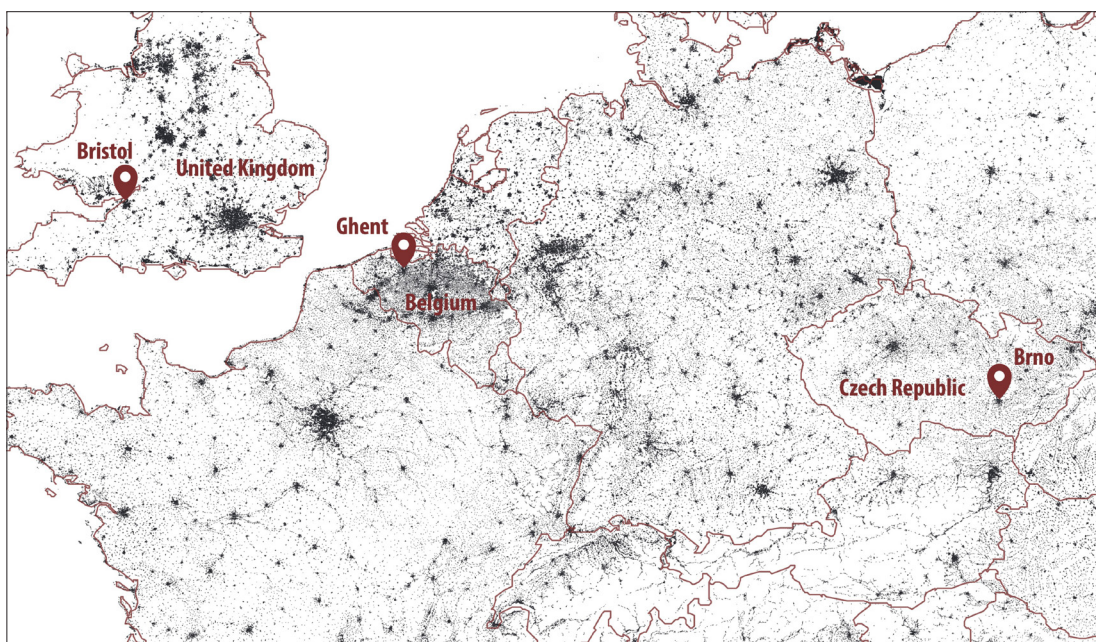


Fig. 1: Location of the three case studies in Europe (Build-up area in black)
Source: CORINE land cover, 2006

De Site slowly developed as a multifunctional place with 160 allotment gardens, each 4 m² in size. It also has an open-air cinema, a cycle track, a soccer field and a children's playground. A chicken coop with 30 laying hens and a field of 0.3 ha were added. In the field a variety of vegetables are produced, sold and processed in a local shop and restaurant, both offering products at lower prices to people with a low income. Eventually, a 10-year lease for De Site was secured in 2016.

3.1.2 Kraví hora, Brno, Czech Republic

Kraví hora (literally 'Cow hill') is a hill in the centre of Brno, the second largest city in the Czech Republic with about 380,000 inhabitants. Three allotments are located on the hill, covering a total of 14 ha of land divided into 575 individual plots of 200–250 m². The first allotment at Kraví hora was established in 1934 and the remaining two shortly

after World War II. The land is owned by the city council and rented to three branches of the Czech Gardeners' Association, the main body administering allotment gardens at the national level. These organisations then sublet individual plots to gardeners and are responsible for collecting fees, organising the maintenance of common areas and managing the allotments as a whole.

In terms of land use categories, the current master plan for Brno classifies the entire hill as public greenery with recreational functions. This classification does not fully capture the diversity of (actual) land uses that are present on the hill which, in addition to the allotments, include a public park, an outdoor sports centre, a swimming pool, an astronomical observatory and several buildings used by different owners. "Recreation" is a broad term – and different opinions of what urban recreational greenery should offer, in

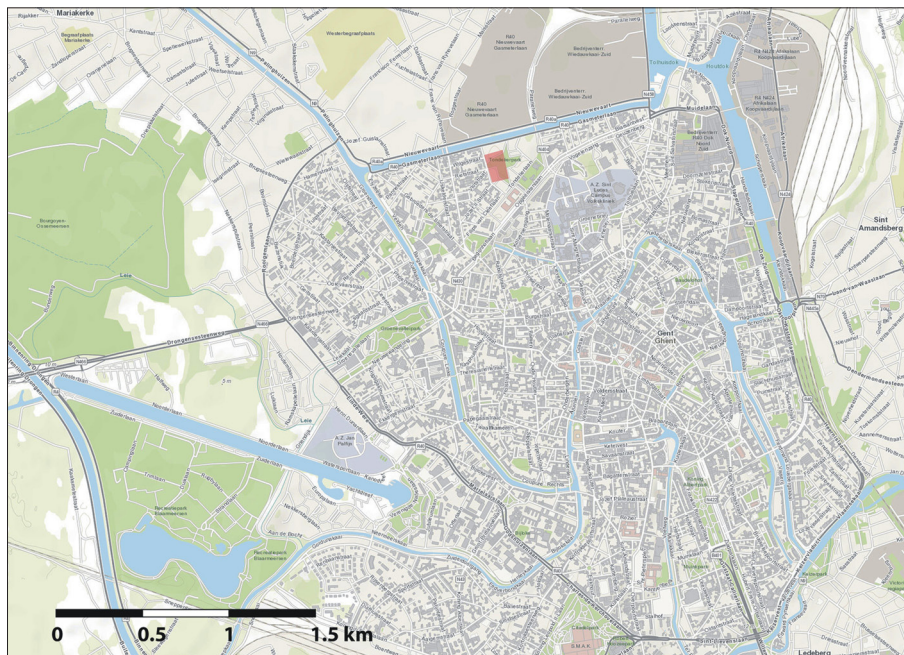


Fig. 2: Location of De Site in Ghent. Source: Esri.ArcGIS, 2017

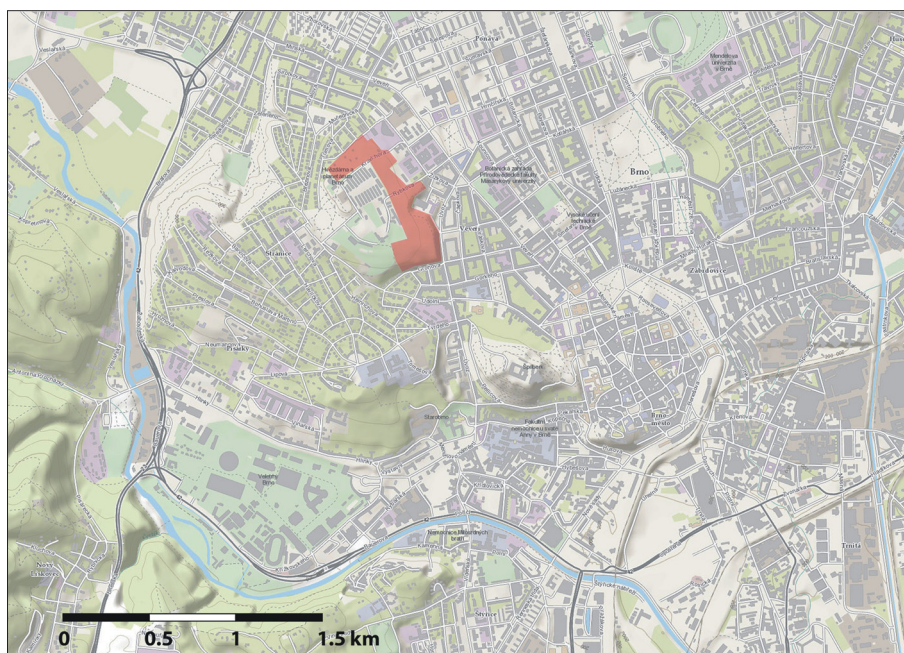


Fig. 3: Location of Kraví hora in Brno. Source: Esri.ArcGIS, 2017

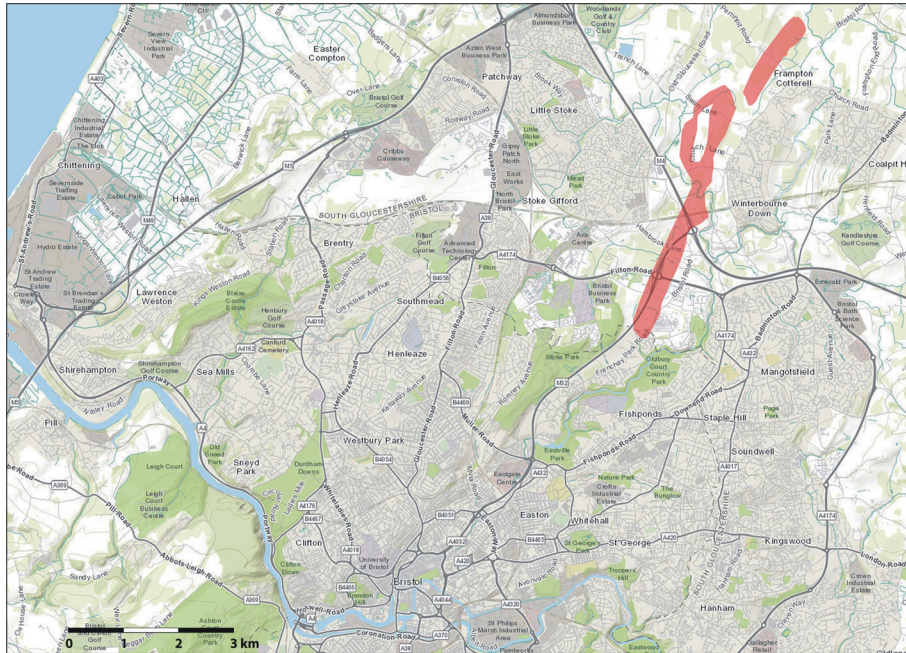


Fig. 4: Location of the Blue Finger in Bristol. Source: Esri.ArcGIS, 2017 (Note: scale differs from Figures 2 and 3)

which way and for whom, have been the centre of disputes over *Kraví hora* as well as other Czech allotments (see, for example, Pauknerova and Gibas, 2011).

3.1.3 The Blue Finger, Bristol, England, UK

The Blue Finger differs from the preceding case studies, which are discreet and delineated areas of their respective inner cities used for vegetable cultivation. The Blue Finger is, firstly, a concept: the name given to a strip of agricultural land covering 400 hectares on the edge of Bristol, a city with a population of 449,000 in south-west England. The Blue Finger stretches from the edge of Bristol's city centre, crosses the municipal boundary into the suburbs and into the rural countryside of the neighbouring local authority area of South Gloucestershire.

In addition to its finger-like outline – the Blue Finger is not more than 500 m wide but almost 20 km long – its name is linked to the blue shading that distinguishes the highest quality of agricultural land ('Grade 1: Best and Most Versatile') on soil classification maps in the UK. Land around Bristol, in common with much of the region and adjacent areas of Wales, is predominantly of lower agricultural grades, thus making the Blue Finger unique.

Secondly, the Blue Finger is an aspiration articulated by a local network, The Blue Finger Alliance (BFA), founded in 2012, which has campaigned for the protection of the agricultural function of the land as a contribution to the city's transition towards environmental sustainability, and to promote opportunities for agricultural jobs. To date some BFA activities have included compiling a register of the many landowners of the Blue Finger, encouraging Bristol City and South Gloucestershire councils to work together to support BFA objectives, and to develop public events and awareness-raising activities, including walks. BFA has also championed the Bristol 'Declaration of Soils', a manifesto seeking to prioritise the protection of soils as part of a systematic shift towards sustainable living.

The land has a diffuse, mainly private ownership but includes some parcels owned by the city council. These include extensive glasshouses, formerly used to cultivate

flowers and shrubs for municipal planting. In what seems a fitting acknowledgement of this horticultural heritage, the council offered temporary leases to the community group 'Feed Bristol'. The southern tip of the Blue Finger includes the Stapleton (municipal) Allotments.

3.2 Data collection and research process

The research was based on case studies using exploratory, qualitative methodologies (Creswell, 2014; Yin, 2003). Data for Ghent and Bristol were collected within the framework of the European Commission Seventh Framework research project SUPURBfood (agreement 312126). This involved a minimum of 15 semi-structured interviews with key stakeholders in each city, including civil society activists, UA coordinators and municipal officials. They were asked about the origins and activities of UA and the challenges and opportunities facing these activities, in their respective cities. Additionally, secondary details about the UA initiatives were collected from websites, news reports and observations gleaned from events.

In the case of Brno, data were collected separately as part of the postgraduate thesis of one of the authors. Semi-structured interviews were conducted with allotment association representatives and individual gardeners. Three interviews with allotment representatives covered details about the area, the number and demographic characteristics of the users, prevalent ways of using the gardens, ownership, and organisational structure. Thirteen interviews with allotment users inquired into their motivations and their relationship to the garden and the allotment community (see Sovová, 2015). Data collection also included non-participant observation (Gray, 2004).

For this paper, these two data sets were integrated and analysed independently from their original purposes. Rather, the data were analysed in relation to the spatial perspective of this paper, focusing on aspects of place, space and place-making. The observations and interpretations are therefore exploratory. This ex-post, abductive inference has been used in order to highlight the inherent tensions involved

in UA. The merit of this method lies in its ability to bring together case studies which have not been considered in the constellation set out here. Such an open-ended data analysis helps avoid what Gibson-Graham (2014, p. 148) term “strong theories” – that is, powerful discourses that seem to organise events into understandable patterns but that may in fact result in reinforcing inaccurate presumptions. The analysis is strengthened by the fact that it is grounded in the comparison of three different cases and builds on existing scholarship on urban agriculture.

4. Results: How urban agriculture shapes urban places

In this section we elaborate on the situation of the three initiatives in relation to space and place, integrating our data analysis with current debates on urban agriculture.

First, the cases are introduced in the light of a narrative of abstract space, describing its situation in the current planning. Second, narratives about concrete place are explored. Based on this, the role of urban agriculture in the process of place-making is explored. Finally, we articulate lessons on governance that can be useful to overcome the tensions between the two space-narratives and to support the place-making function of urban agriculture.

4.1 Urban agriculture in the planning system – narratives of abstract space

The position of all three initiatives within their cities’ spatial plans is precarious. At Kraví hora, the replacement of the allotments with a public park or sport facilities has been discussed continuously for the last decade, despite the long tradition of the allotments. This situation is perceived as a threat, since the rent contracts with the municipality are always temporary (typically valid for one year). The main argument has been that since the allotments are located on public (municipal) land, they should also be accessible to the public, contrary to the current situation where the allotments are fenced and open for members only. The fencing of these relatively large areas also hinders the permeability of the surroundings for pedestrians. A proposed solution to this was the creation of public paths through the allotments; however, for the gardeners this would have a significant impact on their experience of the place (see below).

The case of Ghent reveals unexpected flexibility in the interpretation of rigid planning regulations, which specify fixed functional land use categories. The land at De Site was functionally re-categorised from an industrial to a housing function. While the land remained undeveloped, however, local residents started to use it for vegetable cultivation. Normally, temporary activities that fall outside the official functional land use categories are not permitted, and not even considered unless representations come directly from the land owners (in this case the council itself). The local social benefits of the gardening activity, however, were used as the justification to negotiate temporary, official occupation and use. This highlights the ephemeral nature of De Site in its current location.

In Bristol, local controversy has been caused by proposals for a new public transport network, which affect both Feed Bristol and the Stapleton Allotments. In 2015, Bristol was awarded the accolade of European Green Capital (EGC), secured in significant part by the city’s proposals for sustainable transport.

In Bristol and Ghent, both councils made efforts to identify spaces to replace those being earmarked for development. In Bristol, however, the proposed replacement sites did not respond to the objectives of protecting Grade 1 soil quality in the Blue Finger. In Ghent the city council, which recognises the contribution that De Site makes to its social cohesion policies. It remains to be seen however, whether the promised replacement of one piece of land by another, elsewhere although in the same neighbourhood, will offer similar place-making opportunities as revealed by De Site.

The preceding section has described how all 3 cases reveal uncertainty, because UA was either an unintended consequence or a contested interpretation of sub-optimal spatial planning approaches. This has resulted in tensions which seem to be iconic and inherent to UA, so often located on ‘transitional’ or marginal spaces (Tornaghi, 2014). As illustrated in Bristol and Brno, urban food production spaces are forced to compete with ‘recreational green space’, or are regarded as resources available for certain strategic visions, rather than enjoying their own strategic categorisation in city plans (Tornaghi, 2016). As detailed in the next section, an abstract approach fails to accommodate the specifics of concrete places, which are captured by another set of narratives developed by users.

4.2 Narratives of concrete place

The parallel space narratives in all three cases revolve around the active engagement of people, which results in intimate connections and the transformation of purely functional space into meaningful place. In this section, we first discuss the observed appreciation of and identification with place on an individual level, and then continue to examine the broader cultural context of these relationships. Finally, the presented UA initiatives are shaped and experienced through collective management. This links to conclusions on place-making and its governance, which are discussed in the final section.

4.2.1 Personal identification

A place is shaped through the meanings that people imbue it with, and which are informed by and acquired through what a place offers (Agnew, 2011). Ideas and feelings attached to a place are expressions of this. They illustrate how people identify themselves in relation to the place. The three cases explored here reveal the reciprocal process of personal and place identification in differing ways. First, in Brno, the narratives indicate how Kraví hora both shapes and is an expression of peoples’ personal identity. In many ways, gardeners from Kraví hora experience their plots as a part of home, a phenomenon described previously by Bhatti and Church (2001). Despite being rented, it is not unusual that plots are passed through family generations and their users feel very rooted there:

“We’ve had this garden since I was ten years old. When we first came here, there was just bare earth and a toolbox. Everything that’s here, all the trees were planted by my parents or me. My dad built the shed. It is all their work and I am taking over now.”

The garden is perceived as a place of intimacy and safety. The individual plots within the allotment are separated only by paths or low hedges and their size means that gardeners have no choice but to share their privacy with their neighbours. Most of the respondents find this close cohabitation unproblematic. Common interest, familiarity and regular contact between neighbouring gardeners

reinforces collective identity. Contrarily, the prospect of the allotments being publicly accessible is perceived as an intrusion that disturbs the appreciated home-like intimacy:

“I couldn’t even wear my swimsuit if people were walking around.”

“They want to come to the allotments for a walk...? Well how about I go eat my lunch in their office or their living room?”, another gardener reacted.”

Allotment members often mention the ability to engage in gardening and spend time in a pleasant, green environment, but it is the sense of “being at home” which distinguishes the allotment from other places where these activities might be performed.

Similarly, De Site is valued for stimulating a ‘feeling of belonging and meaningfulness’. A member of the coordinating civil organisation said:

“All 70 gardeners strongly identify themselves as [a] ‘gardener of De Site’. In addition, 250 volunteers also feel part of De Site. Together, we feel responsible for maintaining the area.”

Among them are the homeless and other sans-papiers residents – a group of people that are left out of the economy – that get involved in productive, meaningful activity by producing food at De Site. Volunteers get ‘paid’ with a local currency, called ‘Torreke’, for the work they do in growing food. Torreke can be spent in the local social restaurant and in a local grocery shop. In this way marginalised residents have their place in the neighbourhood, both literally and figuratively:

“The place creates pride among the users. People say: ‘This is my place, either to play football, to produce food or just to meet other people’.”

In other words, at De Site this feeling of belonging to a shared place helps in reconnecting people of different ages and socio-economic backgrounds and cultures. Also in Bristol, diverse groups of users came together at specific locations through a shared interest in food growing. The wider identity which has developed around the Blue Finger, however, is political. The BFA promotes an ethical and political proposition which connects the Blue Finger’s intrinsic soil fertility, its position on the fringe of the city and its historical productivity, with a narrative that suggests that food production capacity is an attribute of Bristol, and a prerequisite for all sustainable cities. In its campaign, BFA highlighted that the land’s importance to wildlife and its high soil fertility gives local people the opportunity to grow food in this ‘very special area’. By taking to the branches, they refused to allow tree felling to start on ‘our land’².

To summarise, the cases illustrate how people give specific meanings to places based on their expectations and needs, and at the same time, they recreate their own personal identities through interactions with the place. This process is self-perpetuating to some extent: the appreciation of the place determines how people engage with it, and vice versa. Since all of our cases involve groups of users, there is also a factor of shared collective identity, discussed further below. The concrete place narrative also has implications for the replicability of the place and its functions, because these are not only based on physical characteristics but also have a strong

social dimension. These dimensions cause tensions because the values that shape place identities are often sub-ordinated in favour of land use functions in abstract-space debates.

4.2.2 Cultural meaning/identity

The cases contain narratives that illustrate the construction of cultural identity. Tornaghi (2016) has suggested that food provisioning (including growing, preparing, sharing or preserving food) can facilitate both personal experiences, as well as the creation of culturally embedded practices. Food growing in cities thus represents lived manifestations of culture and continuing (if often interrupted) traditions of food production. Case study narratives affirm this and try to justify the presence of food growing in cities, specifically by building on traditions and re-enacting cultures. For example, in Bristol, there is an explicit link to historical market gardening. For several years, an energetic and consultative process of developing a sustainable food strategy for the city has been in progress (Carey, 2013). This has included the establishment of a Food Policy Council and support for a range of local food initiatives in connection with EGC. The city’s health service commissioned a study of the potential to localise food provisioning, which included the re-evaluation of the city’s wholesale market and an estimation of the quantity of food that could be produced within the city, for example in urban parks (Carey, 2011).

In the Czech Republic, food growing is considered as part of national identity, together with many different ways of preserving foods and all kinds of do-it-yourself house and garden improvements (Duffková, 2002, de Hoop and Jehlička, 2017). The Kraví hora allotments are but one manifestation of this culture, including their particular aesthetic appearance. For the older generation, knowing how to grow and prepare food is part of common sense, and the garden is sometimes linked to the memories of growing up in the countryside. Home-grown food is generally perceived as healthier, tastier and generally ‘proper’. Given the current level of urbanisation, however, urban gardens may represent one of the few practical chances for younger generations to learn about food production.

In Ghent, people from different backgrounds share their knowledge and culture about food production. For some this means recreating rural cultures in an urban context:

“De Site started based on the needs that existed within the neighbourhood. The needs are very much correlated to the cultural values the people have. The majority of the gardeners have a Turkish background and used to live in an agricultural area where they already produced food themselves. They literally said: ‘We would like to grow vegetables here’.”

While food culture is part of urban lifestyle (exemplified by Bristol’s annual Food Connections festival), cities tend to dedicate greater attention to strategic arrangements for post-production stages of the food chain, including retail (street markets, shops and restaurants), processing (abattoirs and food factories linked to distribution arteries), and to designs for domestic food spaces (see Parham, 2015 for a comprehensive summary). In contrast, food production has been largely fixed into rural settings. It is generally accepted that agricultural landscapes are cultural, co-produced by people and nature: “land as culture” (Clifford

² See <https://www.theguardian.com/uk-news/2015/feb/02/bristol-bus-protesters-trees-european-green-capital-2015> (Last accessed November 30, 2016).

and King, 2006, ix). Part of the acceptability of the concept of cultural landscape in the rural arena relates to a degree of continuity in landscape management, which results in, for example, patchworks of fields and their boundaries, functional and vernacular architecture and particular habitats. But cities, while no less co-produced than the countryside, are highly dynamic and land use continuity is harder to imagine. This can hinder the possibilities for food production and the associated cultural expressions.

4.2.3 *The collective dimension of place*

The lack of land use continuity in cities has an impact on the creation of places. As urbanisation and migration grow, many people experience what can be described as uprootedness or placelessness (Friedmann, 2010), and therefore the development of valued places within cities has become all the more precious (Perdikogianni, 2007). According to Proshansky et al. (1983), attachment to a place reflects “a sense of belonging and purpose which give meaning to his or her life” (in Davenport and Anderson, 2005, p. 90). At the same time, growing urbanisation and multiple demands for urban land create pressure for efficient spatial planning, sometimes with the result that little space is ‘left to people’. The three cases illustrate how people have been able to identify with a place through a process of active but also collective appropriation. They do not just consume a place, as may be the case in recreational spaces such as parks, but actively shape and maintain it.

The collective dimension in this process of appropriation and identification is important in this regard. Collective management takes on different forms in the three cases. In all of them, however, the communities are defined - not only by shared space but also by shared responsibilities and interests, which in turn give grounds to a collective identity and shared relation to the place.

For example, in Brno, although people feel personal attachment to their individual plots, these are understood as part of a bigger whole, the functioning of which depends on participatory organisation and community cohesion. This collective dimension is an intrinsic characteristic of the allotment, for better or worse: in some cases, internal conflicts arise, while elsewhere gardeners list the friendship with their neighbours as a highly-appreciated feature of the allotment. Either way, it differentiates the allotment from both entirely public (i.e. open for everybody) and entirely private places.

This leads to our hypothesis that, through a culturally embedded activity such as food production, spaces can become meaningful collective places. It is acknowledged that although they are not open to everyone, such places are meaningful to particular groups. The places and the communities, that is, the spatial and the social, are mutually dependent: the meaning of place is strengthened when produced collectively, a process which simultaneously bolsters the community (Barron, 2017; Eizenberg, 2012). We observe this through the names given to places/communities, as they attempt to present themselves as collectives linked to locations. In the three cases, this is confirmed by organisational structures that represent collective identities and needs in negotiations with the authorities.

In the literature this process where social values of place become part of the design has been referred to as place-making. In other words, despite their marginal position in spatial planning, the cases illustrate a place-making function within their cities. This carries implications for the governance of UA.

4.3 *Challenges for governance to support place-making*

As demonstrated in the previous section, the three cases illustrate how UA can play a role in shaping and expressing people’s personal and cultural identity. In Brno and Ghent, users address intrinsic values of trust, safety and being part of a spatially defined community. The Bristol case carries moral and political significance for local activists who share the vision of the value of soil as a part of urban food security and sustainable development. The assertions of each group in the case studies express values that are more relational than functional, and as such constitute narratives of concrete place. In the light of this, the struggle for land experienced in each case is not necessarily one between citizens and the authorities, but between a set of interacting and sometimes conflicting space-narratives.

The tensions present in UA illustrate that traditional planning and public consultation methods struggle to secure meaningful public participation that could optimise sustainable place-making. Kraví Hora and De Site demonstrate different expectations from public (recreational) space, as described by Gibas (2011). The typical image of public greenery is an area which is ‘offered’ by the local authorities, who are responsible for managing it while at the same time setting rules which prescribe how spaces can be used. A public park offers limited opportunities for individuals to engage and interact with their surroundings and they may become passive ‘consumers’ of space.

At the Kraví hora allotments, internal rules allow and encourage personal agency. Gardeners are required to tend their plot and contribute to the maintenance of the common areas. Allotment functionaries point out that gardeners effectively take over the task of green space management, which would otherwise have to be funded from the city’s budget. At the same time, the gardeners emphasise the importance of having an active way of spending their free time. Growing food is perceived as proper, meaningful work, a source of continuity, pride and self-fulfilment:

“I wouldn’t go and sit in a park. I come here because here I get to do something, something is growing, and something remains after me.”

Similar attitudes were observed in Ghent in discussions about the difference between De Site and alternative public spaces. The opportunities that De Site offers in terms of experimenting with a form of public participation, is currently not common in urban planning:

“Now people see a park as property of the city council that they are allowed to use. But that ‘use’ is pre-defined by the landscape architect that places two benches, or a play area for children, or a fountain. The landscape architect decides how the users can experience the park. We think now that it is time to turn this around. The city council is the owner. And that is it. The common, that is people living close to the park, should be able to use the park in the way they would like to use it.”

The fact that such places can develop within temporal contexts which include short tenure agreements and uncertain futures, demonstrates the risks people can take when investing in places without having the security of continuation. It can be argued that a universal tradition of both household self-provision and municipal cultivation represents an asset that facilitates place-making through UA. Temporal spaces offer opportunities to experiment, as demonstrated in Ghent:

“I think that the temporality has been of great value for De Site. It has created space to experiment. This will be more difficult in the park [being made permanently available]. In the park things have to look beautiful immediately. There will be much less room to experiment.

The lack of permanence, however, weakens the place-making function of UA. This becomes very evident at De Site, where an 80-year old gardener responded to the proposed move with regret:

“We feel that there is no more place for us. Money matters more than we do.”

Thus, on the one hand, the temporal character of land access at De Site opened up room to experiment but, on the other hand, it is not a solution to the need to overcome a sense of ‘placelessness’ and the demand for concrete places on the long term.

The facilitation of the place-making functions of UA requires a shift in roles and responsibilities in the governance of urban spaces. Different responses to this challenge are evident from the case studies. In Ghent, the city council has made new permanent space available in a park in the same neighbourhood. Here, the functional attributes of De Site are associated with a spatial designation of UA on the basis of UA’s potential to create place. This contrasts with the situation in Brno, where, in one proposed scenario, the allotment garden is to be transformed into a park (without food production).

In Bristol, the place-making potential of UA is acknowledged via the Food Policy Council (FPC) - and EGC-funded projects but, in practice, this potential is difficult to integrate into urban planning in a fast-developing city faced with traditional spatial development needs and across local authority boundaries:

“Inertia in the political process is another challenge. How can politicians and planners be persuaded to consider cross-authority peri-urban issues when other agendas – infrastructure and economic development – are perceived as more important?”

In particular, the special spatial value invested in the Blue Finger as a result of its fertility, seems very hard to accommodate strategically given the distribution of land ownership and the different functional attributes envisaged by Bristol City vs. South Gloucestershire Councils:

“The scale of the challenge is big – 90% of the land is owned privately and is not easily accessible by foot or bike. In addition, the price of land is very high, usually around £ 7,000 an acre’ [or € 14,875/ha at the time of writing].”

Finally, it is unclear what will happen with the FPC’s food plan under Bristol’s new mayor, elected in 2016. While it has been argued that UA spaces can contribute to place-making, the way space is managed by the planning processes in many cities can be uniform, linear, and unable to accommodate easily the socio-cultural aspects of locality. As demonstrated here, a shift towards stronger place-making through multi-stakeholder realisation of UA can sit uneasily within traditional conceptions of urban planning and governance – in two major ways.

First, our cases are examples of spaces which serve a collective interest and they are also governed by a group of users (not owners). Through their active participation, allotment members shape the place, which simultaneously enhances their attachment to it. While some people expect public green space to be accessible and undemanding, others

are willing to invest more effort in co-producing these places, and require more secure conditions for their commitment. Such personal/collective involvement on what is technically public land, however, is hard to accommodate within the current functional categories of spatial planning.

Second, this has implications for the replicability of UA functions. The cases suggest that in order for UA to contribute to place-making, a certain degree of user autonomy, security and permanence is needed. This reflects the not-public, not-private nature of UA: while the risk of exclusivity ought to be considered, having the power to negotiate who is, or is not, a member of the group is instrumental for developing collective identity and focus on common goals. These are the starting points of collective place-making.

To summarise, we argue that to develop the full potential of UA as a contribution to creating meaningful places, issues of autonomy, collective governance and permanence should be considered in urban planning processes, especially as interest in UA grows. In this respect, insights from the literature on the commons might be useful. Many authors (e.g. Barron, 2017; Bennholdt-Thomsen, 2012; Eizenberg, 2012; Müller, 2012) have already traced similarities between governance in UA and of the ‘traditional’ commons (Ostrom, 1990). Contrary to the abstract space narrative, the commons are not diminished to an economic resource but they are socially mediated and created (Illich, 1992: 49). Apart from institutionalising autonomous collective governance, the commons thinking thus might be a way of giving more weight to lived experience as a spatial force. Finally, in their traditional form, the commons also have a strong sustainability dimension based on collective interest, self-control and the sense of responsibility towards future generations (Bailey et al., 2013).

5. Conclusions

This paper has sought to illuminate the spatial contexts surrounding urban agriculture in response to increasing scholarly interest and practical innovations in this arena. The cases explored here add to knowledge of UA in European ‘second’ cities, a departure from earlier UA scholarship which typically deals with larger metropolitan scales, or frames UA as an economic development opportunity in the Global South. The food initiatives explored in this article reveal what the authors see as a characteristic feature of UA, namely the existence of intrinsic tensions associated with land use for food production. Such tensions are linked to urban land in different ways than to rural land, firstly because agricultural policy has harnessed the rural realm to economic productivity since the 1950s while, conversely, modern economic development has largely divorced the city from the production of food.

One consequence of this binary is a growing interest among city dwellers in exploring the social, environmental and political possibilities of urban food production. These multiple functions of UA create multiple demands on land, which may compete with land use designations outlined within strategic development plans that contain land use categorisations assigned for non-agricultural economic functions. Our argument in this paper has been that the nature of the tension rests on diverging space narratives. While scholarship on urban agriculture is following advances and innovations in practice very closely, this spatial focus has created new insights into the governance of urban land.

There are three main conclusions to draw from this investigation. First, through active and collective processes that arrange spaces with food as personal and culturally embedded practice, UA can transform spaces into distinctive places. This means that UA can have an important place-making function.

Second, the case studies clearly show that the existing governance structures tied to planning policies offer limited scope for negotiating land use tensions and, in fact, add to them. Reasons for this include competition in demands for land (Brno and Bristol), and functionalist categorisations of city space (Bristol and Ghent). It is notable that in Bristol and Ghent there is significant municipal support for the strategic development of a sustainable food system through the localisation of food production. But the Bristol example reveals challenges in how competing sustainability issues are subordinated, and the Ghent case has been highly successful in creating a place of great value to its users within a fixed time-frame. Such creative solutions to the dynamic needs of the city are exciting, but money and energy is wasted if such experiences and practices are not considered in future developments of the place.

Third, our research has revealed that UA is positioned on the boundary between public and private space: public, in terms of being shared and owned by the municipality; private, in terms of protecting certain interests over others (as in the case of the Brno gardeners). To bolster efforts to find a consensual solution to the tensions linked to UA, we add our voices to others (Clifford and King, 1996; Sonnino, 2014; Tornaghi, 2016) in calling for a more equitable, temporal and iterative approach to urban development and place-making which is less (mono-)functionalist. Apart from creating physical spaces to develop urban agriculture through zoning (see Huang and Drescher, 2015; Maloney, 2013; McClintock et al., 2012), the institutionalisation of UA in urban planning strategies should also give thought to the delegation of autonomous governance over spaces suitable for UA. Such a call to institutionalise processes of place-making, however, is not new but yet another example of how collaborative place-making could happen. In order to move forward, insights from the governance of the commons could possibly offer valuable lessons for urban planners and further research in this area is called for.

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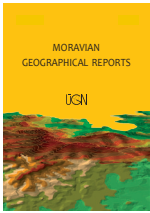
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Business models in urban farming: A comparative analysis of case studies from Spain, Italy and Germany

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Abstract

The “Urban Agriculture Europe” EU COST-Action (2012–2016) has shown that the complexity of urban agriculture (UA) is hardly compressible into classic business management models and has proposed new management models, such as the Business Model Canvas (BMC). Business models of UA have to be different from rural ones. In particular, factors such as differentiation and diversification, but also low cost-oriented specialisation, are characteristic and necessary business models for UA to stay profitable in the long term under challenging city conditions. This paper aims to highlight how farm enterprises have to adjust to urban conditions by stepping into appropriate business models aiming to stay competitive and profitable, and how the BMC is useful to analyse their organisation and performance, both economically and socially. The paper offers an inter-regional analysis of UA enterprises located in Spain, Italy, and Germany, which are further subdivided into: local food, leisure, educational, social, therapeutic, agri-environmental, cultural heritage and experimental farms. The analysis demonstrates that UA is differentially adjusted to specific urban conditions and that the BMC is useful for analysing urban farming. Heterogeneous local food farms and the integration of local and organic food production in social farming business models are most frequent in our case studies.

Keywords: entrepreneurship, urban farming, low-cost specialisation, diversification, differentiation, social farms, Spain, Italy, Germany

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1. Introduction

Agriculture and cities have always been closely interwoven, and yet are often seen as contradictions. This relationship is reciprocal: (1) food supply to citizens; and (2) recycling of urban organic matter (Antrop, 2005; Ferguson, 2014; Zasada et al., 2013). The rural-oriented agri-food system, improved agricultural engineering, reduced transport costs and the globalisation of markets have truncated long-established links between the city and its agricultural neighbourhood. Today, agricultural areas in densely populated areas are fragmented due to changed economic models, population growth and urban encroachment (Yokohari et al., 1994). Farming in and around cities is also strongly influenced by the urban sphere (Heimlich and Barnard, 1992). Urban farming consists of commercial farming activities in metropolitan

areas and is part of the wider urban agriculture umbrella, which includes – apart from professional urban farming – also mushrooming non-profit oriented urban gardening initiatives of citizens (Lohrberg and Timpe, 2011; Lovell, 2010). Urban farming cultivates considerably large areas within agglomerations (Brinkley, 2012; Lohrberg, 2010; Lohrberg, 2011; Zasada, 2011). It is located in (intra-urban) and at the fringe (peri-urban) of cities, but the peri-urban transition zone is of the highest relevance (Lovell, 2010; Mougeot, 1999; Pierr et al., 2011; Opitz et al., 2016).

The advantageous as well as the disadvantageous influences of cities support and challenge urban farming in many different ways. Farms can give up or turn into part-time farming ventures with their main revenues

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originating outside of agriculture, or they can adjust their business towards urban demands in order to increase their chances of maintaining economic viability (FAO, 2007). Economies of scale dominate in rural areas by following the simplified principle ‘growing or giving way’. This is due, with few exceptions, to urban limitations not the business case for urban farms. The complexity of urban influences on farms and farming results in heterogeneous strategies and farm activities both at the city and agglomeration level, which is more pronounced than in rather rural areas (Brinkley, 2012; Busck et al., 2006; Gardner, 1994; Mougeot, 1999; Zasada, 2011; Zasada et al., 2011). Urban farming “has been identified as being more diversified, polarised and multifaceted than elsewhere” (Zasada, 2011, p. 640). The nearness to cities creates opportunities for these urban farms. Undoubtedly, the city means greater demand for goods and services that can be offered by urban farmers. High-value production, niche products, marketing strategies apart from global markets, as well as the provision of various services linked to agricultural production, are commonly-used farm activities to adapt to and profit from cities (Bryant et al., 2013; Gardner, 1994; Heimlich and Barnard, 1992; Houston, 2005).

Gardner (1994) named firstly, higher added value production and, secondly, diversification towards services, as two characteristic farm adaptations for metropolitan farmers. He refers back to observations and explanations on farming intensity described by von Thünen as early as 1826 and on bid rent theory by Alonso (1964). Additionally, market strategies outside of traditional long food value chains, especially of fresh, non-mainstream and also processed products, are relevant in urban farming. Diversification strategies include a wide range of non-agricultural activities, yet often more or less loosely linked to primary agricultural production, such as tourism, recreation, leisure, education, health, cultural and natural activities (Buciega et al., 2009; Zasada, 2011). Cities and agglomerations enforce farm business adaptations to make profit out of the urban sphere. These city-adjusted farm activities build the key elements of characteristic business models of urban farming.

This paper aims to highlight how farm enterprises have adjusted to urban conditions by adopting appropriate business models aiming to stay competitive and profitable, and how the Business Canvas Model is useful in analysing their organisation and performances, both economically and socially. The paper offers an inter-regional analysis of UA farm enterprises located in Spain, Italy and Germany, which are further subdivided into specialised, differentiated and diversified farms (van der Schans, 2010, 2015; van der

Schans et al., 2016). This inter-regional approach between European countries allows for the detection of consistent and inconsistent business strategies and models applied under urban conditions – independently from other external determinants. This paper’s theoretical framework is developed in the next section, followed by a description of the material and methods, the presentation of results, and final conclusions.

2. Theoretical framework

2.1 Urban farming’s business models

“The business model explains how value is created for the customers and how value is captured for the company and its stakeholders” (Henriksen et al., 2012, p. 31). In the literature, the concepts of business models to set and analyse businesses arose in the mid-1990s (Henriksen et al., 2012). Many different definitions and interpretations of business models are in use; nonetheless, a common understanding of business models is obvious.

“It is thus widely accepted that the business model concept is emerging as a new unit in analysis, that business models emphasise on a system-level a holistic approach towards explaining how firms do business, that organisational activities play an important role in the various conceptualisations of business models, and that business models seek to explain how value is created and captured” (Henriksen et al., 2012, p. 32).

Based on, firstly, characteristic city-adjusted farm activities and, secondly, the business model method, some scholars have recently started to develop classifications of urban farming’s business models (see Tab. 1).

Some years ago, van der Schans (2010) defined ‘low-cost specialisation’, ‘differentiation’ and ‘diversification’ as common business models of urban farming in the Netherlands; however, this also represented European conditions. Hereafter, we focus on the European perspective. The business models – ‘diversification’, ‘primary food production’, ‘value differentiation’, ‘service provision’ and ‘innovative operations’ – are classified by Liu (2015) by conducting a case study investigation of urban agriculture on the global scale. Recently, van der Schans has proposed an extended list of urban agriculture’s business models: ‘low cost’, ‘differentiation’, ‘diversification’, ‘the commons’ and ‘experience’ (Van der Schans, 2015; Van der Schans et al., 2016). These classifications of urban agriculture’s business models focus mostly on urban farming as the primary business-oriented activities under the wider UA umbrella. Research and development – especially in the

Van der Schans (2010)	Hedin (2015)	Liu (2015)	Van der Schans (2015)	Pölling et al. (2015)	Van der Schans et al.(2016)
– Specialisation	– Small production	– Primary food production	– Low cost	– Cost reduction	– Low cost
– Differentiation	– Large production	– Value differentiation	– Differentiation	– Differentiation	– Differentiation
– Diversification	– Secondary purpose	– Diversification	– Diversification	– Diversification	– Diversification
		– Service provision	– Reclaiming the commons	– Shared economy	– The commons
		– Innovative operations	– Experience	– Experience	– Experience
				– Experimental	

Tab. 1: Classification of urban agriculture’s business models
Source: authors’ elaboration

field of high-tech innovations, often in inner-city locations – adds business cases to traditional city-adjustments of urban farming. Additionally, emerging non-profit-oriented initiatives (urban gardening) “may operate their garden as a collective rather than as an allotment and residential gardeners may be involved in commercial gardening” (McClintock, 2014, p. 150).

Recent studies proposing ‘innovative operations’, ‘the commons’ and ‘experiences’ demonstrate that the business model concept is under scientific discussion, rich in its expressions and innovations, and that it differs with regard to the research subject. This paper however focuses on the well-established business models of ‘low-cost specialisation’, ‘differentiation’, and ‘diversification’, while not ignoring the other concepts. Additionally, it analyses solely traditional farms adjusting to urban conditions with city-oriented strategies and business models, while (commercialising) urban gardening initiatives are beyond the scope of the paper.

The model of ‘low-cost specialisation’ is associated with high added-value crop production, a typical farm activity. Herein, products with high added values, high transportation costs, freshness and high perishability, are characteristic for urban areas as proximity to customers possesses comparative advantages (Gardner, 1994; Heimlich and Barnard, 1992; Lohrberg, 2001; Mougeot, 1999; Zasada et al., 2011). Urban encroachment and comparable small areas of farmland in and around cities necessitate higher added values per farmland unit to maintain or enhance economic viability. Agglomerations, in which high-value – here greenhouse – production has been identified as an important farm activity, comprise, for example, Paris and Lisbon (Péron and Geoffriau, 2007), Copenhagen (Zasada et al., 2011), The Hague (Korthals Altes and Van Rij, 2013), Barcelona (Dupras et al., 2016) and Metropolis Ruhr in Germany (Pölling, 2016). Anonymous high value crop production for the mass market without appropriate up- and down-stream management, however, is not sufficient anymore: contested global markets increasingly demand differentiation in production and/or marketing.

The business model of ‘differentiation’ embraces niche production as well as differentiation in processing and marketing by integrating (parts of) the added-value chain on-farm. Niches, like exotic species or traditional breeds, create unique selling propositions and business options for urban farms (Van Der Schans, 2010). City environments encourage farmers to identify activities along the whole added-value chain to innovate the business towards ‘differentiation’, with the aim of obtaining higher prices (Prain and de Zeeuw, 2007; Zasada, 2011). Vertical integration shortens the added-value chain and creates manifold additional business fields that can be used by differentiated urban farms (Van Der Schans, 2010). Within this business model, specific product features are very important to be successful, but personal producer-consumer relationships, transparency and authenticity help in terms of ‘standing out from the crowd’. Cities offer favourable conditions for direct sale or other short supply chains (restaurants, canteens, other farm shops, etc.), eliminating additional intermediaries (Beauchesne and Bryant, 1999; Lohrberg, 2010; Zasada, 2011).

‘Diversification’ in production as well as into services, is another characteristic farm business model within urban areas. The variety of exploited commercial services connected to or close to agricultural production cover a wide range, such as agro-tourism (recreation, gastronomy), social support (education, therapy, health, caretaking), and further public and private services (maintenance, log work, winter road clearance) (Bailey et al., 2000; Beauchesne and Bryant, 1999; Busck et al., 2006; Heimlich and Barnard, 1992; Lohrberg and Timpe, 2011; Vogl et al., 2003; Zasada, 2011). Among others, horse services (Bailey et al., 2000; Elgåker and Wilton, 2008; Quetier and Gordon, 2003; Zasada et al., 2011), education services, and care farming (Siebert et al., 2009; Van der Schans, 2010; Wiskerke, 2009) are frequently used by farms located in rather densely populated areas due to the presence of a large number of (possible) clients.

Existing knowledge on UA is largely based on isolated investigations of farms or intra-regional groups of farms. Thus, this paper aims to add knowledge to the emerging research field of urban agriculture’s business models by comparing selected urban farms from Spain, Italy and Germany. This allows for the detection of more generalisable features of UA’s business models in Europe.

3. Method and materials

The method adopted was elaborated within the EU COST-Action “Urban Agriculture Europe” (2012–2016) Working Group on “Entrepreneurial models of urban agriculture”¹. This group focused specifically on the business model concept and they developed and tested a standardised questionnaire addressing people from European UA, with a focus on urban farming. They also adopted the Business Model Canvas to characterise and describe the businesses models of urban farms and their underlying strategies.

3.1 Data collection

The farms under consideration in this study are chosen as suitable examples of urban farming’s characteristic business models adjusted adequately to the urban environments. These choices are based on national and more regional expertise with existing networks in practical farming, and rooted in a diversified approach to analyse a wide range of business cases (see Fig. 1). Within this panorama, selected good practices of urban farming show key strategies in urban areas, how they exploit the consumer potentials of urban markets and evade the constraints originating from the urban environment. They are influenced by metropolitan dynamisms, including a strong competition for land and large consumer potentials in their vicinity. The investigated cases are not urban farms which can be generalised for the case study regions and nations, but they serve as best practices suitable to learn from for the wider audiences of farms influenced by cities. In-depth personal farm interviews were carried out to detect information on and insights into urban farms and their underlying strategies and business models. The questionnaire asked for several quantitative and qualitative data items, especially geographical setting, agricultural practice, marketing, institutional environment, success factors, obstacles, clients’ expectations, policy options and societal benefits.

¹ WG 3 on “Entrepreneurial models of urban agriculture” had been coordinated by Wolf Lorleberg and Pedro Mendes Moreira and attended by 41 participants.

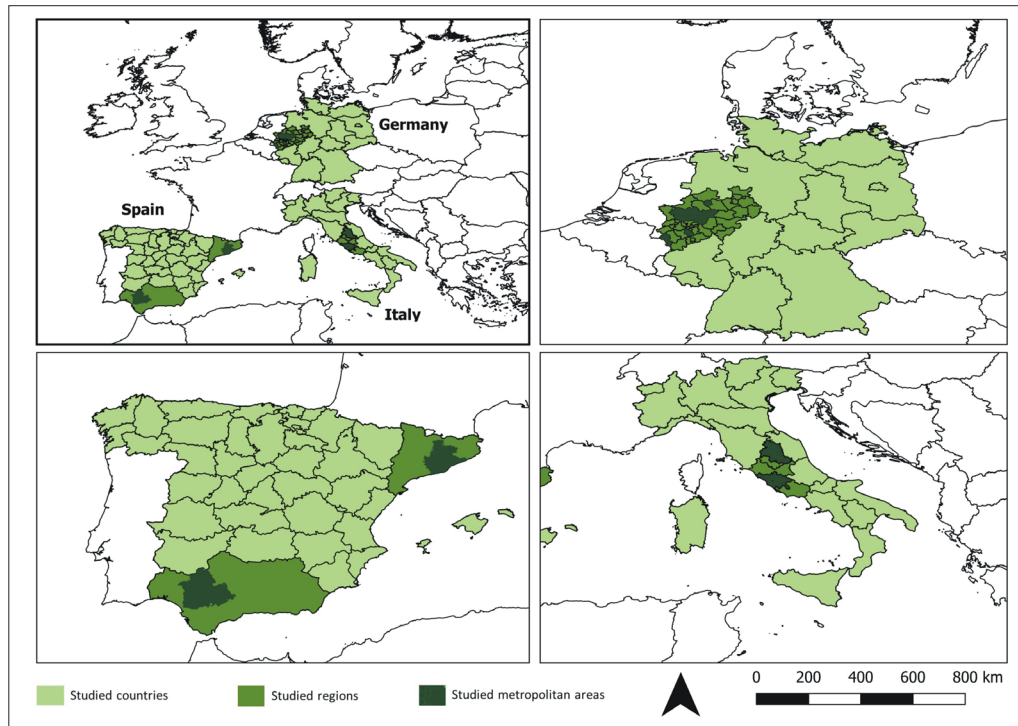


Fig. 1: Case study regions of urban farming in Spain, Italy, and Germany
 Source: authors' elaboration

3.2 Analysis: The Business Model Canvas

The strategic management template Business Model Canvas (BMC) is suitable in providing an overview of value creation and capture, relationships, success factors and comparisons of the companies – here urban farms. Osterwalder, Pigneur and more than 470 practitioners from 45 countries published “Business Model Generation”, including the BMC (Osterwalder and Pigneur, 2010). In their definition, “a business model describes the rationale of how an organisation creates, delivers, and captures value” (Osterwalder and Pigneur, 2010, p. 14). The BMC is named simply and understandably, while not oversimplifying its entrepreneurial activities. It is

a strategic management template to document not only those existing, but also to develop and visualise new business model ideas. The BMC’s four main components are customers, offer, infrastructure and financial viability. BMC is a tool, which provides helpful overviews of companies to emphasise key success factors, to detect barriers, to compare competitors, and to generate business ideas and innovations: “Although the Canvas has a simple structure, it forms a complex system of interdependencies between the different elements” (Henriksen et al., 2012, p. 34). The four main components are the backbone of BMC’s nine basic building blocks, which are briefly introduced in Table 2.

<p>8.</p> <p>Key partnership</p> <p>The network of suppliers and partners that make the business model working</p>	<p>7.</p> <p>Key activities</p> <p>The most important activities a company must do to make its business model working</p>	<p>2.</p> <p>Value proposition</p> <p>The bundle of products and services that create value for a specific customer segment</p>	<p>4.</p> <p>Customer relationship</p> <p>The types of relationships a company establishes with specific customer segments</p>	<p>1.</p> <p>Customer segments</p> <p>The different groups of people and organisations that the company aims to reach and serve by its products and services</p>
	<p>6.</p> <p>Key resources</p> <p>The most important assets required to make a business model working</p>		<p>3.</p> <p>Channels</p> <p>How a company communicates with and reaches its customer segments to deliver value proposition</p>	
<p>9.</p> <p>Cost structure</p> <p>All costs incurred to operate a business model</p>		<p>5.</p> <p>Revenue streams</p> <p>The cash a company generates from each customer segment</p>		

Tab. 2: The Business Model Canvas, with short indications of the nine basic building blocks
 Source: authors' conceptualisation based on Osterwalder and Pigneur (2010)

The BMC is used in this inter-regional analysis to define urban farming's characteristic business models – low cost specialisation, differentiation and diversification – in the three study countries, Spain, Italy and Germany. Herein, diversification is subdivided into two strategies: one representing farms diversifying into services outside of agricultural production; and one for businesses diversifying into farming, e.g. health care or educational institutes. Each UA business model is presented by indicating specific findings for the nine basic building blocks of BMC. The nine blocks refer to different aspects orienting the analysis, both on social and economic findings.

We note that the quantitative data collected by interviewers are fragmented and differ severely between countries and regions. This has to be seen in the light of very sensitive economic data, which are partly offered by the interviewed farms due to long-established contacts with the interviewers' institutes and trust between them, but partly also not. So the data (both quantitative and qualitative) collected have been mobilised to compare, describe and characterise the business models. Although based largely on qualitative and more general findings, this approach allows comparisons of business models and also the detection of inter-regional similarities and differences in adjusting to cities.

Scholars investigating sustainable innovation have largely neglected “the way in which firms need to combine a value proposition, the organisation of the upstream and downstream value chain and a financial model in order to bring sustainable innovation to the market” (Boons and Lüdeke-Freund, 2013, p. 9). Thus, this paper addresses this gap. We note, however, that BMC has already been used to analyse UA in studies such as: a sophisticated collection of urban and peri-urban agriculture examples in the Netherlands (Nationale Federatie Stadsgerichte Landbouw, 2013); the analysis of an organic farm situated in Vietnamese Ho Chi Minh City (Nguyen and Truong, 2013); an investigation of agri-/horticultural enterprises, producer organisations, and cooperatives in Latin America (Lundy, 2012); and an overview

of urban gardening initiatives and projects in San Francisco (Ganguly et al., 2011). Before presenting the results, it has to be emphasised that the business models briefly introduced in the theoretical background support the analysis and are suitable to classify urban farms. Yet, many farms do not fit fully and solely into one of the business models, but rather belong dominantly to one of UA's business models and make use of elements of other business models simultaneously as well. Thus, many farms can be characterised by highlighting one business model, but the exploitation of additional strategies from other business models is present in many cases and has to be considered.

4. Results

This paper analyses 50 urban farms located in Spain, Italy, and Germany (see Fig. 1, Tab. 3). Thirteen of the farms are located in two Spanish metropolitan areas: Seville Metropolitan Area (SMA) and Barcelona Metropolitan Region (BMR). The agricultural context dominates in SMA, where three farms are situated, while there is a stronger domination of urban land uses in BMR for the remaining ten Spanish cases. The farm sizes of the case studies in BMR and SMA are smaller than the average sizes of farms in their regions. Other determinants such as the high density of population, urban sprawl and infrastructure density, and the general scarcity of farmland due to natural factors (hilly areas, water availability and proximity to the sea), are responsible for the comparably small land resources of the farms. The average job intensity in BMR is higher than the average for its wider region, but it is lower in SMA, which can be explained by agribusiness specialisations, large farm plots, the cultivation of cash crops, and the activities conducted by the urban farmers.

The 16 Italian urban farms in this study are also located in two urban areas: the metropolitan areas of Rome and Perugia, 150 km north of Rome. These areas differ by size and a different density of green areas. With reference to the green areas, 32% of the large metropolitan area of Rome is farmland, about 30% are protected areas, and the

Business model (Country)	Number of farms	Average farm size [ha]	Average number of jobs [full-time equivalent]	Average job intensity [number of jobs/ha]
Low-cost specialised farms (SP)	3	40.12	1.28	0.14
Low cost specialised farms (IT)	3	22.17	8.67	0.39
Low-cost specialised farms (GE)	2	20.00	9.00	0.45
Differentiated farms (SP)	1	2.00	4.00	2.00
Differentiated farms (IT)	2	102.50	9.50	0.09
Differentiated farms (GE)	8	75.50	7.90	0.10
Diversified farms (SP)	9	22.11	4.25	0.19
Diversified farms (IT)	6	16.00	5.67	0.35
Diversified farms (GE)	4	122.50	13.10	0.10
Diversifiers into agriculture (SP)	–	–	–	–
Diversifiers into agriculture (IT)	5	10.30	4.00	0.39
Diversifiers into agriculture (GE)	7	18.20	43.20	2.73
Sum/Average (SP)	13	21.41	3.17	0.77
Sum/Average (IT)	16	26.94	6.19	0.23
Sum/Average (GE)	21	60.10	20.80	0.35

Tab. 3: Key characteristics of the surveyed urban farms in Spain, Italy and Germany
Source: authors' elaboration

urban green-area density reaches about 3%. The city of Perugia, on the other hand, has a land area equal to one-third and a population equal to 1/17 of that of the Rome metropolitan area, and is characterised by an even higher share of farmland (44%), a lower density of protected areas (16%), and by the same share of urban green-areas (ca. 3%). The average size of the surveyed farms is higher than the national average (8.45 ha). This shows that a city's proximity does not necessarily imply a reduced agricultural area available for production of goods and services. The average labour intensity is 0.23 man-work units per hectare and is, most likely, higher than the national average, which refers to the total number of employees and, therefore, it also includes a number of part-time workers (0.29 agricultural employees per hectare). These structural data underline the vitality of the urban farms subject to study, which are busy in providing high value-added goods and services that require high use of productive resources. All of the surveyed farms have two common features: (i) production according to organic farming methods; and (ii) operating the direct sale of agricultural products through farm shops, farmers' markets, and collective purchase of goods (Italian: Gruppi di Acquisto Solidale, GAS).

The 21 urban farms interviewed in Germany's federal state of North Rhine-Westphalia represent good-practices of the characteristic business models of urbanised regions, which are located in Metropolis Ruhr, Cologne, Aachen and Münster. These farms' key characteristics considered herein are summarised in Table 2 (also Pölling, 2016). The average farm size of urban farming's good practices cases is similar to the German average, but differences between the business models are significant.

The geographical context of the case studies covers a wide spectrum of urban areas in European regions. Urban agriculture is often associated with high-density urban areas such as Rome, Cologne and Barcelona. In these situations, farming is pushed outwards due to centrifugal forces of population growth and urban encroachment. The 15 case studies in the Ruhr Metropolis address urban farming in an old highly-industrialised metropolitan region. Here, urban farms act in a polycentric net of cities historically dominated by heavy industries. Green corridors between these areas, covering a considerable amount of land, are predominantly used for farming. Urban farming in the peri-urban areas of Spain and Italy reinforces the economic dimension of urban agriculture at the sub-regional scale to achieve better relationships between farmers and urban population. In these peri-urban areas where original rings of forests were considerably replaced by farming activities, urban farming is currently providing an important range of economic, cultural and environmental functions.

We find three business models known from the literature (low-cost specialisation, differentiation and diversification) that unfold in four groups due to the splitting of diversification into two subgroups: agricultural diversification and diversification into agriculture. Each of these four groups is presented in subsequent sections and synthesised afterwards.

4.1 Low-cost specialisation

The farm activities categorised under low-cost specialisation differ largely according the case location chosen. The Spanish low-cost specialised farms differ from the Italian and German ones, which are quite similar (see Tab. 4) in that such farms have very standardised activities

and aim to offer just one or very few products and services, concentrating on bringing down the costs. The city's proximity enables them to cover specific needs like the demand for fresh vegetables and ornamental plants, or to practise leisure horse-riding without being forced to move very far away from town. As an example of the German and the Italian cases, farms located in the city of Rome have comparably large agricultural areas pursuing scale economies. Thus, the business models of the Italian and Germany low-cost specialised farms described via BMC's nine basic building blocks show many overlaps – largely the same customer segments, value propositions, channels, customer relationships, etc.

While the Italian and German case studies specialise in certain values (direct sale or high quality product, e.g. organic produce) and customer segments (people requesting high-quality products or leisure activities), the three Spanish low-cost specialised farms, which are exclusively located in the Metropolitan Area of Seville, maximise margins via economies of scale and reduced cost structures. These low-cost urban farms need to develop survival strategies with agricultural activities to stay competitive in agricultural markets and compete for land with non-agricultural land users. These actions include exploitation of natural resources (irrigation, solar energy and land reclamation), agribusiness strategies and public support. The agribusiness strategies include adapting the land cover to local conditions; cooperatives and agro-enterprises; hiring the labour force required to run and monitor highly engineered activities. The most important customer segments of these low-cost farms near Seville are export-oriented agro-food industries belonging to long value chains. On the contrary, the German and Italian specialised farms emphasise local customer demands.

The location of the Seville MA's low-cost urban farms matters: they are all located on a floodplain on which an historical network of urban centres has been developed. Based on the ancient colonisation, water areas and agricultural plots build the main natural resources for the urban population. Urban farming from the low-cost specialised farms is divorced from the leisure activities of the urban population. This is seen partly in the business choices towards large-scale production and partly because the spatial planning authorities do not consider these private farms as open spaces worthy of note. The situation could be turned around by applying green services and short supply chains valuable for citizens and city environments, and with potential private and public economic contributions. To obtain a better recognition, new ways of landscape-related management, for example support by urban planners, could be worthwhile.

4.2 Differentiation

The business model of 'differentiation' highlights, in the majority of cases, short supply food chains: mainly direct sale arrangements; short chains with only one or very few intermediaries (canteens, restaurants, etc.); and new forms of customer participation and co-production, such as the rent-a-field concept. Each of this sample's eleven differentiated farms uses at least one non-mainstream marketing strategy in agricultural production, processing or marketing. While only one urban farm is considered under the business model of differentiation in Spain, there are two in Italy and eight in Germany (see Tab. 5). The most frequent activity in this group is the vertical integration of the value-added chain by

	Spain	Italy	Germany
Customer segments	– Agro-food industries	– People from the area requesting fresh vegetables and ornamental plants	– People requesting high-quality products
	– Export-orientation	– People requesting leisure activities/enjoyment	– People from the area requesting leisure activities/enjoyment
	– Farmers Associations	– Families willing to cultivate a vegetable garden	
Value proposition	– Citrus and rice varieties	– Fresh vegetables and ornamental plants	– High-quality products
	– Low cost: economies of scale, partly also direct marketing	– Courses/Education	– Specialties (niches)
		– Specialties (niches)	– Courses/Education
		– Accessibility of green areas	
Channels	– Agro-food industries	– On-farm	– On-farm
	– Agribusiness		
	– On-farm		
Customer relationships	– Personal to agro-food industries and exporters	– Personal assistance	– Personal; Individual
	– Dedicated personal assistance		
Revenue streams	– Long supply chains	– Product sales	– Product sales
	– Short supply chains	– High turnover per farmland unit	– High turnover per farmland unit
	– Quantity	– Fees for services	– Fees for services
Key resources	– Fertility of soils	– Business attitude	– Knowledge
	– Irrigation infrastructure	– Land	– Labour
	– Citrus and rice varieties	– Labour	– Land
	– Farm location	– Machinery/ Equipment	– Machinery/ Equipment
Key activities	– Production and long supply chain marketing	– Standardised activities: fresh vegetables/ornamental plants	– Production and services (floriculture, horse keeping/services)
	– Direct sale	– Production and services (floriculture, horse keeping/services)	
		– Rent-a-field (preparation/consultation)	
Key partnerships	– Agro-food industries	– Thematic Networks	– Associations
	– Farmers' Associations	– Associations	– Thematic Networks
			– Neighbouring farms
Cost structure	– Water and electricity	– Wages	– Wages
	– Wages	– Running costs	– Running costs
	– Equipment and machinery hiring	– Equipment	– Equipment
	– CAP requirements	– Training	– Training
	– Cost reduction via economies of scale	– Cost reduction via specialisation	– Cost reduction via specialisation
Key conclusion	– Agribusiness	– Focusing solely on one/very few products; often this product used to broaden income sources	– Focusing solely on one product; often this product used to broaden income sources
	– Long to short value chains		
	– Good accessibility in a nice atmosphere		

Tab. 4: Summary overview of the low-cost specialised urban farms: Key notes of the nine basic building blocks for each of the three case study countries

Source: authors' elaboration

	Spain	Italy	Germany
Customer segments	– Food-conscious people from the area	– Food-conscious people from the area – Public canteens – Agritourists	– Food-conscious people from the area
Value proposition	– Local food – Organic food – Social farming	– Direct sale of food products – High-quality products, like organic food – Agritourism	– Direct sale of food products – High-quality products, like organic food – ‘Rent-a-field’
Channels	– On-farm – Farmer or artisan food markets – Short supply chains (to specialised shops, restaurants)	– On-farm – Collective purchasing group	– On-farm – Short supply chains (restaurants, other farms, canteens, etc.)
Customer relationships	– Individual; partly personal	– Individual; partly personal	– Individual; partly personal
Revenue streams	– Direct sale – Short supply chains – Grants/subsidies to employ people with mental disorders	– Product sale (direct sale focus) – Sales to other buyers of the value-added chain – Service sales	– Direct sale – Short supply chains
Key resources	– City proximity – Social work	– Facilities/Constructions for direct sale (farm shops, booths) – Farm atmosphere – Workers – Land	– Facilities/Constructions for direct sale (farm shops, booths) – Farm atmosphere – Workers – Land
Key activities	– Direct sale – Social farming	– (Direct) sale – Production, processing – Logistics – Trade agreements	– Direct sale – Production – Logistics – ‘Rent-a-field’ (preparation / consultation hours)
Key partnerships	– Upstream industries – Mental disorders associations – Organic food council	– Thematic Networks – Associations – Public institutions	– Direct sale farms (exchange of products) – Associations – ‘Rent-a-field’ start-up firm
Cost structure	– Wages – Buying products from upstream industries – Supplies	– Wages – Running costs – Processing costs – Direct sale facilities and constructions	– Wages – Direct sale facilities and constructions and logistics – Land lease
Key conclusion	– Direct sale of organic products – Social work	– Vertical integration, direct sale – Cultural heritage farm	– Vertical integration, direct sale – Producer–consumer interaction and participation via ‘rent-a-field’

Tab. 5: Summary overview of the differentiated urban farms: Key notes of the nine basic building blocks for each of the three case study countries
Source: authors' elaboration

marketing products directly to the consumers or via short supply chains eliminating intermediaries, while one German differentiated farm also makes use of the participatory ‘rent-a-field’-concept. The direct sale of products represents the core business of differentiated farms. This vertical integration achieved by the farms provides the real strength that guarantees consumers maximum safety with respect to the origin of the products, as well as its contribution to the local economy. By doing so, the differentiated farms step out from the anonymous mass market of agrarian products and establish direct producer-consumer relationships built on trust. The farm atmosphere, the farmers’ and their families’ attitudes and the surrounding ambience, are relevant soft factors for the successful differentiation of farm strategies. High-value (vegetables, fruits, berries, flowers, etc.) and high-quality production (organic labelling) support the implementation of short supply chains.

With the ‘rent-a-field’ concept, the farmer rents small parcels – mainly of pre-sown vegetables – to interested city dwellers for one season. The renters are responsible for the further cultivation and harvest work, but the farmers offer exchange of knowledge, tools and water.

The Spanish differentiated farm is a small chicken farm producing organic eggs. The main channels used to sell its production are on-farm, farmers’ markets, and short supply chains to specialised shops and restaurants without intermediaries. The main revenues originate from egg sales, grants and subsidies, where the latter are linked to their care taking of people with special needs. This farm employs as a side issue people with risk of social exclusion for their mental disorders. It has been established for self-fulfilling job opportunities for citizens with handicaps or other special needs.

The two Italian differentiated farms also integrate some elements of diversification into their business portfolio; however, the short supply chain focus prevails as most important for their businesses. Apart from direct sale arrangements, the farm in Perugia runs agritourism activities that involve a number of cultural and recreational events, while the one in Rome performs social activities through work inclusion of people at the margins of society (e.g. in-mates and immigrants). In both cases, revenues from the agricultural activities have allowed the companies to maintain and enhance their cultural and historical buildings, thus fulfilling also the functions of promotion of culture and local heritage.

4.3 Diversification

4.3.1 Agricultural diversification

Most of the surveyed diversified farms apply service provisions linked somehow to agricultural production (Tab. 5). Apart from recreational aspects, social and cultural issues play another major role, including education, therapy and environmental consciousness. For example, educational aspects are demonstrated in the Italian agricultural panorama as different kindergarten farms are emerging, established in peri-urban areas with the aim both to offer an alternative to traditional educational provision and to stimulate a process of cultural re-assessment to help the farming sector recover the social function it has served for centuries (Torquati et al., 2015). The most important services among the Italian diversified farms are farmers who receive school groups and families requesting learning and leisure time at agricultural facilities and in green spaces. Additionally, some farms add social inclusion aspects

of disadvantaged people into their businesses. Here, care-taking is used as a diversification, while the diversifiers into agriculture (see below) are coming from outside farming into this sector to use farming as a vehicle for social work and therapies.

Services are offered to a wide range of customer segments in the German case study farms, especially via agritourism services like gastronomy, accommodation and horses. Three of the four diversified farms developed special diversification strategies: one by integrating ‘land art’, one by offering ‘swingolf’, and one by integrating do-it-yourself leisure-time gardening via ‘rent-a-field’. The use of certain cultivation measures on farmland, like flower strips, ploughing patterns, etc., results in so-called ‘land art’, which attracts many people from the nearby settlement areas. ‘Swingolf’ is an easy kind of golf open for all people regardless of their golf skills. Apart from service diversification, German farms are on average also characterised by the largest farmland capital, which allows product diversification in crop production and livestock breeding. This widens the product range. Generally, the diversified farms broaden their revenue streams, which reduce dependence on one specific income thread, but in parallel creates complexity in everyday work and management, including the costs. While the provided services connected with farming build the core business for these farms, agricultural production is a minor business path. The focus on services is partly also connected with direct sale arrangements (differentiation) to exploit several income sources.

Similar to the Italian and German diversified farms, the Spanish cases apply a huge variety of diversification measures, closely but also loosely linked to production. They offer on average more jobs than farms focusing on primary production (Tab. 3). The most common services offered by the Spanish diversified farms are education (children), cultural (local heritage), gastronomy, and event (concerts, readings, sport) services. It can be recognised, however, that due to the location of the Spanish cases in an agricultural area characterised by viticulture, wine issues play a considerable role, parallel to and in co-existence with diversification measures (Tab. 6). For services like cultural heritage and gastronomy, wine production can be smoothly connected to create profitable synergies. These are good examples in showing how local production can be interwoven with diversification activities linked to agricultural production, in this case to wine.

4.3.2 Diversification into agriculture

This study puts a special focus on diversification into agriculture, defined here as public and private institutions offering care-taking for disadvantaged people or for other means (cultural heritage, landscape management). They have in common that non-farmers start farming activities. While no Spanish case study is considered here, five Italian and seven German care farms are analysed as diversifiers into agriculture (see Tab. 7). All cases are related to the specific needs of citizens who have found a common bond in agriculture to address and resolve issues related to the social sphere in the broadest sense.

These organisations include the Capanne prison social farm in Perugia, designed to make it possible for inmates to be able to learn a trade that will facilitate their social integration once their sentence time is served and that, simultaneously, makes them feel useful during their time in prison, also regaining some dignity linked to an honest

	Spain	Italy	Germany
Customer segments	<ul style="list-style-type: none"> – Families/groups of people interested in farm activities linked to wine – Wine tourists 	<ul style="list-style-type: none"> Broadly addressing customer segments from the area – Families – Children – People with special needs 	<ul style="list-style-type: none"> – Broadly addressing customer segments from the area – Families – Children
Value proposition	<ul style="list-style-type: none"> Services: education, culture, gastronomy, events – Local and regional food – Organic food – Wines and “cavas” (sparkling wines) from a protected designation of origin – Local varieties of wine 	<ul style="list-style-type: none"> – Agritourism Work – Courses/Education – Direct sale of food – Organic products – Assistance 	<ul style="list-style-type: none"> – Services: education, culture, gastronomy, events, sports – Broad production basis
Channels	<ul style="list-style-type: none"> – On-farm – Farmer or artisan food markets, – Short supply chains 	<ul style="list-style-type: none"> – On-farm – Collective purchasing group 	<ul style="list-style-type: none"> – On-farm
Customer relationships	<ul style="list-style-type: none"> – Off-farm activities individual; partly personal 	<ul style="list-style-type: none"> – Personal; partly individual – Community 	<ul style="list-style-type: none"> – Personal; partly individual
Revenue streams	<ul style="list-style-type: none"> – Fees for services, like educational, leisure and cultural activities/events – Direct sales/Short supply chains – Long supply chains 	<ul style="list-style-type: none"> – Fees for services, like educational, leisure and cultural activities/events – Product sales 	<ul style="list-style-type: none"> – Fees for services, like educational, leisure and cultural activities/events – From production
Key resources	<ul style="list-style-type: none"> – Landscape – City proximity – Heritage 	<ul style="list-style-type: none"> – Farm atmosphere and surrounding – Farmland – Workers – Open-mindedness – Network with public institutions 	<ul style="list-style-type: none"> – Farm atmosphere and surrounding – Farmland – Open-mindedness – Workers
Key activities	<ul style="list-style-type: none"> – Educational activities – Leisure activities – Cultural events – Gastronomy – Events – Production and direct sale; partly long chains 	<ul style="list-style-type: none"> – Educational activities – Leisure activities (agritourism) – Therapies, assistance, formation – Production, partly including the value-added chain 	<ul style="list-style-type: none"> – Educational activities – Leisure activities (‘Swingolf’/‘rent-a-field’) – Cultural events (‘Land art’) – Gastronomy – Events – Production, partly including the value-added chain
Key partnerships	<ul style="list-style-type: none"> – Local restaurants or local chefs – Local farmers – Protected designation of origin council – Artists for cultural events – Upstream industries – Organic food council 	<ul style="list-style-type: none"> – Thematic working groups – Associations – Public institutions – Cultural forums 	<ul style="list-style-type: none"> – Thematic working groups – Associations
Cost structure	<ul style="list-style-type: none"> – Running the services – Wages – Advertising and marketing – Upstream material providers – Land lease 	<ul style="list-style-type: none"> – Running the services – Wages – Constructions for offering services – Various inputs (resources) required 	<ul style="list-style-type: none"> – Running the services – Wages – Land lease – Various inputs (resources) required
Key conclusion	<ul style="list-style-type: none"> – Non-agricultural service activities (also to promote products) – Direct sale 	<ul style="list-style-type: none"> – Broadening approach into services connected to farming 	<ul style="list-style-type: none"> – Broadening approach into services connected to farming – Production diversification

Tab. 6: Summary overview of the diversified urban farms: Key notes of the nine basic building blocks for each of the three case study countries. Source: authors' elaboration

	Italy	Germany
Customer segments	<ul style="list-style-type: none"> – Clients with special needs – Mentally and physically disabled people – People with social disadvantages – People interested in cultural tourism 	<ul style="list-style-type: none"> – Clients with special needs – Mentally and physically disabled people – People with social disadvantages – People interested in cultural tourism
Value proposition	<ul style="list-style-type: none"> – Work inclusion: Places to work in farming, including processing, marketing, services – Partly places to live – Creating self-esteem – Direct sale of organic products – Agritourism – Accessibility of green areas – Knowledge of local identity and heritage 	<ul style="list-style-type: none"> – Work inclusion: Places to work in farming, including processing, marketing, services – Partly places to live – Creating self-esteem – Direct sale of organic products – Agritourism
Channels	<ul style="list-style-type: none"> – On-farm – Collective purchasing group – Theme events 	<ul style="list-style-type: none"> – On-farm
Customer relationships	<ul style="list-style-type: none"> – Most often individual (with clients), partly personal – Community/Cooperative creation 	<ul style="list-style-type: none"> – Most often individual (with clients), partly personal
Revenue streams	<ul style="list-style-type: none"> – Public payments for social work – Product sale – Service fees, e. g. guided tours 	<ul style="list-style-type: none"> – Public payments for social work – Product sale
Key resources	<ul style="list-style-type: none"> – Clients – Social workers – Grant of property and land use – Network with public institutions 	<ul style="list-style-type: none"> – Clients – Social workers – Property – Network with public institutions
Key activities	<ul style="list-style-type: none"> – Rehabilitation of disabled or socially impaired people via farming activities – Job creation – Problem solving – Social assistance – Research for alternative sales channels – Enhancement of identity places 	<ul style="list-style-type: none"> – Rehabilitation of disabled or socially impaired people via farming activities – Job creation – Problem solving – Social assistance
Key partnerships	<ul style="list-style-type: none"> – Social organisations – Public institutions, job agencies, social welfare offices – Associations – Research centres, University – Neighbouring farms 	<ul style="list-style-type: none"> – Social organisations – Public institutions, job agencies, social welfare offices – Associations
Cost structure	<ul style="list-style-type: none"> – Wages (social workers) – Time-intensive assistance – Running costs – Property/land lease 	<ul style="list-style-type: none"> – Wages (social workers) – Time-intensive assistance – Running costs – Property/land lease
Key conclusion	<ul style="list-style-type: none"> – Care farming for clients with special needs – Cultural heritage farm 	<ul style="list-style-type: none"> – Care farming for clients with special needs

Tab. 7: Summary overview of the diversifiers into agriculture: Key notes of the nine basic building blocks for each of the three case study countries
Source: authors' elaboration

job. Other Italian social farms are built around existing day-care centres for young people with autism, which are real laboratories of ideas that start right from the agricultural production; or they connect with care centres for young immigrants, where church institutions have made available previously abandoned agricultural land to create community gardens linked to a joint purchasing group for the products. All of the seven German surveyed diversifiers into agriculture are social farms, which offer working (and living) places for people with special needs, like physically and mentally handicapped people as well as young adults facing problems on the regular labour market.

Although farm-specific characteristics and the processes of care farms differ between the individual farms to some extent, the general farm strategy is comparable. All care farms offer working places and partly also living places for clients with special needs. These clients are mentally or physically disabled, children with severe problems in family and/or school, and young adults facing problems entering the regular labour market. The farmland resources are rather small compared to many other farms (see Tab. 2), but the prevalence of organic farming and the maximisation of cultivated crops and kept animals enlarges the working opportunities for the clients. Farm production aims to create manifold tasks in the whole chain from production to processing and marketing, as well as in additional services offered to other customers of the farm, especially gastronomy. This diversified farm concept allows clients to conduct work which suits their special needs. The important success factors of care farms are qualified social workers and close connections to social entities, like job agencies, social welfare institutions, and also private social associations or companies.

One particular case, finally, is the farm established within a facility run by the Italian National Trust (FAI), the Forest of Saint Francis, which contributes, through the production of agricultural products and the preservation of a unique landscape, in connecting visitors to the local and Italian environment, culture and landscape heritage.

4.4 Synthesis and discussion

Many examples demonstrate the diversity of the business strategies run by farms, so that in many cases a dominant business model can be detected but often being added to by activities from other business models. Commonalities can be detected, however, between business models and between countries when synthesising the 50 urban farms in Spain, Italy, and Germany.

Regardless, we do have to admit that the number of low-cost specialised farms is limited in this survey and a stronger focus is put on diversification and differentiation business models of urban farming.

Our research fits also to the findings of Aubry and Kebir (2013) that a mass market orientation to bring down costs is no longer sufficient for agricultural activities when acting under urban environments with associated societal demands. An orientation to contested global markets alone causes fragility, and provides some reasons for the reduction of high value crop production in the Ruhr Metropolis, Germany, for example (Pölling et al., 2016).

Most of the surveyed farms focus in particular on local customer segments and via short supply chains of agricultural products and services. This is the case regardless of the country and regardless of the business

model, except for the three low-cost farms situated near Seville (Spain). Rather, they focus very much on export-oriented agro-food industries by making use of their fertile soils and appropriate irrigation systems, which allow for the reduction of costs via economies of scale. On the contrary, the Italian and German farms belonging to the business model of low-cost specialisation focus on specialisation rather than low-cost; they specialise cost-efficiency on specific goods and services demanded by local populations.

Naturally, customer segments and value propositions differ between the four business model groups, while the majority of applied channels (on-farm) and customer relationships (personal, individual) are rather similar. This is a key difference to other non-city-adjusted farms and their underlying business models: the other farms' channels are predominantly off-farm and customer relationships are often non-personal due to their integration into long-value chains. All four business model categories are dominated by personal relationships, which is a particular strength of the surveyed farms. The channels and revenue streams – especially of diversification and differentiation groups – are similar, mainly because their agricultural activities are supported by short supply chains, often with direct sales, while low-cost specialised farms have a different market access via agribusiness relations.

The remaining building blocks of the BMC differ between the four groups according to the farm concept, the customer segments and value propositions. Groups of customers that companies reach and serve belong to different segments, each of which expresses a demand for partly non-traditional goods and services. The diversified farms cover a rather broad customer segment of people requesting some enjoyment or demanding other services linked to agriculture, while those segments are more clearly specified for the other three business models: clients with special needs (diversifiers into agriculture); food-conscious people (differentiated farms); and people requesting specific services, such as floristry courses and high-quality equestrian education in their leisure-time (specialised farms). These key customer segments are directly linked to the farms' value propositions. The value propositions to customers are: in terms of the business model of low-cost specialisation, comparable cheap products in the case of the Spanish low-cost urban farms in the Seville region, as well as specialised goods and goods; in the case of the differentiated farms, high-quality agricultural products offered via short, transparent and personal supply chains; and in the case of the two diversification business models, social, educational, cultural and recreational services.

Access to workers and farmland are key resources for all four business models; however, specific business models demand more land than others. The low-cost approach of farms around Seville demand comparably large properties to exploit cost-reduction benefits. Additionally, Italian differentiated and German diversified farms are comparably large (see Tab. 2). The German diversified farms cultivate a huge variety of crops and keep different livestock, both of which demand certain land resources. Additionally, activities such as horse-keeping and associated services, need farmland to produce fodder and offer pastures for the horses, and outdoor activities for the customers of equestrian services. The Italian primarily differentiated farms are comparably large due to their additional offers linked to diversification, which fits again with the above-mentioned reasons for the size of diversified farms in Germany. In the last decade,

Italy's urban farming has changed considerably, with an orientation towards diversification and multifunctionality according to urban demands, and to the morphological, structural, historical and cultural features of the cities in which they developed. The Barcelona diversified farms are based on the monoculture of vines, and they include the three stages of agricultural entrepreneurship (production, agro-industry processing and sales and marketing). Offering a large number of activities related to agriculture, gastronomy and heritage is one way to promote their wines.

All business models emphasise the importance of location, meaning that green areas close to large customer segments within cities and agglomerations provide favourable framework conditions for personalised business. This is important both for the production of food and non-food agrarian products, and also for the provision of various services linked more or less loosely to agricultural production. Here the link between agricultural production (viticulture) and the provision of services as conducted in the Barcelona region shows suitable links to provide valuable synergies among them. Diversified farms in particular are bound to the beauty of their landscapes, cultural heritage and multifunctionality, which attracts customers from their cities.

More generally, this study shows that a huge variety of business cases exists within urban and peri-urban settings throughout Europe. Depending on the local markets, the agricultural history of the region and to more recent city-adjustments conducted by the urban farmers, characteristic business models can be identified with their partly similar, but also partly different features.

5. Conclusions

The analysis conducted in selected metropolitan areas of Spain, Italy, and Germany demonstrates that urban farming adjusts to specific urban conditions in manifold ways. Inter-regional similarities become obvious when comparing the business model paths of low-cost specialisation, differentiation, and diversification. Additionally, geographical and historical determinants influence urban farming. Thus, cultural heritage plays a larger role in Mediterranean regions compared to Germany or more Northern and Central European regions. The case studies show that economies of scope via diversification and differentiation are more important in metropolitan areas than economies of scale via low-cost specialisation. The latter option is the most common and mainstream farm path in rural areas offering expansion options in terms of land and livestock units, but urban influences force farmers in densely populated areas to fill business niches via adjustments and innovative business thinking.

Yet, low-cost specialisation also belongs in urban farming and is a business model for at least a few urban farms, such as those in the Seville region with its favourable conditions to exploit cost reduction strategies. Diversification is the most frequent business model detected in the case study regions, including diversifiers into agriculture, especially by health care institutions entering farming from outside the primary sector. This empirical work from Spain, Italy and Germany fits into scientific findings that UA has to specialise, differentiate or diversify – or to combine these alignments. Many farms investigated in this survey merge aspects of more than one business model. Merged business model concepts might be one way to reach sustainability under challenging urban conditions. Thus, it seems to

be appropriate to conduct larger surveys to evaluate the business model approach, emphasising such merged business model concepts to a greater extent.

Methodologically, the strategic management template of the BMC permits researchers to analyse the organisation and performances of farms, both economically and socially. It also allows for the definition and comparison of key success factors, barriers, competitors and business ideas and innovations. In conclusion, this method seems appropriate for the analysis of urban farming businesses for future research agendas. Business-related studies on urban farming or more generally on urban agriculture, are rare, although they have become more common recently. Knowledge creation, discourses on methodological issues and learning from good practices, are relevant to leverage city-adjustments of farms to maintain their profitability and simultaneously to provide positive externalities for society and environment.

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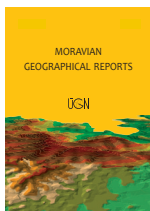
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Effects of consumer-producer interactions in alternative food networks on consumers' learning about food and agriculture

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Abstract

In the recent literature, Alternative Food Networks (AFN) are discussed as a promising approach, at the urban-rural interface, to meeting the challenges of the current agri-food system. Consumer-producer collaboration is seen as a characteristic feature in this context. What is lacking, however, are general concepts for describing the topics of consumer-producer interactions (CPI). The present study aims (1) to develop an analytical framework relying on six CPI domains and (2) to apply it to investigate CPI effects on consumers' learning about and appreciation of agriculture. We conducted 26 guided interviews with consumers and producers of the three most frequent AFN types in Germany: community-supported agriculture (CSA), food coops, and self-harvest gardens. The results show that AFN participation enhances consumers' learning about food (seasonality, cooking/nutrition, housekeeping aspects) and agricultural production (farmers' perspectives, cultivation). Our results show that consumer's learning is influenced by certain CPI domains, and each AFN type can be described by distinctive CPI domains. This led to the conclusion that specific AFN types open up specific learning channels and contents, with consumers learning from producers. AFNs at the urban-rural interface exploit knowledge of rurality.

Keywords: Analytical framework, community-supported agriculture (CSA), food coop, self-harvest garden, urban-rural, Germany

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1. Introduction

In the recent literature, Alternative Food Networks (AFN) are popularised as a promising approach to overcome some of the recent drawbacks of the current small-scale agri-food system (Forssell and Lankoski, 2015). Despite the overall aim to achieve changes in food quality, production, distribution and consumption, the AFN concept covers a broad variety of forms, such as on- and off-farm direct marketing (Allen et al., 2006; Brown and Miller, 2008), producer-producer networks (Marsden et al., 2008) or producer-consumer partnerships (Venn et al., 2006). Still, some commonalities are also discussed in the literature, for instance

1. spatial or organisational proximity of consumers and producers,
2. new modes of consumer-producer connectivity, and
3. shared values of actors within an AFN.

(see Forssell and Lankoski, 2015; Jarosz, 2008; Marsden et al., 2008; Sonnino and Marsden, 2006; Tregear, 2011; Venn et al., 2006; Wiskerke, 2009).

More specifically, modified relations between consumers and producers represent an important feature of AFN concepts, contrasting with conventional agri-food systems where they remain separate from each other (Schermer, 2015). Forssell and Lankoski (2015) describe consumer-producer relations as a strong bond characterised by trust and social embeddedness, and Jarosz (2008) sees food purchasing venues as a means to strengthen consumer-producer relations. Due to the diversity of AFN types as well as AFN actors, however, descriptions of consumer-producer relations remain vague in most AFN studies.

Alternatively, other aspects are drawn on to explain consumer-producer relations, e.g. spatial proximity or AFN members' shared values (Forssell and Lankoski, 2015). While urban agriculture is located in predominantly urban areas and influenced by urban conditions, AFNs are networks at the urban-rural interface, as a part of peri-urban agriculture (Opitz et al., 2016a; Zasada, 2011). This urban-rural context is not explored in detail in all studies, but as Wiskerke (2009) observes, AFNs are mostly

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networks that bring together urban dwellers and the food market (Doernberg et al., 2016). Jarosz (2008) emphasises current development trends such as rural restructuring as determinants for the emergence and diversity of AFNs. In addition to the physical proximity that is typical of regional networks, Forssell and Lankoski (2015) identify two other forms of distance between AFN consumers and producers: distance within the food value chain, and informational distance. Besides proximity, shared values are another determinant for explaining consumer-producer relations. In general, stakeholders in a network are committed to social, environmental or economic standards in agriculture (Jarosz, 2008) and share an understanding of food quality (Wiskerke, 2009).

General conceptualisations of consumer-producer relations in AFNs are rare. Venn et al. (2006) focus on functional relations among AFN actors to categorise AFNs. They distinguish between producers as consumers, producer-consumer partnerships, direct sell initiatives, and specialist retailers (Venn et al., 2006). For short food supply chains, Renting et al. (2003) conceptualise three categories of networks: networks that rely on face-to-face communication, proximate networks that are more complex, and extended networks. Rather lacking are approaches using the content of stakeholders' interactions to characterise AFNs. Only Holloway et al. (2007), who developed a methodological framework for exploring food production-consumption relationships, use content-related aspects to describe some of their categories.

Therefore, we propose an analytical framework of consumer-producer interactions (CPI) designed to specifically highlight the deliberate mutual interaction between consumers and producers in the domains of knowledge, labour, financing and contracting, produce, resources, or land, that sometimes even result in a reversal of roles. The analytical framework is described in section two.

Besides enhancing our understanding of AFN organisation and functioning, an approach, which is based on a characterisation of CPIs as a central AFN feature, allows us to investigate the specific benefits and consequences, especially for consumers, of AFN-based food supply. In

several studies, effects of AFN participation such as healthier diets or changes in nutrition (Andreatta et al., 2008; J. N. Cohen et al., 2012; Minaker et al., 2014; Wilkins et al., 2015) or effects on farm income (Galt, 2013; McIlvaine-Newsad et al., 2004; Oberholtzer, 2004; Tegtmeyer and Duffy, 2005) have been investigated.

Other studies focus on the effects of consumers' learning and heightened awareness (Adler et al., 2003; Andreatta et al., 2008; Brunori et al., 2012; J. N. Cohen et al., 2012; Gorland, 2002; Hayden and Buck, 2012; Lamine, 2015; Lutz and Schachinger, 2013; Macias, 2008; Vogl et al., 2004). Often-described effects are learning about cooking, eating and meal planning, also to avoid food waste (Andreatta et al., 2008; J. N. Cohen et al., 2012; Gorland, 2002; Hayden and Buck, 2012; Lutz and Schachinger, 2013). In addition, we find only few other learning fields, e.g. about cultivation techniques in self-harvest gardens (Vogl et al., 2004) or production problems in a food coop (Brunori et al., 2012). Interestingly, some of the studies explain consumers' AFN-based learning by consumer-producer interactions. These explanations remain rather abstract (Adler et al., 2003; Macias, 2008), however, or rely on observations of a specific case and are therefore difficult to transfer to other cases.

Addressing the challenge presented by the lack of inductive transferability of case-specific evidence, the main objective of our study is to develop a structuring concept of CPIs in AFNs. We particularly focus on three different AFN types at the urban-rural interface, i.e. community-supported agriculture (CSA), food coops, and self-harvest gardens (see description in Section 3.1), and apply the approach to investigate the effects of CPIs on food production-related processes of learning about and appreciating agriculture.

2. Analytical Framework

In the present study, we propose a CPI-based approach using consumer-producer interactions in the domains of knowledge, labour, financing/contracting, produce, resources, and land to explain the specific effects on consumers' learning and appreciation (Fig. 1).

To this end, AFN are distinguished by the knowledge formats, e.g. annual meetings or Internet blogs, and the

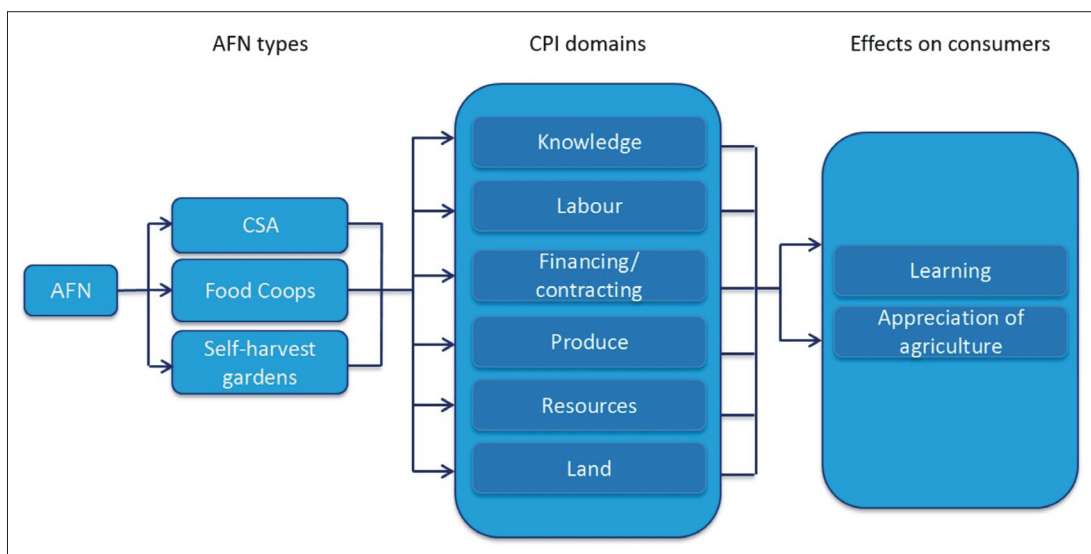


Fig. 1: Analytical framework, using six domains of consumer-producer interactions (CPI) to characterise types of alternative food networks (AFN) and explain AFN effects on consumers
Source: authors' conceptualisation

contents of knowledge exchange as well as by the amount and type of work done by consumers within the network, e.g. in distribution or production. Further domains are agreements on financing and the delivery of produce. AFNs are distinguished by how often, how reliably and at what price consumers receive produce from the farmers. CPIs are further characterised by the issues related to the exchange and sharing of resources, e.g. seeds or tools, or land ownership. AFNs, and in our case consumer-producer partnerships, can be described and distinguished with reference to the six domains of interaction. This analytical framework helps us to structure and explain AFN effects on consumers.

3. Data and methods

In order to deepen our understanding of consumer-producer interactions and their effects on learning and the perception of agriculture, we conducted and analysed 26 interviews with producers and consumers in three metropolitan areas in Germany.

3.1 Selection of AFN types and case study regions

In a first step, databases and websites were searched with a set of keywords to gain an overview of the incidence and spatial distribution of AFNs in Germany. As a first result, we found a concentration of cases in the three metropolitan areas of Berlin, Munich, and Hamburg (see Tab. 1). We then selected the three most frequent AFN types for further analysis:

- Community-supported agriculture (CSA), which represents partnerships between a group of consumers who pay up front for a share of the annual harvest and a farmer who supplies produce for the shareholders on a weekly basis (Hayden and Buck, 2012; Moellers and Birhala, 2014; Perez et al., 2003);

- Food Coops (also called Solidary Purchase Groups) – associations of consumers who jointly organise their food purchases and arrange for regular deliveries by regional farmers (Brunori et al., 2012; Zitcer, 2015); and
- Self-harvest gardens – plots for gardening and services provided by farmers to consumers (Vogl et al., 2004).

As Figure 2 shows, AFNs are located at the urban-rural interface. We therefore extended our case study areas to include a belt of about 25 km width around the three cities. This allowed us to include farmers operating in the peri-urban area and to do justice to the urban-rural character of AFNs.

3.2 Selection of interviewees, and interview conduction

For the selection of AFN interviewees, we conducted a sample of all AFNs in the three cities (see Tab. 1). In each of the metropolitan areas, one AFN initiative of each of the three types was randomly selected using an Internet application. During the selection process, ten food coops, five self-harvest gardens and one CSA were excluded from the study due to a lack of availability or

	Berlin	Munich	Hamburg
CSA farmers	5	3	2
CSA picking points	40	76	7
Food coops	10	1	13
Farmers directly related to food coops	4	4	1
Self-harvest gardens	7	51	8

Tab. 1: Number of AFNs in each metropolitan area per type, supplemented by number of associated places and farms. Source: authors' survey

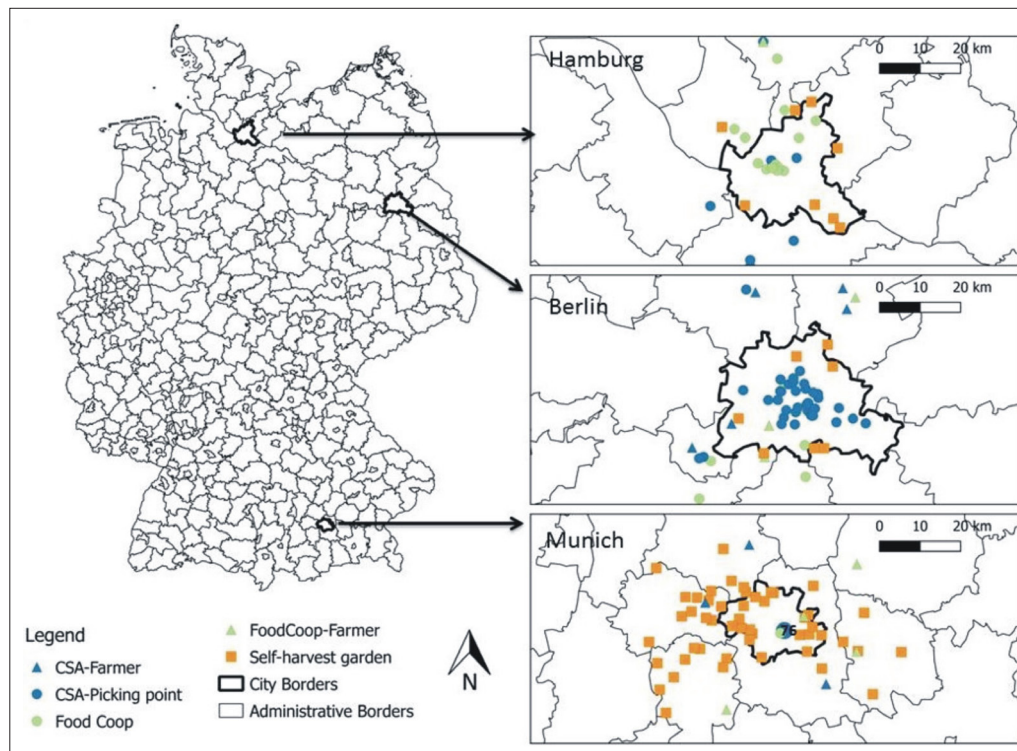


Fig. 2: Maps of Berlin, Munich, and Hamburg, with locations of the three AFN types investigated
Source: authors' elaboration

interest of the potential interview partner. In the case of self-harvest gardens and CSA networks, which are mostly operated by farmers, we contacted the producers and asked them to name two consumers they were connected with. In the case of food coops, we directly contacted the consumers group, selecting one producer who supplied the consumer's network. In one case, the selected producer in a CSA network is also the supplier to a food coop. In this case, we interviewed the producer only once. Except for two cases, the producers and the two consumers who were interviewed belonged to the same network.

Between February and May 2016, the 26 interviews were conducted in the three metropolitan areas as face-to-face (20) or telephone (6) interviews using an interview guideline. They took between 1 and 1.5 hours and followed a structured agenda. The main topics included information about CPIs, interviewees' motivation to participate in an AFN and views regarding potential effects in terms of societal change. In line with our research question, we asked consumers whether and how their perception of agriculture or rural areas had changed since they joined the AFN. We did not address the question of learning directly, respondents introduced the issue themselves.

3.3 Data analysis and interpretation

As a preliminary task, the interviews were recorded and transcribed. The analysis of the interviews was carried out in two steps: First, following the method of Kuckartz (2014), we conducted a content analysis using the MAXQDA software and iteratively generating a code system that was tested and applied. Starting with the question of changes in perception, we identified multiple aspects of consumers' learning and applied them in a general structure. The eight interviews conducted with AFN producers were mainly used to analyse CPIs and to demonstrate and complement the analytical framework. The 18 interviews with consumers were used to answer the question of consumers' perception of agriculture and learning fields. Second, we conducted a descriptive statistical analysis of the number of interviewees in each AFN type who referred to certain issues, supplemented by the number of references for each issue. This provided us with an estimate of the relevance of certain issues as compared to others.

4. Results

Based on our analytical framework, we will first describe AFN types by using the six CPI domains and the results from the interviews. Second, we will present the findings for consumers' learning about food and agriculture and appreciation of agriculture and relate them to the CPI domains.

4.1 Consumer-producer interactions

We investigated CPIs in six domains: knowledge, labour, financing/contracting, produce, resources and land.

4.1.1 Knowledge

CPIs in the domain of knowledge are constituted through the (i) different kinds of knowledge formats, (ii) frequency, and (iii) contents of knowledge transfer. Our findings show that direct knowledge transfer from producers to consumers (as well as among consumers) is a central element of the relationship between both AFN parties in all three investigated AFN types. Besides written formats such as newsletters or Internet blogs, meetings are a frequently

used format for knowledge and information exchange. In CSA initiatives, regular general meetings are held with all shareholders at least once a year. On these occasions, shareholders discuss farm development or share prices. In food coops, information exchange via telephone or online is mainly about organisational issues regarding offers and orders. In addition, participants of the food coops have access to the farms, from which they get their food. In self-harvest gardens, participants are offered workshops about specific cultivation techniques, or consulting hours.

4.1.2 Labour

Labour-related CPIs mainly address the way work is shared between consumers and producers, regarding the (i) field of labour, (ii) obligation, (iii) frequency, and (iv) responsibility. Interviews have shown that there is consumer-producer collaboration in all AFN types. Consumers contribute a certain amount of labour in cultivation, harvest and handling as well as distribution. In CSA initiatives, assistance work by consumers (e.g. harvest events, working days) is expected by producers, but not fixed by contract. The work load to be shared, however, is limited to particular tasks such as planting and harvesting. It is shown, that this is often linked to transaction costs, e.g. due to extensive supervision by the producer (# CSA producer 3). In food coops, participants are mainly taking over distributional tasks, such as organising orders and deliveries. They operate a storage room where all participants can pick up their food, coordinate the mode of orders, the distribution and the time of delivery with the farmer, organise the allocation and weighing of the produce, and decide on what to do with produce that was not collected. In one case, one or more participants are also involved in the transport of produce from the farm. In self-harvest gardens, cultivation work is shared between consumers and producers, with producers preparing the beds by tillage and sowing and committing the plots to consumers, and consumers caring for the plants and harvesting them. In one case, the producer offers additional watering services during the season.

4.1.3 Financing and contracting

CPIs in the domain of financing and contracting are covering aspects of (i) common agreements on pricing, (ii) contract duration and (iii) consumers' payment. Throughout all AFN types, variability in application can be observed. All AFN initiatives in our study rely on consumer-producer contracts. While in CSAs and self-harvest gardens, these are based on written contracts, food coops usually rely on oral agreements, with consumers committing themselves to regular orders with the farmer. In CSA contracts, consumers commit themselves to a monthly payment, a so-called share, while producers commit themselves to supply produce. A special feature of CSA contracts is that consumers and producers do not know how much the producer will harvest. The share is understood to constitute a payment for the farmers' labour rather than a price for the produce. In food coops, consumers pay for the food they have ordered, while in self-harvest gardens consumers pay for one season's use of the plot and the services provided by the producer or operator.

4.1.4 Produce

CPIs in the domain of produce are about the frequency of food supply and consumers' involvement in decision processes about what is grown on the farm. Interviews reveal that this CPI domain occurs in all three AFN types. In CSA initiatives, the harvest share is delivered to

participants on a weekly basis or, in winter, twice a month. Generally, consumers' freedom of choice regarding the type or the amount of the vegetables or fruit they will get is very limited. In one case, participants can choose whether to get their milk share in the form of milk, yoghurt, or cheese. But CSA participants can give farmers feedback on last year's vegetables and current preferences at the beginning of the season. In food coops, farmers mainly provide an assortment of the food crop they grow, and consumers choose from it. In self-harvest gardens, participants have the largest freedom of choice as they basically get what they harvest. Although farmers decide about the general setup, consumers can strongly influence the choice of crops to be cultivated and harvested.

4.1.5 Resources and land

The CPIs related to the sharing of resources are predominantly about what is provided by the farmers, i.e. tools and equipment for gardening or working clothes or inputs like seeds and water. This type of producer-consumer interaction is only relevant in those cases where consumers actually work in the fields, particularly in CSAs and self-harvest gardens. Usually, the inputs are provided by the farmer (mainly the case in CSAs) or are bought by the consumers who apply them in compliance with specific rules, e.g. for organic production (self-harvest gardens). In food coops, the consumers group or individual members of the group own or rent the needed resources, i.e. rental space and equipment. Land-related CPIs mainly occur in cases where consumers rent a plot from the farmer. This is only the case in self-harvest gardens where participants are required to rent a plot to cultivate.

4.2 Learning about food

Acquiring knowledge about and awareness of food and food handling to prevent food waste was found to be a major issue in all interviews, including topics of cooking and nutrition, seasonality, and housekeeping.

Cooking and nutrition as the primary aspect of learning about food is reported by almost all respondents. Consumers confirm that AFN membership has a positive effect on the frequency and regularity with which they prepare meals themselves. They learn to cook with as yet unknown and/or seasonally available vegetables using new recipes that are sometimes provided by the farmers or found in consumer-driven knowledge exchange formats or on the Internet. As one interviewee says:

“Because when I already had the process, I used to choose a recipe and then see what I had by way of produce. And here I first get the produce and then I have to go looking for recipes.” (# Self-harvest gardens consumer 2 Hamburg)

Especially CSA participants describe seasonal cooking as a great challenge. In winter, consumers only get storage produce and the few vegetables that grow in winter. Therefore, they need to learn to cook with a reduced array of produce, e.g. cabbage or celeriac. Some participants also learned more directly about processing and nutrition, including milk processing, pasteurisation and control standards. Others were advised in terms of dietary changes.

Considering the relation between learning about nutrition and cooking, interviewees relate them directly and indirectly with the CPI domains of knowledge and produce. As described above, AFN consumers and producers use various knowledge formats to share recipes or advice for processing. That is necessary as they often do

not know the products or they receive the same varieties of vegetables for a long period without much variation, e.g. during winter times. Frequency and delivery agreements regarding the produce influence the consumer learning process. Table 2 shows the related CPI domains of all the three identified learning fields of food.

Seasonality represents a second food-related issue but is reported less frequently. Respondents report learning about when crops are ripe and available. They also say that they have acquired specific knowledge about regional vegetables and traditional varieties they did not know before (as these are not available through retail trade) and are enhancing their understanding of regional cultivation options. AFN participants get their knowledge from workshops or newsletters provided by the farmers. But respondents also report learning about experiences while co-working and learning-by-doing or just having the seasonal produce in their basket. Therewith, learning about seasonality is related to the CPI domains knowledge, labour, produce and indirectly to the domain of financing/contracting (Tab. 2). Only long-term contracts allow insights in variability of varieties over the seasons.

The third aspect of learning about food concerns the practice of housekeeping. Especially with CSA participants, storage and handling on a household level, e.g. processing herbs and vegetables, is a frequently mentioned topic. Related to the prevention of food waste, we found learning processes about natural storage times of perishable food crops and about techniques to extend them. Gains in housekeeping knowledge also include learning about the time and the finances required for the various steps in food supply, e.g. distributional tasks in food coops and adaptation of shopping routines. Respondents directly relate learning about housekeeping with the CPI domain of produce (see Tab. 2).

4.3 Learning about agriculture

Besides the topic of food, participants learn about agriculture and the production process itself and, more specifically, about farmers' perspectives. This topic is frequently referred to in almost all cases. Cultivation practices play a secondary role but are relevant at least for CSAs and self-harvest gardens.

4.3.1 Farmers' perspectives

We observed learning processes with regard to farmers' perspectives on (i) economic requirements, (ii) workflows on the farm, (iii) distribution, and (iv) availability of land – in CSAs and food coops.

‘Economic requirements’ as the first of the four factors covers aspects of a farm's costs and calculation practices. Interviewees learn about agricultural costs and accounting through being involved in the process of calculating CSA share prices. In other cases, interviewees become aware of the question of farm succession or farm decision-making

Learning field	Related CPI domains
Cooking/nutrition	Knowledge, produce
Seasonality	Knowledge, produce, financing/contracting, labour
Housekeeping	Produce

Tab. 2: Consumer's learning about food in AFNs and the related CPI domains. Source: authors' elaboration

processes, e.g. concerning on-farm processing. Learning about ‘economic requirements’ is influenced by the configuration of the contracts and the financing agreements – that is why it is related to the CPI domain of financing/contracting. In Table 3 all influencing CPI domains for learning about agriculture are summarised.

‘Workflows on the farm’ covers timelines and events on the farm. Interviewees report gaining new insights into workflows on the farm or into special events, e.g. a butter flood or slaughtering schedules. One interviewee extensively describes the contents of a weekly newsletter:

“It’s all very detailed, you even get to know how many pigs were born or that they just finished setting up the new polytunnel for the new tomato greenhouse or whether or not there is a new apprentice on the farm or whether or not they bought a new tractor (...).” (# Food coop consumer 2 Hamburg)

In the quotation, the respondent refers directly to the CPI domain of knowledge.

The topic of ‘distribution’ covers all organisational, packaging and transport processes. In CSAs and food coops, consumers are involved in distributional tasks. From being involved in labour (CPI domain of labour), they therefore get specific insights into the efforts and requirements of distribution, e.g. the complexity and micro-management of small-scale packing and customer-specific delivery or consumer-producer differences over requirements. While consumers need to have one day in the week for delivery by all the farmers who supply produce for the food coop, farmers may find it difficult to coordinate different distribution pathways with the requirements of just one food coop. One interviewee states:

“That’s when we really got an idea why food coops are not that easy to work with for small-scale farmers, for instance.” (# Food coop consumer 2 Berlin)

The aspect of ‘availability of land’ covers the difficulties for farmers to rent additional land or continue farming on land especially in the urban fringe. This is reported by interviewees from all three AFN types. They learned that renting or buying arable land close to cities is difficult because availability is reduced and prices are comparatively high. One respondent associated these facts with land grabbing practices of the large-scale agro-business. Consumers become aware of the issue by newsletters or in the case of CSA by talking with the producers at the annual meeting or during the working events (CPI domain of knowledge).

4.3.2 Cultivation

Learning about cultivation is a major topic predominantly in self-harvest gardens. Respondents from CSA and food coops mention the issue less frequent and less variously. Consumers talk about aspects such as (i) dependency on external factors, (ii) cultivation planning, (iii) cultivation techniques, and (iv) yields.

The aspect ‘dependency on external factors’ covers the

Learning field	Related CPI domains
Farmers perspectives	Knowledge, labour, financing/contracting
Cultivation	Knowledge, labour

Tab. 3: Consumer’s learning about agriculture in AFNs and the related CPI domains. Source: authors’ elaboration

full range of weather and climate conditions, as well as seed quality, that influence the harvest and the yield. Participants describe how droughts or hailstorms may destroy the harvest or open the way for pests, and how farmers can adapt, e.g. by growing tomatoes in glasshouses. But they also report that adaptations like irrigation techniques or tabs are not always possible or too expensive to install, and why agricultural production in many cases depends on the rain and the sun, making cultivation and yields less predictable. Interviewees also report becoming aware of changing conditions over the years, i.e. of what they call ‘climate change’. A further issue besides the weather is seeds, e.g. the quality of organic seeds as compared to hybrid seeds. One interviewee reported learning that when seeds were cultivated outdoors, plants were more resilient to extreme weather conditions; another had learned about the advantage of having stones in the soil to slacken it. Learning about external factors is a process of realisation by doing. While AFN participants are doing cultivation work, they make experiences with climate effects. Learning about external factors is related to the CPI domain labour. Additionally, interviewees report about newsletters or workshops, explaining the relation between weather and harvest. Learning is related to the CPI domain of knowledge. An overview is given in Table 3.

The issue ‘cultivation planning’ primarily covers the techniques of crop rotation. Farmers instruct consumers about energy flows in integrated farming systems, or about the necessity of crop rotation as a provision for pest avoidance, or about fertilisation and how it works (CPI domain of knowledge). One interviewee reports:

“That’s why crop rotation is really important (...) because when you keep cultivating cabbage at the same place too many times in a row, some very nasty bacteria will come to live in the soil (...). And then it’s potentiating, it’s getting worse from year to year.” (# Self-harvest garden consumer 2 Berlin).

One respondent reports that cultivation planning may also involve a social perspective: to prevent harvests from being stolen, certain vegetables that are easy to harvest are not grown close to streets.

As a third topic, ‘cultivation techniques’ covers all the techniques of cultivation, such as sowing, planting, plant care, ripening process, harvesting, pest management, tillage and fertilisation, as well as the timing for each of these steps. In general, learning about cultivation techniques is related to the CPI of labour. Interviewees report learning about many practical aspects of gardening or cultivation, e.g. how to let seeds germinate in little pots and raise the seedlings on the windowsill before planting them out in the soil, or how to pinch tomato plants. In some cases, consumers are interested in the regulations of organic production. They therefore learn about how to use green manuring for organic fertilisation, how to use nets for pest avoidance or how to collect potato bugs and, more generally, about the efforts involved in growing organically.

As a last aspect, interviewees across all AFN types report insights into expected yields. They learn about how many eggs a hen can lay, or how much milk a cow can give, or how many potatoes can be harvested from a specific plot.

4.4 Appreciation of agriculture

Asking interviewees about the change of their perception of agriculture since they joined the AFN, we found broad awareness of and interest in food issues and appreciating

certain aspects of agriculture even prior to AFN participation. Especially access to good and fresh food represents an incentive for them to join an AFN initiative. Some of the respondents explain their early awareness by childhood links to rural areas or friends who shared their interest; others refer to a general interest in food and nutrition or to changes in lifestyle, e.g. having children, getting older. These groups are more conscious of the quality and the origin of the food they buy, e.g. only organic food, or less meat, or buying on farmers markets. Others seem to be driven by their rejection of the prevailing agro-food system.

Food quality is the first important issue referred to by a majority of the consumers we interviewed. Respondents particularly appreciate the freshness and tastiness of produce such as tomatoes, butter, bread, or potatoes and describe them as healthy. Another quality criterion is that produce is grown organically or that animals are fed with organic fodder. In addition, there is a specific quality value in terms of an emotional bonding to animals and plants. One participant in a self-harvest garden describes how watching a plant grow during the season intensifies this bond, and the pure joy of watching kids harvesting:

“(…) when you see (…) their eyes beaming with excitement, watch them lifting a carrot with their little knives.(…) How its value suddenly changes, the very carrot they may refuse to even touch at supper, and now they just won’t part with it.” (# Self-harvest garden consumer 2 Berlin)

Food quality is often described in contrast to the food available through regular retail trade. Respondents express their appreciation of AFN-supplied produce while rejecting supermarket vegetables as ‘mouldy’ (# Self-harvest garden consumer 1 Munich) or ‘overbred crap’ (# CSA consumer 2 Munich). Only one interviewee concedes that her self-grown vegetables are sometimes smaller or less tasty than vegetables bought in a bio-supermarket or at a farm shop (# self-harvest garden consumer 2 Hamburg).

A second aspect most frequently reported by self-harvest gardeners is their appreciation of farmers’ work efforts. Especially the laborious manual handling, e.g. pulling out weeds, that is typical of organic and/or small-scale cultivation of vegetables was repeatedly acknowledged. Interviewees reported getting a better feel for workloads, fair product prices and wages.

As a third and last aspect, consumers appreciate transparency regarding food origins and modes of production, which makes for an emotional component. In contrast to the anonymity of supermarkets and global value chains, interviewees describe their feelings with “trust” (e.g. # CSA consumer 2 Munich) and “transparency” (e.g. # Food coop consumer 1 Berlin, # CSA consumer 1 Berlin).

5. Discussion

From our perspective, the findings of our study allow for four distinct conclusions. First, four out of the six CPI domains are relevant for all the investigated AFN types, two of them are only relevant for single AFN types. In frequency of interaction, the AFN types do not differ very much, but taking qualitative descriptions, we can see that some CPI domains meet the core of the certain AFN types more than others. Second, AFN participation enhances consumers’ learning about food (seasonality, cooking/nutrition, housekeeping aspects) and agricultural production (farmers’ perspectives, cultivation). Third,

different CPI domains affect learning in different fields. Fourth, CPIs in AFNs at the urban-rural interface exploit knowledge of rurality. Opting for a specific AFN type opens up specific learning channels for consumers. In the following, we will discuss these conclusions with reference to the current state of research.

5.1 CPI domains characterise AFN types

Our analysis is based on a new analytical framework that we developed. We rely on six CPI domains – knowledge, labour, financing/contracting, produce, resources, and land – to describe the three AFN types we investigated. Our findings show that in all three types (CSA, food coop, and self-harvest garden) consumers and producers collaborate in four out of the six domains. Resource-based interactions are only relevant in those cases where consumers actually work in the fields, particularly CSA and self-harvest gardens. Land-based interactions seem to be specific to self-harvest gardens. Thus, considering the level of CPI domains, the AFN types show very little differentiation regarding the participation of consumers among the three investigated AFN types. Taking additionally the comparably small number of cases for each AFN type into consideration, we cannot derive significant differences regarding the frequency of participation. Hence, for explaining the results of the current study, the frequency of interactions on the six CPI domains is not helpful. Still, in a more descriptive way, CPI domains contribute to characterise AFN types.

Taking the scientific literature and our observations from the interviews into consideration, the relevance of single CPI domains differs in the three AFN types. In CSAs, financing/contracting (pre-payment for a year’s use of the share) and agreements on the supply of agricultural produce (all year round on a weekly basis) are very specific and elementary to the CSA concept in general. Describing the concept of CSA, both of these elements are often repeated (Hayden and Buck, 2012; Moellers and Birhala, 2014; Perez et al., 2003). Compared to the domains of financing/contracting and produce, for the CSA concept it is not constructing, whether the consumers do assistance work on the field or not (Janssen, 2010), or how the knowledge transfer is designed, or whether the consumers can use tools from the farmer. For food coops, interactions about labour (distributional work of the consumers group) and the supply of agricultural produce (ordered food) are at the core of the concept. In the few international published studies about food coops, both of these CPI domains are at the core of the descriptions and investigations, e.g. when Brunori et al., 2012 describe the consumers-producers-networks and subnetworks of a Solidary Purchase Group or Zitcer (2015) for food coops. In self-harvest gardens, in contrast, CPIs typically are about labour (sharing of work between the farmer who prepares the plot and the consumer who cultivates it), land (renting for one season) and produce (consumers get what they harvest) (Vogl et al., 2004).

Even if the way and frequency of knowledge transfer does not show characteristics for certain AFN types, CPI in the domain of knowledge is a key element of all AFN types (Brunori et al., 2012; Moellers and Birhala, 2014; Vogl et al., 2004). Communication and knowledge transfer can be seen as precondition for community building, motivation for participation (Brehm and Eisenhauer, 2008) or as one way of integration of members (Anschütz, 2015; Forssell and Lankoski, 2015; Moellers and Birhala, 2014). That is why in the different AFN types different contents of knowledge

are transferred and consumer's learning is stimulated differently in certain AFN types.

5.2 Consumers' learning in AFNs

Our findings confirm that during AFN participation, consumers learn about food (seasonality, cooking/nutrition, housekeeping aspects) and agricultural production (farmers' perspectives, cultivation). This is more or less in line with existing literature on AFNs, where knowledge acquisition in the domain of food, especially nutrition and behavioural changes regarding cooking and food consumption, is one of the most frequently explored issues. Studies on CSA primarily explore increased consumption of fruit and vegetables (J. N. Cohen et al., 2012; Minaker et al., 2014; Wilkins et al., 2015), changes in cooking practices or the frequency of eating out (Andreatta et al., 2008; Curtis et al., 2013), and learning about seasonal crops (Wilkins et al., 2015). Some studies were unable to confirm the hypothesis that CSA participation leads to healthier food consumption habits (Gorland, 2002; Quandt et al., 2013). No comparable studies exist, as far as we know, on food coops or self-harvest gardens. In this way, our empirical work provides new insights, confirming the significant and substantial importance of consumers' learning about various aspects of food, food processing, and food consumption regardless of AFN types. This multifaceted issue is referred to in all our interviews. Apart from verifying the broad scope of learning, it would be interesting to know more about the actual extent of the knowledge thus acquired or the depth of the effects, e.g. whether consumers affiliated with AFNs really engage in a healthier lifestyle than other members of the population. These issues are not specifically addressed by our research design.

Other novel insights of our study relate to learning about agricultural production, which is a relatively new object of investigation in the literature on AFNs. Vogl et al. (2004) report learning effects in self-harvest gardens due to mutual visits. The authors concluded that consumers' involvement in primary production may lead to a better understanding of the challenges and risks producers have to cope with. Our findings indeed confirm these observations by Vogl et al. (2004) for all our AFN types. Moreover, the differences described above in the specific nature of interactions, activities and learning contents along the whole production and distribution process, result in differences also in experienced complexity.

5.3 Specific CPIs affect specific fields of learning and appreciation

As shown in the results section, consumers' learning is influenced by CPIs in various ways. Even if we asked directly for the changes of perception during AFN participation, direct influences of CPIs on appreciation are not derivable from the interviews.

5.3.1 Consumers' learning

The interviews show that CPIs in four out of the six domains relate to specific fields of consumers' learning. We present an overview of this relation in Table 4.

CPIs about knowledge relate to nearly all of the learning fields. CPIs about labour relate to learning about production and seasonality, CPIs about financing/contracting relate to the learning field of farmers' perspectives, and CPIs about produce relate to learning about food. The interviews do not allow us to relate the CPI domains 'resources' and 'land' to one of the learning fields.

But even in cases where the three CPI domains of knowledge, labour, and produce enhance learning about seasonality, learning processes may differ in quality and intensity. Newsletters and workshops, as well as experiences of ripening processes through regular gardening work, may all lead to learning about the seasonality of food, but as learning means different things for different target groups, learning processes are certainly not fully comparable in terms of contents and feasibility.

5.3.2 Appreciation

In addition to learning effects, we analysed consumers' appreciation of agriculture. Three aspects are referred to in the interviews: appreciation of food, labour, and food origins.

Taking the current state of scientific literature, our results are in line with recent discussions. AFN participants report about their appreciation for food and its origins. As examined in other studies, the appreciation for food and certain food qualities is one central element of social identity in AFNs (Jarosz, 2008; Renting et al., 2003; Wiskerke, 2009). Therewith, appreciation for food and its origin is a precondition for consumers to participate in an AFN, as confirmed by the interviewees in our study. Furthermore, social identity, built on the belief in good food and their societal meaning, is a central element of AFNs, e.g. it contributes to the acceptance of higher prices (Forsell and Lankoski, 2015).

This might be a problem for the interpretation of empirical studies about AFNs, because respondents perceive themselves as 'good consumers' and may emphasise the positive effects of participating in an AFN. In our study, we attempted to reduce this issue while addressing the research question in the interviews indirectly.

Regarding the appreciation about labour, no comparable studies exist. Some studies investigate the conditions and mostly negative effects of increased workloads of farmers or AFN participants (Brunori et al., 2011; Oberholtzer, 2004; Simon Fernandez et al., 2012). An increased appreciation in terms of an increased value of farmer's labour is not examined so far. In Germany, there is a decreasing number

CPI domain	Learning fields
Knowledge	Cooking/nutrition
	Seasonality
	Farmer's perspectives
	Cultivation
Labour	Seasonality
	Farmer's perspectives
	Cultivation
Financing/contracting	Seasonality
	Farmer's perspectives
Produce	Cooking/nutrition
	Seasonality
	Housekeeping

Tab. 4: CPI domains of knowledge, labour, financing/contracting, and produce and related influences on consumers' learning

Source: authors' conceptualisation

of small and medium farm types. One reason among others is that older producers do not find successors motivated to continue the business. One reported reason is the missing appreciation of agricultural labour. Behind this backdrop, AFNs generate an interesting potential, which is hardly recognised so far.

Different to consumers' learning, from the interviews we cannot derive influences of CPIs on changed appreciation of food and its origin. We did not examine a quality or quantity of appreciation before and since participation in an AFN. Regarding the context of appreciation of labour, respondents report about their respect since they visited the farm or helped with cultivation in a CSA or a self-harvest garden. Certainly, also in this case, we cannot exclude from consideration that the participants had awareness of farmer's labour and working conditions before they entered the network.

5.4 Learning at the urban-rural interface

In addition to CPIs, we considered interactions within a consumers group and related them to the six learning fields. Interactions between consumers in a consumer group are related to learning about cooking/nutrition, and housekeeping, and in the case of self-harvest gardens to cultivation practices. In these cases, respondents report consumer-driven internet blogs or informal meetings on the plots in the cases of self-harvest-gardens, as knowledge exchange formats (Fig. 3). Considering the different learning fields (see sections 5.2 and 5.3), we concluded that in contrast to networks consisting only of consumers, CPIs in AFNs at the urban-rural interface widen the scope and intensity of consumers' learning, especially regarding topics of rurality, such as farmers' perspectives. Direct relations between producers from rural or peri-urban areas and consumers enable urban dwellers to access the farmer's knowledge resources. In all AFNs, and more particularly in CSAs and self-harvest initiatives, consumers' perception of farmers' perspectives has improved. Therefore it can be reasoned, that there is a major role of farmers in influencing perceptions and learning processes about the complex agri-food system.

From the insights discussed above, i.e. that each AFN type shows specific characteristics in the six CPI domains and that CPIs in each domain affects specific learning fields, we can assume that specific AFN types open up specific channels for urban consumers to learn from producers, as well as for producers to indirectly influence consumer's appreciation of their agricultural work.

Given these experiences and the findings of our study, and in analogy to the discourse about urban agriculture, perspectives on AFNs at the urban-rural interface should be more multifunctional. In the literature on urban agriculture, the latter is discussed as a vehicle for learning for innovation (Opitz et al., 2016b) or as a means of integrating the elderly (Cohen et al., 2012). Comparable multi-functional approaches to AFNs are conceivable, especially because the complex issue of food seems to be a highly workable gateway to access complex knowledge about agriculture, markets, and health issues that, in turn, will have consequences for individual behaviours. Furthermore, our study encourages counting on new and indirect farmer-driven ways to approach consumers by socially innovative means. In an active knowledge society consumers, or at least a certain number of them, can be assumed to positively respond to such offers of enhanced interaction.

6. Conclusions

In our study we analysed the effects of consumers' participation in alternative food networks (AFN) on their learning about and perception of agriculture. We investigated the three most frequent AFN types in Germany: community-supported agriculture (CSA), food coops, and self-harvest gardens. To account for the diversity of AFN types, we propose an analytical framework based on the domains addressed in consumer-producer interactions (CPI): knowledge, labour, financing/contracting, produce, resources, and land.

The findings of our study of AFNs in three German metropolitan areas show that participation in any of the three AFN types enhances consumers' learning about food (seasonality, cooking/nutrition, housekeeping aspects) and agricultural production (farmers' perspectives and

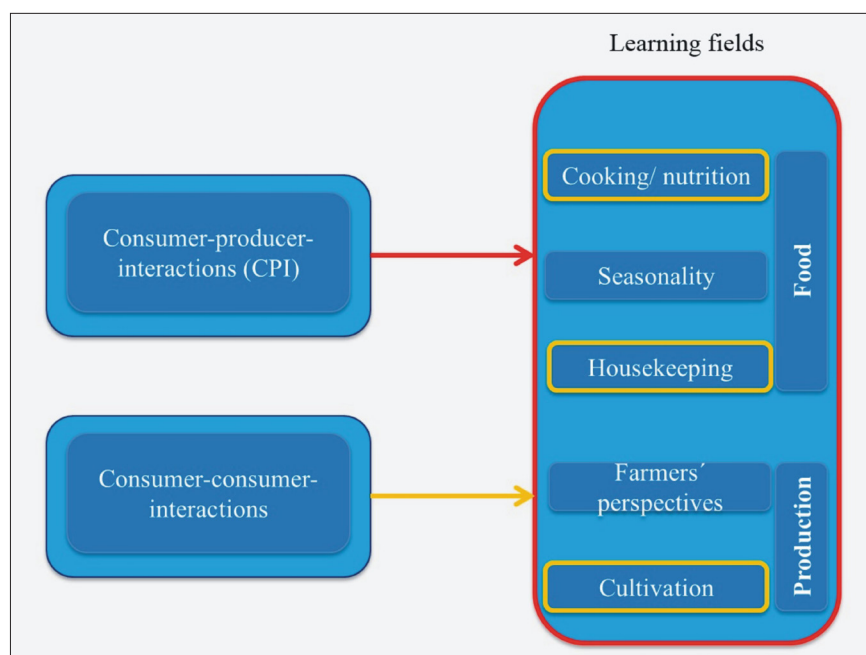


Fig. 3: Consumer-producer-interactions and consumer-consumer-interactions influence learning in different learning fields. Source: authors' conceptualisation

requirements, cultivation). In addition, consumers report appreciation of the quality and origin of the food they get, as well as a heightened appreciation of farmers' agricultural work.

The analytical framework we propose is well suited to describe and distinguish between the interactions and effects of various AFN types. CPI domains as a core element of our framework, are capable of explaining the effects of AFNs on consumers' learning about and allow us to relate these effects to specific learning fields. CPIs about produce are strongly related to the learning field 'food', while CPIs about labour, financing/contracting, and knowledge relate to the learning field 'agricultural production'. As a conclusion from these findings, i.e. that each AFN shows specifically using single CPI domains and that these domains are related to specific learning fields, we suggest that each AFN type opens up specific channels for consumers to learn from producers, as well as for producers to indirectly influence consumers' appreciation of their agricultural work.

In contrast to networks consisting only of consumers, consumer-producer networks exploit rural knowledge for urban dwellers. Thus, food seems to provide a workable gateway to access more complex knowledge about nutrition and production processes.

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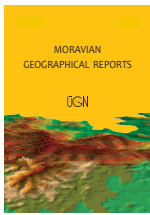
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Challenges for the revitalisation of peri-urban agriculture in Spain: Territorial analysis of the Madrid and Oviedo metropolitan areas

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Abstract

Contemporary urban sprawl and urban functional centrality at the regional scale have made the classical urban-rural dichotomy no longer valid. Instead, urban development generates a range of peri-urban transitional areas in which urban and rural uses are mixed in a fragmented land mosaic. The main objective of this paper is to detect opportunities for the revitalisation of peri-urban agriculture based on an analysis and comparison of its evolution in two different regional contexts in Spain. The peri-urban space is delimited according to density, topography and perceptual criteria. Aerial images and cartographic bases are used to identify land quality and land use changes in the areas, concluding that peri-urban agriculture has suffered both urban occupation and internal changes in crops and agricultural uses, experiencing a process of decline. Innovative initiatives performed in these spaces are also explored as opportunities for revitalisation from a multifunctional approach, linking urban population to peri-urban agriculture, organic farming or landscape management. This analysis serves as a prerequisite to develop new policies for the planning of peri-urban agriculture at local and regional scales, based on a deep understanding of the territory and its evolution.

Key words: land use changes, urban sprawl, multifunctional agriculture, Madrid, Oviedo, Spain

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1. Introduction

For the last few decades, urban sprawl has resulted in a new peri-urban landscape determined by the presence of a complex mix of land uses, shaping a heterogeneous mosaic of urban, rural and natural systems, in a dispersed settlement pattern (Adell, 1999; Carusso, 2001; Allen, 2003). Peri-urbanisation has been a general dynamic in Europe (Piorr et al., 2011; Nilsson et al., 2013), as previously rural spaces around cities change in many ways: into low density residential areas; commercial, leisure and sports facilities; industrial or technological hubs and logistic areas; as well as indirect urban uses such as waste disposal or extraction sites. Accessibility by high-capacity infrastructures allows these urban uses to be located in areas with lower land prices, or with higher environmental and landscape quality.

Agriculture located in peri-urban areas faces a double vulnerability (Simón et al., 2014) related to general problems in the agricultural sector and with those due

to its peri-urban location (spatial fragmentation, urban pressure, land prices ...). Proximity to the city, however, also provides opportunities for a differentiated orientation of agriculture, through the development of urban-rural linkages, and the adaptation to new uses and functions. In this respect, multifunctionality refers to the shift from a productivist focus in food provision to the integration of new environmental and social goods and services that can help to improve sustainable development alternatives and the spatial embeddedness of the agrifood sector (Jouvé and Padilla, 2007; Marsden and Sonnino, 2008; Renting et al., 2009; Andersson et al., 2009).

As Zasada (2011) points out, multifunctionality in peri-urban agriculture is related to urbanites' preferences and demands for environmental quality, enjoyment of cultural landscapes, leisure and recreation, regional food, and other kinds of new urban-rural linkages. These linkages can be developed through a better spatial and functional

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integration of peri-urban areas into the urban socio-ecological metabolism (Vejre et al., 2015): for example, through diversification measures such as the provision of environmental services, recreation and social-oriented activities, or short food supply chains in order to take advantage of the urban location, responding to new lifestyles and social demands. The different scales and typologies of agricultural spaces, from those located on the urban fringe to those in rural areas, can play an important role in regional sustainability and resilience (Poli, 2014).

Planning and agricultural policies have a central role to play in the preservation, adaptation and success of peri-urban agriculture. As an intermediate urban-rural space and because of its distinct morphological and functional characteristics, peri-urban areas are complex spaces to operate, both from urban and regional planning perspectives, and from the environmental and agricultural disciplines (Fanfani, 2013). Integrating peri-urban agriculture in urban policies and planning could help to enhance urban resilience related to food security, climate change adaptation and the local economy (Dubbeling, 2014).

The main objective of this paper is to detect opportunities for revitalisation of peri-urban agriculture based on an analysis and comparison of its evolution in two peri-urban locations in different regional contexts: northern and central Spain, represented by the metropolitan areas of Oviedo and Madrid. A land use analysis has been conducted in order to: (i) delimit and compare peri-urban agriculture in the case studies, identifying land quality, as well as agricultural and urban uses located in these spaces; (ii) describe the evolution of the case study areas in the last 40 years, quantifying land use changes; and (iii) identify emergent initiatives that could support the reorientation of peri-urban agriculture based on multifunctionality.

This analysis will enable us to respond to the following research questions: (i) What are main trends of peri-urban agricultural land transformation in Madrid and Oviedo?; (ii) What are main challenges and constraints for revitalisation?; and (iii) What are the main opportunities? Unlike previous studies in the Spanish context, this analysis is focused on two regions that are not expansive horticultural territories of high quality land, as can be seen in the Mediterranean orchards located in historic meadows in southern and eastern Spain. In this regard, the interest in the case studies is in analysing the evolution of peri-urban agriculture in cities with an industrial and tertiary economic orientation, and understanding the role such activities might play in the future, with the aim of developing better planning and policies.

2. State of the art: theoretical framing

2.1 Peri-urban studies

A unique and agreed-to method for the spatial delimitation of peri-urban areas does not exist. Different methodological approaches have been proposed, based on physical features, such as distance and population size (OCDE, 1979; Larcher, 1998; Audirac, 1999), population density and size (Bibby and Shepherd, 2004; Piorr et al., 2011), or settlement density (Vizzari, 2011). To achieve a more complete definition of peri-urban areas it is necessary to consider the presence of urban functions in rural landscapes. In this regard, recent studies based on multicriteria analysis and spatial statistical analysis (Murgante and Danese, 2011; Russo et al., 2014; Diti et al., 2015), conducted using GIS methods,

combine morphological and functional information - such as land use, planning classification, landscape fragmentation, production capacity, accessibility, agricultural employment and commuting - in order to define land classification categories and sets of indicators. These approaches are useful for the creation of thematic maps, the assessment of different land use models, and to inform public policies.

Peri-urban agriculture provides a wide range of services to urban areas, beyond food provision, services that are related to cultural identity, recreation, education or the regulation of natural cycles, and that have been quantified and assessed in recent studies (Willemen et al., 2010; Brinkley, 2012; Simón et al., 2014). The public policy approach to multifunctionality in these areas is usually focused on environmental issues that are more likely to be included in planning tools, and perceived as important by local authorities, although social actors also recognise and value other economic and social issues (Vandermeulen et al., 2006; Ives and Kendal, 2013; Marraccini et al., 2013; Olsson et al., 2016).

2.2 Peri-urban agriculture in Spain

Studies focused in the Mediterranean context show that there are social and economic peculiarities in their peri-urban agriculture systems, due to the distinct cultural landscapes, built heritage, diet, land planning traditions or property structure (Jouve and Padilla, 2007; Morán et al., 2015).

The dynamic of peri-urban areas in Spain since 1970 is linked to major landscape transformations and urban sprawl. Among Spanish scholars these processes have been analysed by considering land use changes and spatial planning as the main arguments, although other authors as Gómez Mendoza (1987) overcome this framework in focusing on the potentialities of development of a dynamic and innovative peri-urban agriculture. Land use changes have been analysed in recent years through new techniques and sources of information, which have led researchers to quantify these processes more accurately. Peri-urban agriculture land use transformations and planning regulations have been studied for Andalucía by Perez-Campana (2015), for the metropolitan region of Barcelona by Paül and Tonts (2005) where an urban sprawl process tended to isolate pockets of peri-urban agriculture, and for medium-sized towns by Simón et al. (2014).

Regarding the diversification of peri-urban agriculture, the case of the Baix Llobregat (Barcelona) as an alternative food network was studied by Paül and Mackenzie (2013), while in the peri-urban area of Valencia, Marques-Perez et al. (2014) highlighted social preferences for the functions, goods and services that agriculture provides. An ecosystem services assessment in Spain found that as cultural services related to traditional knowledge decrease in the agricultural areas, those associated with recreational, educational and aesthetic services have increased (Ministry of Agriculture, Food and Environment, 2013). Local and organic food is progressively more valued and short food supply chains have increased its market presence (López, 2016).

Social concern for the future of cultural landscapes and agricultural heritage has resulted in the mobilisation of civil society and the development of processes against urban development (Matarán, 2013). The social demand for short food supply chains, organic food and food sovereignty has encouraged the Public Administrations to provide protection over some peri-urban areas, as Segrelles Serrano (2015) has

pointed out. Governance and management instruments such as the agrarian parks have also been developed (Zazo, 2015), as spaces in which environmental and landscape improvement are linked to services such as direct sales or agritourism (Gaviglio et al., 2014).

3. Materials and methods

In order to address the research questions regarding land transformation, challenges and opportunities of peri-urban agriculture, a land use analysis and identification of emergent initiatives in the case study areas has been conducted. Land use categories have been defined based on public cartographic and photographic sources, and their evolution is presented in a matrix in which changes from one category to another can be identified. Additionally public policies and social initiatives reflecting new urban-rural linkages have been detected through a literature review.

3.1 Land use classification

Historical aerial photography is an important resource when analysing landscape dynamics, useful for understanding how the process of change unfolds, and the amount of land that is occupied. Moreover, if it is carefully observed, this source provides the possibility to identify traditional agricultural landscapes, which are normally good examples of sustainable practices (Antrop, 2005). Aerial images and other public cartographic sources (see Tab. 1) have been used to analyse land use evolution in the case study areas.

Urban land uses have been mapped through photointerpretation databases, and buildings and infrastructures maps. For non-urbanised land, two main sources have been used: the Map of Agrological Classes – that considers the productive capacity of the soil; and the Map of Crops and Agrarian Uses – that reflects the actual use in each year. The relationship between the defined categories, the cartographic bases, and the CORINE Land Cover classes can be seen in Table 2.

Regarding the suitability of soils to support agriculture, the Map of Agrological Classes identifies eight categories, representing the capacity of soils to maintain their productive capacity regarding intensity of use. The eight categories have been grouped into the following four types:

1. I, II and III, systematic soils tilling;
2. IV, occasional soils tilling;
3. V, VI, VII, no arable soils; and
4. VIII, unproductive soils.

Using photointerpretation techniques, the map has been updated to reflect the current land distribution, adding the new impervious soil to class VII.

3.2 Land use changes

Land use change is addressed analysing the loss of agricultural land due to urban development. From the intersection of geographical land use information in the considered years, a matrix is generated, adapted from Naredo and García (2008), in which land use changes from one category to another can be identified. The total surface of each category in the two years analysed can be seen in the row and column totals (see Tab. 3).

3.3 Peri-urban revitalisation opportunity elements

Public policies and social initiatives in the study areas that may indicate a reorientation towards a multifunctional peri-urban agriculture, have been identified through a literature review of planning documents, newspapers, and the internet sites of public and social actors. The initiatives considered are those that fulfill functions referring to the links between the urban population and peri-urban agriculture, such as leisure and recreation activities, social agriculture, short food supply chains, organic farming or landscape management.

4. Case studies

A wide diversity of topographic and climatic conditions can be found in Spain, giving rise to different settlement patterns, agricultural systems and cultural landscapes. Nevertheless, agriculture has lost its importance in an increasingly tertiarised national economy, accounting only for 4.4% of the total employment in the country (National Statistics Institute, 2016). Construction has been the main driving force for the Spanish economy in the last decades, so peri-urban agriculture has been especially pressured, suffering processes of degradation and abandonment in waiting for urban development.

Although urban sprawl and peri-urbanisation processes can be found in almost every Spanish city, rural space still covers the majority of the territory in the country, accounting for 90% of its surface and being home for only 20% of the population (Ministry of Agriculture, Rural and Marine Affairs, 2009). There is high territorial polarisation in terms of population and urbanisation (Serrano, 2015), with urban pressures especially intense on the Mediterranean coastline and the large metropolitan areas, thus significantly affecting peri-urban agrarian spaces (Paul and Tonts, 2005).

Document	Source
Orthophotographs, inter-ministerial flight corresponding to 1973–1986 (approximated scale of flight 1 : 20,000) and 2015 flight (Scale of flight: 1 : 15,000)	National Plan of Aerial Orthophotography (2015)
BTN25 (2015). Buildings and transport infrastructures	National Geographical Institute of Spain (2015)
Urban and Industrial Land Uses Database, applied to the Madrid region	Naredo and García (2008)
Map of Crops and Agrarian Uses. Data obtained in the periods 1975–80 and 1999–2008 (Scale 1 : 25,000).	Spanish Ministry of Agriculture (2008)
Map of Agrological Classes. Elaborated between 1986 and 1994* (Scale 1 : 50,000).	Spanish Ministry of Agriculture (2008)

Tab. 1: Cartographic and photographic sources

Note: *The Map of Agrological Classes has been elaborated at different dates for the different Spanish regions

Land use categories*	Corine Land Cover 06**	Map of crops *** (use and overuse data)
Built-up area		
Urban continuous	Continuous urban fabric	
	Green urban areas	
Urban discontinuous	Discontinuous urban fabric	
	Green urban areas	
Industrial, commercial and leisure	Industrial or commercial units	
	Sport and leisure facilities	
Infrastructures	Road and rail networks	
	Port areas	
	Airports	
Extraction, dump and construction sites	Mineral extraction sites	
	Dump sites	
	Construction sites	
Agriculture		
Dry land farming	Non-irrigated arable land	Dry land farming
Irrigated arable land	Permanently irrigated land	Irrigated arable land
Fruit trees	Fruit trees and berry plantations	Non irrigated fruit trees
		Irrigated fruit trees
Olive groves and vineyards	Vineyards	Non irrigated groves
		Non irrigated vineyards
	Olive groves	Irrigated groves
		Irrigated vineyards
Scrubland		
	Shrub and/or herbaceous vegetation associations	Scrubland
		Dry grassland
Forest		
	Forests	Coniferous
		Broad-leaved forest

Tab. 2: Land use categories relationship with CLC06 and Spanish Map of Crops

Sources: *defined by the authors; **European Environmental Agency; ***Spanish Ministry of Agriculture

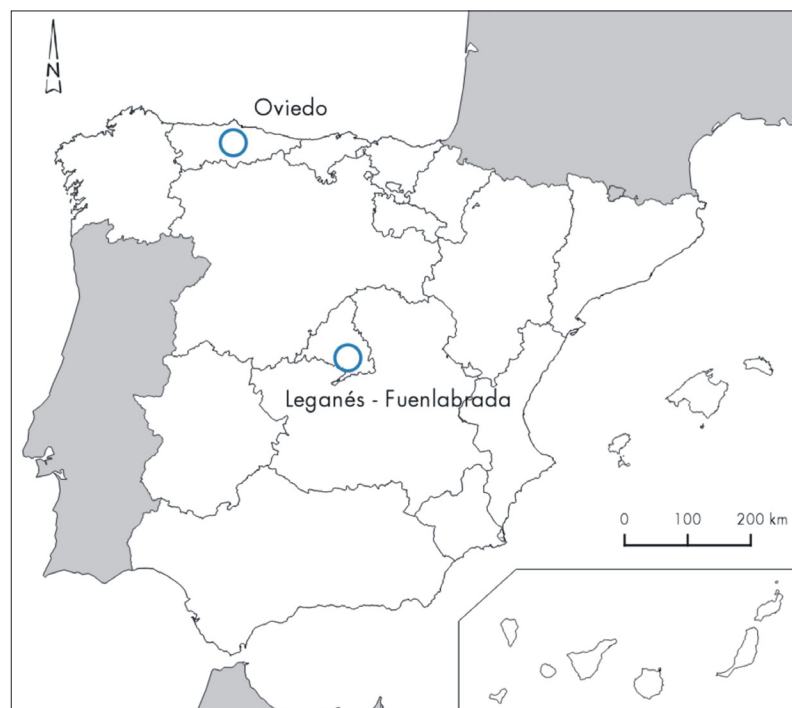


Fig. 1: Location of case studies. Source: authors' compilation

	Built-up area	Urban continuous	Urban discontinuous	Industrial or commercial	Inf. & indirect urban uses	Agriculture	Dry land farming	Permanently irrigated	Fruit trees	Olive groves and vineyards	Scrubland-Pasture	Forestry	TOTAL 2015
Built-up area													
Urban continuous													
Urban discontinuous													
Industrial or commercial													
Inf. & indirect urban uses													
Agriculture													
Dryland farming													
Permanently irrigated													
Fruit trees													
Olive groves and vineyards													
Scrubland-Pasture													
Forestry													
TOTAL 1980													

Tab. 3: Land use change matrix
Source: Adapted from Naredo and Garcia (2008)

The cities analysed, Madrid and Oviedo (Fig. 1), are located in two regions in which agricultural activities have experienced a long process of de-intensification and abandonment, beginning with industrialisation and urban development in the last decades of the twentieth century. The relevance of these cities lies in their functional centrality at a regional scale, and the marginal share of agriculture in their economies. Analysing land use changes, the remaining surface of agricultural land and the new uses that these areas are supporting, is necessary for developing innovative planning approaches.

The two cases exhibit different climatic and geographical conditions, thus the traditional farming systems are quite different. The peri-urban space in the Madrid area is predominantly occupied by dry land farming aimed at commercial grain production (irrigated arable land, olive groves and vineyards can also be found). In the Asturian area, irrigated arable land forms the greatest portion of the agricultural space, including herbaceous crops, horticultural part-time farming and fruit crops; olive groves or vineyards are not present in this region. In addition, the two regions have distinctive traditional settlement patterns: a polycentric structure of compact cities in Madrid, typical of the central plateau, and a dispersed urbanisation pattern in Oviedo, specific to the Atlantic Arc in northern Spain.

4.1 Delimitation of the peri-urban space in the case study areas

The following criteria have been applied in order to delimit the peri-urban space:

- Population density: more than 100 inhabitants per km² (according to census section data);
- Urbanisation density: more than 0.4 km² urbanised over 1 km² surface (GIS neighbourhood analysis: 10 metres raster resolution and 5 km radius);
- Topography: changes of slope; and
- Boundaries perception: natural and artificial barriers.

The southern metropolitan area of Madrid covers a wide territory of flat topography with a high population and urbanisation density. In order to narrow the case study delimitation, functional and perceptual criteria have been used, and a representative section of 115 km² has been selected that does not correspond to administrative limits, but comprises the wedge delimited by two main radial highways. It is a functional area articulated by the road connecting the cities of Leganés and Fuenlabrada, and includes land belonging to four municipalities and its corresponding urban centres (Leganés, Fuenlabrada, Humanes and Moraleja de Enmedio).

For the case study area of Oviedo, the peri-urban area of 104 km² was defined according to physical and perceptual borders, but also taking into account their functionality. It covers part of the municipalities of Oviedo, Siero, Llanera and Noreña. As a basin, it is easy to delimit the area in which slopes increase, as the mountain chains act both as a physical and perceptual barrier. There is a prevalence of elements of the traditional landscape such as meadows, farmhouses, rural roads, place names or auxiliary buildings like Hórreos (a granary built in wood, raised from the ground by pillars, a typical element of the rural landscape in northwest regions of Spain).

4.2 Southern Madrid metropolitan area

Madrid, the capital city of Spain, is located in the centre of the country. The administrative region has a diversified topography, from the western and northern mountains to the south-eastern river basins. The city is located in the central plain. Urban development has sprawled over the more topographically appropriate areas, forming two axes of lineal development along the floodplains of the rivers Henares (eastwards) and Guadarrama (north-westwards), and a dense polycentric southern development, in a grid pattern along the plain, which is the area on which the present analysis is focused.

The study area is located in a Tertiary basin with a flat topography (less than 3% of land slope), constituted by gypsum, sand and clay soils. Regarding climatic conditions, the average annual temperature is 15 °C, and precipitation ranges from 400 to 500 mm, with 2,800 sunshine hours and 60% relative humidity.

Although land quality is not very high, the availability of water from the tributaries of the river Manzanares, and especially from groundwater, has made this area an historical space of food supply for Madrid. There has never been a continuous irrigated agrosystem of horticultural cultivation, however, but an atomised land ownership structure characterised by small plots (0.5 to 5 ha), and a mosaic pattern of vegetable and grain production. These small farms have a low profit margin, and have gradually specialised in monocultures of chards or cabbages (Mata Olmo and Yacamán, 2015).

Due to migration processes during the 1970s and 1980s, the former agricultural villages became industrial cities, causing a 22-fold increase in population between 1960 and 1981 (Community of Madrid Statistics Institute, 2015). A major shift has occurred in the 21st century due to the tertiarisation of the economy linked to city region development. Although industry still accounts for 20% of the total employment in the area (compared to only 7% in the entire Madrid region), services are the main economic sector (70% of employment), and agriculture represents less than 1% (Community of Madrid Statistics Institute, 2015b).

The rupture of rural-urban linkages that occurred in the 1980s was due to a deep cultural shift, affecting not only consumer behaviours (diet and purchase options) but also employment and farm orientation (de-intensification, lack of labour, low agricultural income, industry and construction development). As a consequence, there was a massive sale of agricultural land, intended for urban development or ownership concentration, and also a loss of diversity in crops and in processes of commercialisation (Morán, 2015).

4.3 Oviedo metropolitan area

Oviedo, the capital city of the autonomous region of Asturias, is located in the north of Spain (approximately 43.4 °N, 5.8 °W). The study area is located in a Mesozoic and Tertiary basin with a moderate topography. The lithology is dominated by clay and limestone. The climate is represented as an annual average temperature around 12.5 °C, total precipitation is 960 mm, 1,756 sunshine hours and 78% relative humidity. The industrialisation of the region in the 1970s led to an increment in population due to migration processes, so since the 1950s the population has doubled. At present, about 300,000 inhabitants live in the Oviedo basin. In Asturias, the tertiary sector accounts for 75% of

total employment, whereas employment in the agricultural sector is about 4% (Asturian Society of Economic and Industrial Studies, 2015).

The Oviedo peri-urban area is characterised by its flat topography and mixed land uses which shape a diffused landscape. In this area, the largest extent of flat surfaces within the Asturias region can be found, i.e. the slopes under 3% total over 100 km². As a result, the area studied has a fragmented landscape, such that agriculture is limited to isolated areas (Fernández, 1998). Two rivers flow through the study area, both of which are natural corridors where peri-urban agriculture was traditionally carried out.

Agriculture is currently reduced to isolated areas on the margins of middle-sized-towns and parallel to linear features such as rivers, roads, railways and highways. Part-time farming and fruit crops are the main types of agriculture, associated mainly with private initiative and small orchards for self-consumption. Fruit cultivation has a long tradition in Asturias, especially apple trees, *pumaradas*. The spatial impact of market-oriented farming is low.

A key element of the cultural landscape is the so-called *Ería*, a closed set of plots dedicated to cereal and vegetables crops, in long and narrow parcels. They are located in flat areas – alluvial plains, meanders and riverbanks – and managed as traditional commons, with private exploitation of the plots but collective decision making about harvest dates, crop rotations or entry of cattle. This type of farming is strongly related to the land ownership structure, only 4% of the plots in the area studied are over 1 ha according to the General Direction of Cadastre of Spain (Ministry of Economy and Finance, 2016).

5. Results

5.1 Peri-urban agriculture in the Southern Madrid metropolitan area

5.1.1 Land use changes in the Southern Madrid metropolitan area

According to the Agrological Classes Map, all the non-urbanised soils in the area are suitable for cultivation, corresponding to a medium quality land (III class). Taking into consideration that there are no class I soils in the Madrid region, and that the class II soils can only be found in the wide river basins in the southeast, conditions in the study area can be seen as 'normal' for the metropolitan space of Madrid. While in the 1980s artificial land covered only a sixth part of the area, it has tripled its surface in the period, such that in 2015 fully one half of the area was urbanised (Fig. 2 and Tab. 4).

Class	1986 km ²	2015 km ²
VIII	18.55	59.93
VII	0.00	0.00
VI	0.00	0.00
V	0.00	0.00
IV	0.00	0.00
III	96.87	55.49
II	0.00	0.00
Total	115.42	115.42

Tab. 4: Surface evolution of agrological classes in Southern Madrid. Source: authors' calculations

Regarding urban and agricultural land use changes, several dynamics can be identified in the peri-urban space, either related to urban pressures or to internal changes in agricultural uses. The 1980 land cover map (Fig. 3) shows a tendency to urban sprawl, mainly due to industrial developments located along the main roads, as well as to dump and extraction sites concentrated near Madrid and the intersecting irrigated areas in the north of the area. Nevertheless, the cities still presented a compact pattern, and irrigated agriculture occupied considerable extensions around the cities and a continuous space of dry-land farming could be found all over the area.

Between 1980 and 2015 there has been intense urban development. While the urban fabric, including residential, industrial and commercial areas, has tripled its total surface, the transport infrastructures surface has had an 8-fold increase, due to the construction of consecutive bypasses and radial roads around Madrid (M-40, M-50 and R5 highways go through this area). The urbanisation dynamic has been paralysed by the current economic crisis, leaving a surface of 9 km² of sites in which urbanisation remains incomplete.

As can be seen in Table 5, in the period analysed agricultural land has lost almost half its surface (42%), due

mostly to urban land occupation. In quantitative terms, the greater loss has occurred in dry land farming (33 km² have been urbanised), which was the majority of the agricultural land, but it must be emphasised that almost one third of irrigated land has been lost, which is a worrying percentage considering the relatively small surface of this kind of land in the area.

Permanent irrigated land has been affected by urban pressure in two ways. Firstly, four square km have been lost because of industrial and residential developments, both continuous urban fabric and discontinuous residential areas. Secondly, almost the same surface (3 km²) has suffered a loss in crop productive intensity, changing from fruit and vegetables production to arable crops.

There has also been a noteworthy trend in agricultural land abandonment and degradation. These processes have been identified as affecting previously cultivated land that is currently occupied by less demanding crops and non-urban uses. In this way, 2 km² of no longer cultivated dry land farming spaces have been detected, surrounding the urban continuum. But this dynamic is especially significant in irrigated areas, where 3.3 km² are now occupied by dryland farming, scrublands or pastures – this is almost the same surface that is cultivated.

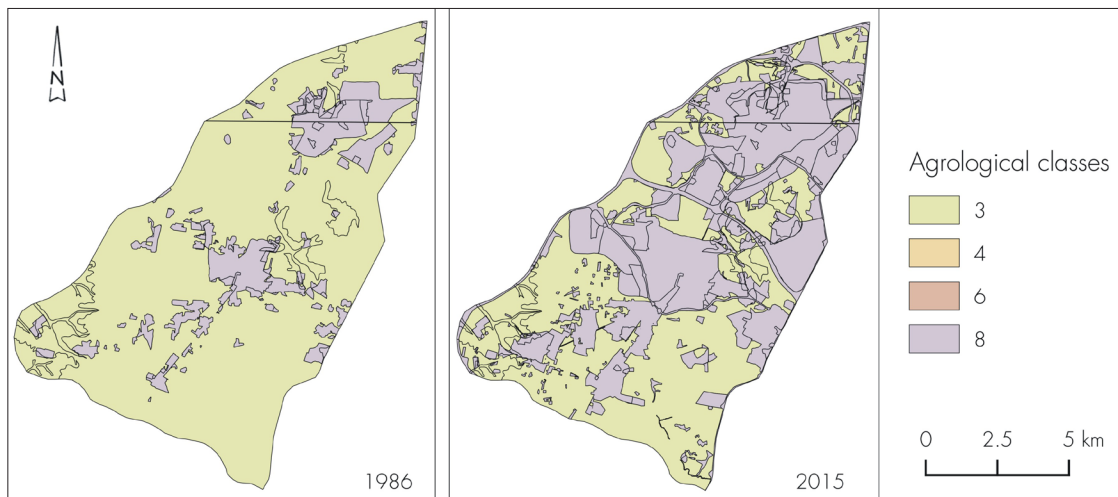


Fig. 2: Agrolological classes dynamic from 1986 to 2015 in the Southern Madrid metropolitan area
Source: Agrolological Classes Map (1992)

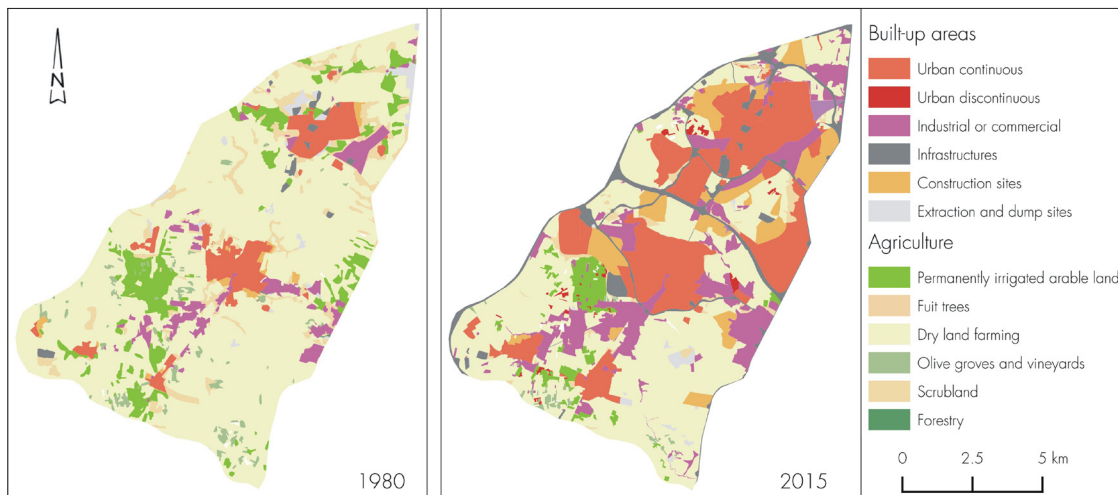


Fig. 3: Land uses in 1980 and 2015 in the Southern Madrid metropolitan area. Sources: elaborated by the authors from Naredo and García (2008), PNOA and BTN25, IGN (2015)

	<i>Built-up area</i>	Urban continuous	Industrial or commercial	Inf. & indirect urban uses	<i>Agriculture</i>	Dry land farming	Permanently irrigated	Fruit trees	Olive groves and vineyards	<i>Scrubland-Pasture</i>	<i>Forestry</i>	TOTAL 2015
<i>Built-up area</i>	16.11	7.71	5.15	3.25	38.13	33.36	3.98	0.05	0.73	5.62	0.03	59.88
Urban continuous	9.11	7.67	0.01	1.43	14.37	12.34	1.74	0.02	0.27	2.86	0.01	26.36
Urban discontinuous	0.02	0.00	0.00	0.02	0.69	0.46	0.20	0.01	0.02	0.06	0.00	0.77
Industrial or commercial	5.83	0.00	5.09	0.74	8.27	7.17	0.89	0.01	0.20	1.33	0.02	15.45
Inf. & indirect urban uses	1.15	0.04	0.05	1.06	14.79	13.39	1.15	0.02	0.24	1.37	0.00	17.31
<i>Agriculture</i>	0.27	0.00	0.10	0.18	51.21	44.44	5.38	0.01	1.38	1.68	0.00	53.16
Dryland farming	0.27	0.00	0.10	0.18	46.98	42.79	3.07	0.01	1.11	1.65	0.00	48.90
Permanently irrigated	0.00	0.00	0.00	0.00	3.63	1.28	2.25	0.00	0.10	0.03	0.00	3.66
Fruit trees	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.04
Olive groves and vineyards	0.00	0.00	0.00	0.00	0.56	0.33	0.06	0.00	0.17	0.00	0.00	0.56
<i>Scrubland-Pasture</i>	0.08	0.03	0.02	0.03	1.81	1.60	0.17	0.00	0.03	0.41	0.00	2.30
<i>Forestry</i>	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.02	0.00	0.05
TOTAL 1980	16.46	7.74	5.27	3.45	91.17	79.42	9.54	0.07	2.15	7.73	0.03	115.39

Tab. 5: Land use changes 1980–2015 in the Southern Madrid metropolitan area (km²)

Source: authors' calculations

5.1.2 Peri-urban agriculture revitalisation opportunities in the Southern Madrid metropolitan area

Almost one half of the area surface is still agricultural land; in addition, an important amount of land intended for urban development but not yet urbanised has been identified, land which could be recovered for agriculture. In order to define a successful policy for the preservation of these areas, a change in their cultural signification should be achieved.

Some public policies are already addressing the revitalisation of peri-urban agriculture by linking it with the city. In 2012, an 8 km² Agrarian Park was defined by the municipality of Fuenlabrada: its Management and Development Plan was approved in 2013, setting out actions related to infrastructure improvement, farmer training, and short food supply chains (Yacamán and Zazo, 2015). A range of tools is being applied, such as a quality label for fresh and local products cultivated and processed in the park, or short food supply chains through monthly farmer's markets, direct sale points within the city, and a map of local shops and restaurants that sell local food¹. Social economy food enterprises are also settled in the park, processing organic preserves². Alliances with other cities are being developed. Particularly relevant is the case of Madrid: the city capital signed the Milan Urban Food Policy Pact in 2015 and from 2016 is holding farmer's markets for the first time, in which farmers from the Fuenlabrada park and other agrarian spaces in the region sell their products.

Fuenlabrada also joined the Milan Urban Food Policy Pact in 2016, which can be considered an opportunity for developing innovative policies related to food access, social inclusion, and relocalisation of the food chain, although clear results have yet to be identified.

Regarding leisure, education and social activities, different types of vegetable gardens can be found in the area. There are municipal allotment gardens in the larger cities (Fuenlabrada and Leganés), some of them organised for the unemployed and retired population and others open to anyone interested in growing food; all of them are located in green and open spaces within the urban fabric. Private organic garden sites can be found in the peri-urban space, where plots are rented (Fig. 4). These emerging initiatives are too recent to be proven changes, so their impact on land preservation, changes in crops and agrarian uses and on the economic diversification of peri-urban agriculture is not known, but they can be highlighted as promising elements for the revitalisation of the area.

5.2 Peri-urban agriculture in the Oviedo metropolitan area

5.2.1 Land use changes in the Oviedo metropolitan area

Most of the soils in the peri-urban area of Oviedo are arable. The first class is not present in the analysed area, but classes II and III are considered highly suitable for agriculture, as possible crops in this area: cereals, legumes,

¹ Website of the Fuenlabrada Agrarian Park: <https://parqueagrariofuenlabrada.es/>

² Driadas is a women social enterprise that makes organic preserves from local crops. <http://proyectodriadas.blogspot.com.es/>

root vegetables, forage crops, vegetables and fruits. In 1992 these classes covered 57% of area, by contrast in 2015 they occupied about 46%. The decrease is strongly related to the development of built-up areas, as the difference in coverage in class VIII in the period analysed shows a 15% increase (Fig. 5 and Tab. 6).

Focusing on land uses, Table 7 summarises the transformation processes that occurred from 1970 to 2015. In 1970 the area was characterised by a clear distinction between urban and rural landscapes with strong presence of agricultural activities (Fig. 6). The industry was located near commodities and commercial functions were exclusively urban. By then the area was awaiting a collapse of the historic landscape construction model, since the new regional highway and the first industrial parks were built.

Class	1986 km ²	2015 km ²
VIII	23.47	39.54
VII	4.89	4.84
VI	6.22	5.41
V	1.15	1.07
IV	9.57	5.64
III	35.25	30.9
II	23.45	16.6
Total	104.00	104.00

Tab. 6: Surface evolution of agrological classes in Oviedo. Source: authors' calculations (Note: percentages rounded)

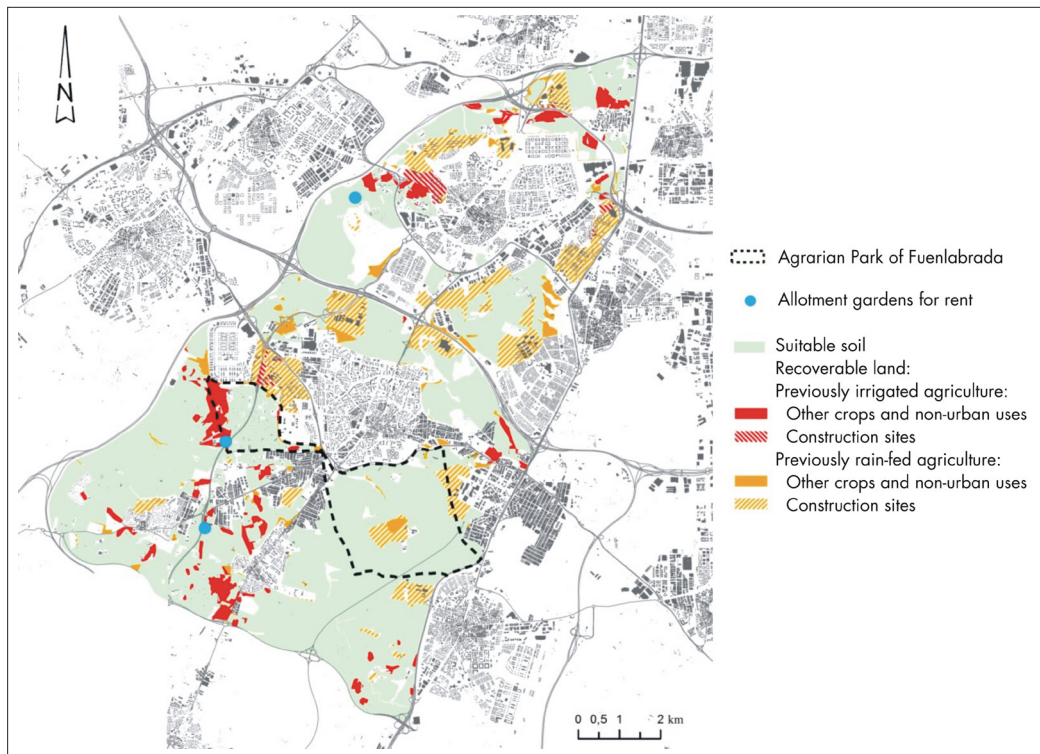


Fig. 4: Suitable soil for agriculture and new agricultural peri-urban uses in the Southern Madrid metropolitan area, 2015. Sources: elaborated by the authors from Naredo and García (2008), PNOA and BTN25, IGN (2015), Fuenlabrada Agrarian Park (2016)

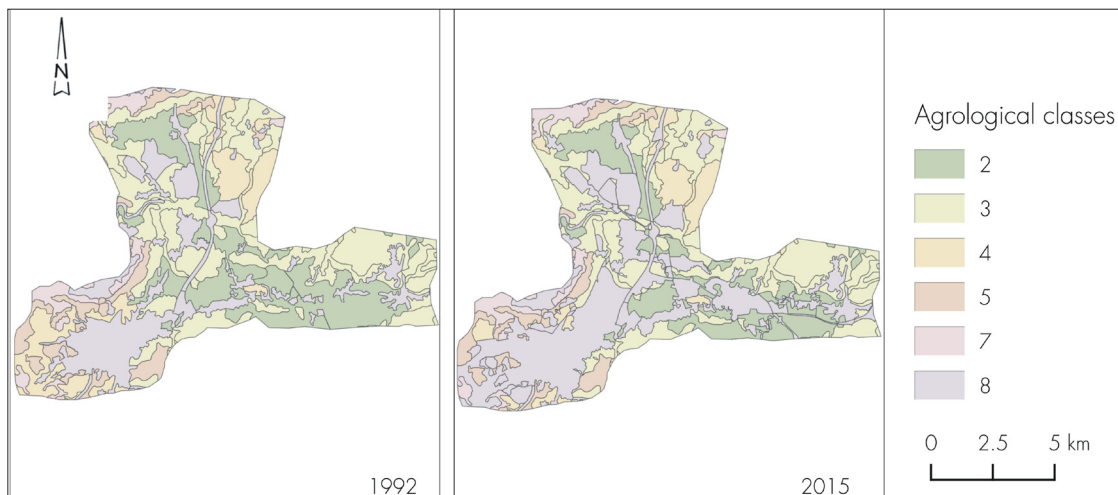


Fig. 5: Agrological classes dynamic from 1992 to 2015 in Oviedo Source: Agrological Classes Map (1992)

Between 1970 and 2015 there has been an intense urban development, built-up areas have increased from 9.7km² to 25.5 km². Industrial and commercial land uses have experienced more than a 6-fold increase, located mostly in former arable lands in the dynamic of urban sprawl. In this period, agricultural land has lost 10 km² and fruit trees diminished by 75%, so 2.1 km² of *pumaradas* have been replaced by other agrarian uses. The consumption of soils of the permanently irrigated areas is due mainly to the urbanisation process: the increment of the continuous urban fabric represents the replacement of 1.63 km², whereas the discontinuous sums up 2.8 km², evidencing residential dispersion processes.

The main reasons for soil consumption are urban sprawl process, ineffective planning instruments and the development of new infrastructure. In 1976, the highway which links the cities of the Asturian central area was inaugurated. Since that point in time, it is commonly accepted that the process of urban sprawl began (Fernández, 2003; 2007). The residential function is traditionally dispersed in the north of Spain. In recent decades, however, the low-density housing model has gained importance (Herrán Alonso, 2002). This process was carried out, on the one hand, by the densification of rural villages with new types of buildings and new inhabitants and, on the other hand, by the spread of small residential developments to the suburbs.

	Built-up area	Urban continuous	Urban discontinuous	Industrial or commercial	Agriculture	Permanently irrigated	Fruit trees	Scrubland-Pasture	Forestry	TOTAL 2015
Built-up area	4.54	3.61	0.41	0.53	20.66	20.37	0.30	0.00	0.29	25.49
Urban continuous	4.12	3.61	0.28	0.23	8.84	8.76	0.08	0.00	0.17	13.13
Urban discontinuous	0.09	0.00	0.09	0.00	4.39	4.26	0.13	0.00	0.06	4.54
Industrial or commercial	0.31	0.00	0.01	0.30	6.21	6.12	0.09	0.00	0.05	6.57
Infrastructures	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	5.07	1.63	2.81	0.64	56.33	53.86	2.47	0.09	9.91	71.40
Permanently irrigated	5.07	1.63	2.80	0.64	55.65	53.40	2.25	0.09	9.90	70.72
Fruit trees	0.00	0.00	0.00	0.00	0.68	0.47	0.22	0.00	0.00	0.69
Scrubland-Pasture	0.00	0.00	0.00	0.00	1.39	1.39	0.00	0.00	0.28	1.67
Forestry	0.05	0.00	0.00	0.05	2.88	2.86	0.02	0.00	2.48	5.42
TOTAL 1970	9.67	5.24	3.22	1.22	81.27	78.48	2.79	0.09	12.95	103.99

Tab. 7: Land uses changes 1970–2015 in Oviedo (km²)
Source: authors' calculations

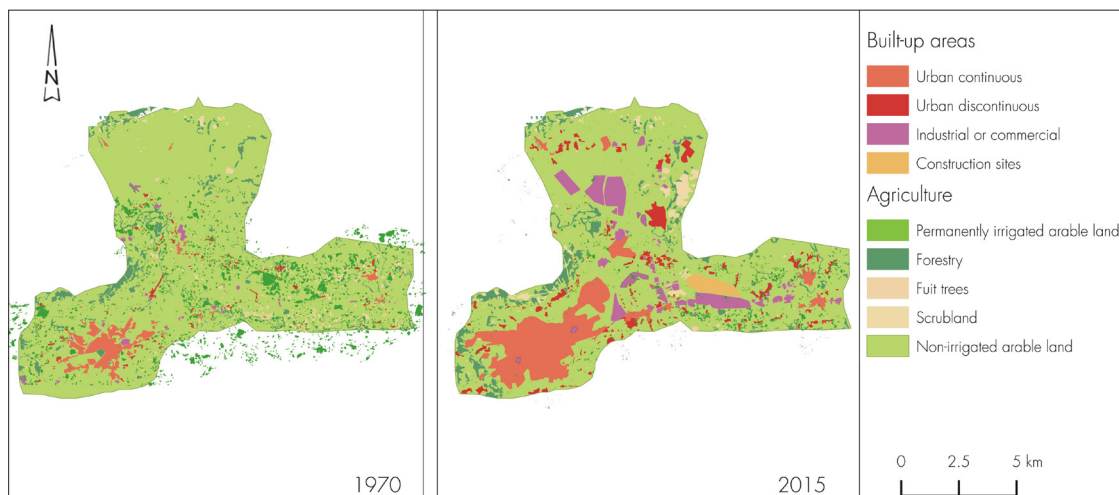


Fig. 6: Land uses in 1970 and 2015 in Oviedo
Sources: elaborated by the authors from PNOA and BTN25, IGN (2015)

Since 1980, various initiatives have promoted the construction of peri-urban industrial areas (Fernández, 1997). Nevertheless, the dispersion of industries, above all along the road which leads to the East, constitutes further evidence of the ineffectiveness of planning policies. A concrete example of these practices is located in Bobes, where an Ería was totally removed to build an industrial park. As a consequence of the lack of financial funds, the project is currently stopped. Other functions such as commerce had a great impact at the regional scale. Two malls are located outside the city of Oviedo; one of them was built in 1977, the Pryca/Carrefour was linked to the highway. In 2001 a new mall was inaugurated near a highway junction; Parque Principado / Intu Asturias, a strategic place for which isochrones show that the maximum area of Asturias is covered from this location.

5.2.2 Peri-urban agriculture revitalisation opportunities in the Oviedo metropolitan area

The area identified as suitable for peri-urban agriculture covers 47 km², most of it located in agrological classes II and III, mainly along riverbanks, meanders and pockets of soils which surround both rural and urban settlements (Fig. 7).

At the regional level some actions were implemented with the financial support of European funds, such as the Leader programme, which stimulated the creation of Local Action Groups. These groups fund diversification projects such as those of red fruits, modern apple orchards or greenhouses. The Strategy for Competitiveness of Primary Sector and Economic Development of Rural Environments in Asturias contemplates actions for peri-urban agriculture. At the municipal level there has been an increasing social demand for urban agriculture facilities and this encouraged public administrations to provide solutions such as community gardens. The Oviedo municipality has approved a new regulation on urban agriculture and 155 urban gardens in three different peri-urban locations have been built. More might be expected in the future since there are waiting lists.

Private stakeholders and non-governmental organisations have built their own peri-urban farms: some of them are initiatives to rent allotment gardens, others concern actions to promote social cohesion such as the integration of unemployed migrants through farming. Some grassroots movements have developed community-supported agriculture schemes

based on short food supply chains linking local producers and urban demands, an example of which can be found in the self-managed social centres and the rural network Red Campesina de Asturias, among others.

5.3 A comparison of peri-urban agriculture in the Southern Madrid and Oviedo metropolitan areas

The preceding descriptive accounts of peri-urban agriculture in the two case study areas can now be compared statistically: the principal concern is with the aggregated categories of built-up area (BUA), agriculture (A), scrub-pasture (S-P) and forests (F); indicated as BUA_M for Madrid, BUA_O for Oviedo, ... etc.; and changes in their land use composition over the two time periods (Time M_O: 1980–2015 for Madrid; 1970–2015 for Oviedo).

A contingency analysis is used for this purpose. Table 8 shows the results of this (three-way) cross-tabulation, with the significant differences in specific categories indicated by numbers in bold.

The association reported in this table is statistically significant (CHI-square = 49.32, df = 7, p < 0.0001). Clearly, as highlighted in the table, the expected proportions of built-up areas for both Madrid and Oviedo (BUA_M [7.7 to 27.1%] vs. BUA_O [4.5 to 11.8%]) are much greater than expected from their marginal proportions over their respective time periods, indicated as significantly different column proportions using the Z-statistic in SPSS).

Importantly, however, the proportions of agricultural areas do not differ significantly: for A_M: 41.2 to 24.0% is seen as significant, but for Oviedo the difference from 36.7 to 32.1% is not significant. A plausible inference in this case is that the rates of conversion of peri-urban land from agricultural purposes to urban land uses is much greater in Madrid than in Oviedo – the processes are likely quite similar, but the rate of change is remarkably different. The remaining proportions of scrub-pasture and forest are largely insignificant in this larger scenario. The changes in proportionate terms are presented in Figure 8.

6. Discussion

Although biophysical conditions in both areas have caused distinct cultural landscapes and urban settlement patterns in the past, urbanisation processes in the last decades have followed the same path, based on the layout of



Fig. 7: Suitable soils for agricultural functions in the peri-urban area of Oviedo, 2015
Source: elaborated by the authors from PNOA and BTN25, IGN (2015)

		Time M_O			
		1980/1970	2015	Total	
Land use group M_O	BUA_M	Count	17a	60b	77
		Expected Count	38.5	38.5	77.0
		% within Time_M_O	7.7	27.1	17.4
	A_M	Count	91a	53b	144
		Expected Count	72.0	72.0	144.0
		% within Time_M_O	41.2	24.0	32.6
	S-P_M	Count	8a	2a	10
		Expected Count	5.0	5.0	10.0
		% within Time_M_O	3.6%	0.9%	2.3%
	F_M	Count	0a	1a	1
		Expected Count	.5	.5	1.0
		% within time_M_O	0.0%	0.5%	0.2%
	BUA_O	Count	10a	26b	36
		Expected Count	18.0	18.0	36.0
		% within Time_M_O	4.5	11.8	8.1
	A_O	Count	81a	71a	152
		Expected Count	76.0	76.0	152.0
		% within Time_M_O	36.7	32.1	34.4
	S-P_O	Count	1a	2a	3
		Expected Count	1.5	1.5	3.0
		% within Time_M_O	0.5	0.9	0.7
	F_O	Count	13a	6a	19
		Expected Count	9.5	9.5	19.0
		% within Time_M_O	5.9	2.7	4.3
	Total	Count	221	221	442
		Expected Count	221.0	221.0	442.0
		% within Time_M_O	100	100	100

Tab. 8: Contingency matrix for (land use_area × time) for Southern Madrid vs. Oviedo. Source: calculated by authors
Note: Each subscript letter denotes a subset of Time M_O categories whose column proportions do not differ significantly from each other at the 0.05 level

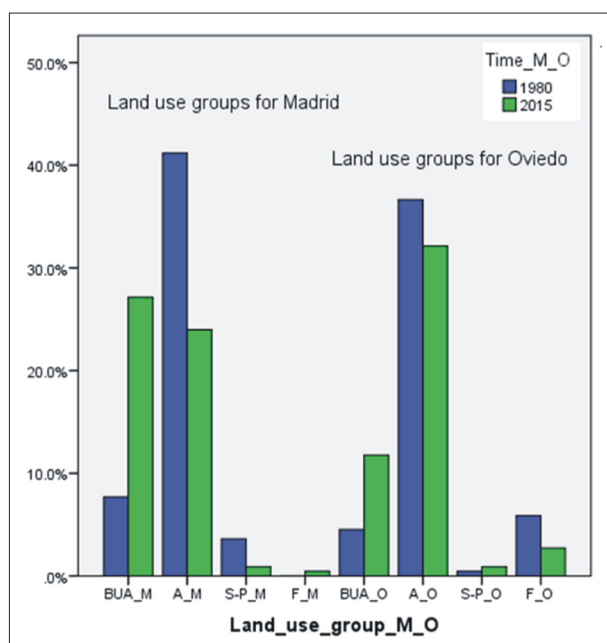


Fig. 8: Changes of land use in Oviedo and Madrid in proportionate terms. Source: calculated by authors

infrastructures over valleys and plains, and the expansion of urban sprawl, resulting in a similar mosaic of land uses, and standardising the territorial model, affecting both the agricultural systems and the urban development pattern.

In the period analysed the built-up area has increased practically fourfold in both cases. In terms of land quality, none of the peri-urban spaces have land of the highest quality, but there is a similar percentage of land suitable for agriculture, occupying nearly half of their total surface. The agricultural area at the beginning of the periods analysed was almost the same (around 90 km²), although the distribution of crops was very different.

As can be noticed in Table 8 peri-urban agricultural land transformation has been due to urban occupation – including residential, industrial and commercial uses, as well as transport infrastructures. There's also a remarkable trend of loss in productive intensity, changing from human food crops, as vegetables and especially fruit trees, to less demanding agricultural uses, as arable crops and, in the most extreme cases, resulting in processes of land abandonment and degradation. These trends are similar to those occurring in peri-urban agricultural spaces within Europe and specifically in other Spanish regions (Nilsson et al, 2013; Simón et al, 2014); although regarding

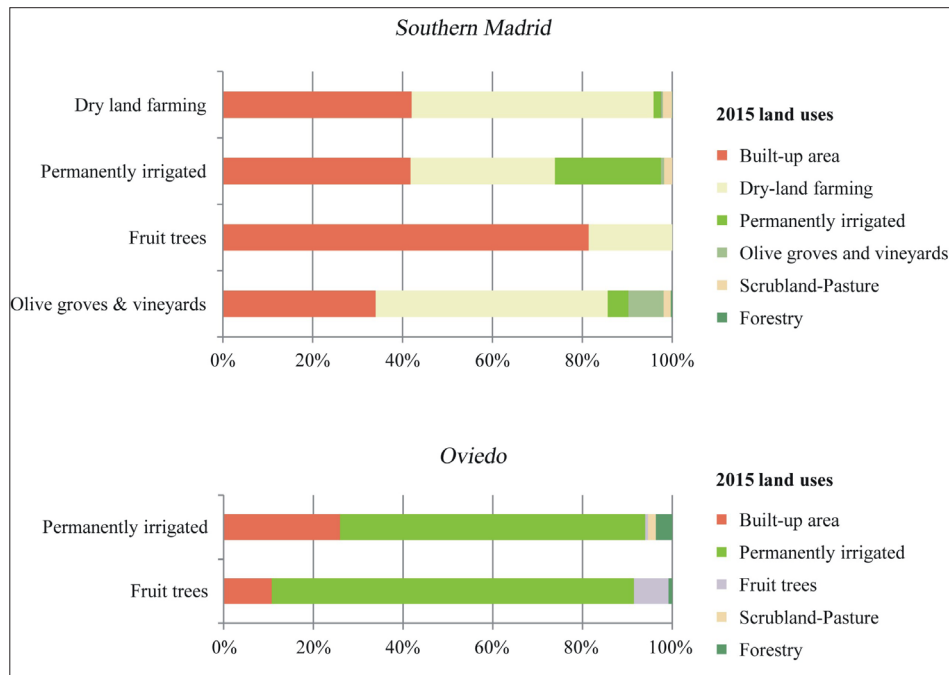


Fig. 9: Percentage of land uses occupying by previously agricultural land
Source: elaborated by the authors

deintensification, it is interesting to note that some high quality agricultural spaces, as those in Andalusia studied by Pérez Campana (2015), are experiencing an intensive agriculture development, even occupying previously non-irrigated areas, which might indicate a large scale territorial specialisation process. Considering the national scale in terms of employment, surface and quality of agricultural land, the peri-urban spaces studied might not seem to have a significant value. Nevertheless, the interest in its preservation and regeneration arises from a systemic approach to the functions these areas can fulfil, and the strategic role they can play in the context of environmental and social crisis, avoiding defensive localisms, and planning from a deep understanding of the ecological capacity of the areas, their historical uses and the current situation.

Important challenges and constraints for revitalisation have been found: firstly, land planning does not integrate the social and ecological potentialities of peri-urban agriculture, although new tools as Agrarian Parks are being explored there is not a solid regulative framework that allows for the preservation and revitalisation of peri-urban agriculture; and secondly, wider participation from economic and social actors is needed, as has been noted by other authors (Fanfani, 2013; Zazo, 2015). As urbanisation processes have spread over administrative borders, peri-urban areas should also be addressed from a supra-municipal scale: its hybrid nature between rural and urban also makes necessary an inter-sectoral coordination, in which spatial, agricultural, economic and environmental planning meet. Although municipal policies are useful and cannot be neglected, cross-scale coordination is required in order to establish common strategies and actions.

On the other hand, an economic planning orientation in metropolitan areas lacks recognition of the primary sector as a suitable way of encouraging development. Despite being traditionally an agricultural country, neither agricultural activity nor spaces have been socially valued in Spain, especially within urban contexts, in which better paid jobs can be found and more profitable uses can be located.

In terms of spatial planning, an opportunity arises in redesigning the urban fringe, and defining a more accurate transition between urban and rural spaces. Understanding these territories as biophysical systems opens up the possibility of developing green infrastructures including agricultural land, which can act as urban growth limits and ecological networks, through green rings and corridors.

Several emerging processes have been detected that may indicate a resignification of (peri-urban) agriculture, as urban population demands for goods and services provided by these areas, and farming diversification, especially regarding food supply and leisure, which is consistent with the findings from Zasada (2011), although the environmental dimension defined by the author is weak in the case studies. Another potentiality can be noted in innovative urban and rural policies, such as those developed in the framework of the Milan Urban Food Policy Pact, and in the Regional Agricultural Policies that are beginning to attend to urban-rural linkages, short food supply chains and peri-urban areas. Consequently peri-urban agriculture, despite the declining processes described above, shows a potential for regeneration.

7. Conclusions

As has been demonstrated in these case studies, peri-urbanisation is a dynamic that acts in a similar way over different regions and cultural landscapes, standardising urban settlement patterns through urban sprawl and the proliferation of infrastructures, which causes fragmentation of agricultural spaces. This contributes to the degradation of cultural landscapes, and to the loss of traditional crops and cultivation systems.

The preservation and regeneration of peri-urban agriculture has not been a priority in spatial planning or other urban and sectoral policies. Nevertheless, these areas are strategic resources, even in countries with a large agricultural surface in rural areas, as in Spain, because they might serve a wide range of ecological and social functions.

Knowing the history and evolution of these areas is one of the key factors in order to design effective policies based on local resources and identity, instead of implementing deterritorialised models of development. The methodology proposed in this paper is a useful tool for supporting planning and public policies adapted to the local contexts and taking advantage of the distinctive characteristics of the territories. Through it, a better understanding of land use changes at a local scale is achieved, the more suitable land for agriculture is identified, as well as the traditional uses carried out in it.

The analysis conducted in the selected cases has identified areas to recover, preserve and regenerate, as a first approach to the characterisation of peri-urban areas. Further development of the methodology could include other information (for example, land tenure, legal status, water resources) in order to propose detailed uses and activities for particular areas.

In order to define a successful policy for the preservation of peri-urban agriculture, a shift in its cultural signification should also be addressed: the public policies and social initiatives identified in the case studies can serve as inspiring examples that show ways of strengthening the links between urban and peri-urban spaces, enhancing their social valuation.

Learning from the landscapes of the past, leads us to assess the soil potential in order to create new peri-urban agriculture facilities at a regional scale, like riverbanks corridors, green belts or land pockets. Therefore, urban agriculture constitutes an opportunity to develop regional sustainable planning based on traditional landscapes, an extraordinary source of knowledge and collective learning about sustainable land use management.

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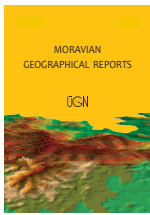
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SCIENTIFIC COMMUNICATION

Exploring urban agriculture as a component of multifunctional green infrastructure: Application of figure-ground plans as a spatial analysis tool

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Abstract

Using 'Urban Atlas' as a data source, the authors present and critically discuss in this paper the application of figure-ground plans in combination with complex land-use maps as a tool for spatial analysis of urban agriculture in European cities and their multifunctional green infrastructure. The selected cities and metropolitan areas (including Dublin, Ruhr Metropolis, Geneva and Sofia) represent different regions in Europe from the Northwest to the Southeast. Urban fabric, agriculture and non-agricultural open spaces have been analysed and compared as the main land-use components. Agricultural open spaces include arable land with annual crops and permanent crops, such as vineyards, fruit trees and olive groves; pastures; as well as complex and mixed cultivation patterns. The results reveal the scale and land-use diversity of metropolitan regions and different spatial patterns of urban agriculture at the regional level and in central urban areas.

Keywords: Urban agriculture; figure-ground plans; spatial analysis; green infrastructure

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1. Introduction

Green infrastructure of European cities includes productive agricultural landscapes, such as agricultural parks, allotment gardens, productive greenbelts or other forms of urban agriculture. These characterise Europe's cities and agglomerations (Lohrberg and Simon-Rojo, 2016) and significantly co-create contemporary European urban landscapes, while forming novel urban design models (Timpe, 2016).

In this paper, the scale, diversity and specifics of urban agricultural landscapes in selected European cities are mapped and analysed, while considering functional and systematic linkages between the concepts of green infrastructure and urban agriculture. A methodological aim of the paper is to contribute to the existing geographical research by new inspiration in the form of figure-ground plans or figure-ground analysis, which is a widely used analytical tool in landscape architecture and landscape planning. This article relies on the empirical basis of maps

created from the dataset of the 'Urban Atlas 2012' of the European Environment Agency (see Copernicus Land Monitoring Services 2015; 2016a; 2016b). Creation of figure-ground plans and their description and visual interpretation are done based on this new dataset, which in its present form was newly introduced in 2016. We use description and interpretation of maps and plans, which are two major research strategies in landscape architecture (Deming and Swaffield, 2011) and explain this method in more detail in the next chapters.

The hypothesis is tested on four European cities with metropolitan urban landscapes, including Dublin (Ireland), Ruhr Metropolis (Germany), Geneva (Switzerland) and Sofia (Bulgaria). These four model areas (Large Urban Zones) were selected as case studies because they were reference regions and objects of analyses within the COST Action TD1106 'Urban Agriculture Europe' (hereinafter UAE) and at the same time, their comparable land use and land cover GIS data are available in the 'Urban Atlas of the

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European Environment Agency', which provides material for comparative land use structure and green infrastructure system analyses using the figure-ground method.

2. Theoretical departures

2.1 Definition of urban agriculture and green infrastructure

Agriculture has been an inherent component of cities since the earliest records of urban development (Vejre et al., 2016; Lička and Maldonado, 2016; Branduini et al., 2016). It takes place in all urban contexts, from the built-up downtowns to the open spaces of peri-urban areas (Yokohari et al., 2000) and it is as much connected to the built environment as it is to the open landscape (Kuczman, 2014; Lička and Maldonado, 2016). Urban agriculture has been driven and shaped by diverse global driving forces, such as peri-urbanisation and suburbanisation, political and economic crises, poverty or industrialisation (Bryant et al., 2016). When compared to other forms of agriculture, urban agriculture is spatially and functionally more deeply integrated in the urban system and urban areas (Vejre et al., 2016). It is of great interest in finding new answers for how cities can master recent social, economic, and ecological challenges (Duží et al., 2014; Lohrberg, 2016).

The European Commission perceives green infrastructure as 'a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces and other physical features in terrestrial and marine areas. On land, green infrastructure is present in rural and urban settings' (European Commission, 2013, p. 3). As a planning concept, green infrastructure bases on the contemporary model of multifunctionality (Brandt and Vejre, 2004; Brenken et al., 2005), which considers all landscape functions and services (Timpe et al., 2016), including agriculture.

2.2 Urban agriculture as part of the urban green infrastructure

Urban space is used for a wide set of functions, one of which is agricultural production. The spatial quality of agriculture in urban settings is strongly related to the built environment as well as to the green infrastructure of the city (Halajová et al., 2013). In many cases, urban agriculture areas constitute the major part of the urban open landscape and form green wedges (surrounding and penetrating the urban area), green belts (surrounding the urban area), or individual intraurban spots or networks, such as urban farms (Recasens et al., 2016), urban fruit trees (Bakay, 2014), linear tree formations (Supuka, 2013) or even rooftop farms (Sanyé-Mengual, 2016). Many urban agricultural sites were not originally conceived as urban (green) open spaces, but have gradually become an essential part of the urban green infrastructure (Rzepliová and Feriancová, 2014; Paradis et al., 2016). Where existing agricultural areas have been integrated into the city through its expansion over time, they usually contain important structures and elements of cultural and landscape heritage (Lička and Maldonado, 2016; Paradis et al., 2016).

The localisation of urban agriculture is a result of the overall urban development. In many European cities, there are large areas of urban agriculture that are important components of urban landscapes and make significant contributions to green infrastructure (Paradis et al., 2016). Urban agriculture areas are spatially connected to other

urban landscape functions and elements (Lička and Maldonado, 2016). In contrast to most green spaces, urban agriculture areas provide the potential for temporal land occupation, which is important in rapidly changing cityscapes (Paradis et al., 2016). Urban agriculture can be perceived as an efficient urban development tool also in the context of brownfield regeneration in urban landscapes, which is a major challenge in contemporary spatial development of cities (Frantál et al., 2013). In case of brownfields, with an agricultural origin located at the urban periphery, urban agriculture plays a key role as a potential urban planning tool for a revival of the agricultural legacy of the area, since brownfield regeneration in these areas is still undynamic (Frantál et al., 2015). Urban agriculture can be understood as a planning tool that helps stabilising and forming neighbourhoods and driving urban change, since providing an important space for social interaction and inclusion and positively affecting urban quality of life (Sanesi et al., 2016).

2.3 Ecosystem services provided by urban agriculture

Urban agriculture provides a wide range of ecosystem services that are of great value and importance for human well-being and urban resilience (Gómez-Baggethun et al., 2013). The functional dimension of urban ecosystem services provided by urban agriculture is very complex and diverse (Haase et al., 2014). Besides the most obvious production function, urban agriculture provides also a wide range of societal benefits (Pölling et al., 2016), cultural services related to recreation, education or health (Vejre et al., 2016), as well as provisioning services, regulation services and habitat benefits. Timpe et al. (2016) give a structured overview of ecosystem services and green infrastructure benefits that can be provided by urban agriculture and define urban agriculture types that are especially relevant.

When integrating agriculture and green infrastructure, a mutual benefit of ecological stability and agricultural sustainability can be achieved within and around urban environments (Martino et al., 2016). Urban agriculture can significantly enhance green infrastructure through placemaking strategies (Timpe et al., 2016). It is an approach towards management of urban cultural landscapes that enhances social and cultural valuation of ecosystem services (Plieninger et al., 2015). Moreover, it helps developing resilient food systems in metropolitan areas (Tóth et al., 2016), which makes food chains more sustainable (Berčík and Gálová, 2013).

2.4 Typologies of urban agriculture in urban landscapes

Spatial forms and qualities of urban agriculture result from environmental conditions, as well as from the farming methods, technology, and crops (Paradis et al., 2016). Simon-Rojo et al. (2016) divide urban agriculture into two main categories – 1) urban food gardening and 2) urban farming. Urban farming has a rich tradition in Western and Central Europe, for instance in Germany and Switzerland. Urban gardening is represented by two main traditions – allotment tradition and food gardening tradition, which are present throughout Europe (Keyzlarová, 2010; Lohrberg and Simon-Rojo, 2016; Keshavarz and Bell, 2016).

Based on the localisation, Paradis et al. (2016) distinguish 1) fringe agricultural landscapes (periurban localisation), 2) mix of urban and agricultural landscapes (transurban localisation), and 3) productive enclave landscapes (intraurban localisation). These can consist of:

- a. large-scale units, such as entrepreneurial farms or agricultural parks;
- b. medium-scale units, such as allotments; and
- c. small-scale agricultural spots, such as production-oriented family gardens.

Timpe et al. (2016) categorise five different types of green infrastructure systems in European metropolitan areas, in which urban agriculture is spatially integrated as part of a green belt; as a green corridor; as a green network; as a green patch; and as a green matrix.

3. Data and methods

The article uses the 'Urban Atlas 2012' GIS database of the European Environment Agency (Copernicus Land Monitoring Services 2015; 2016a; 2016b), which provides comparable land use and land cover data of the chosen Large Urban Zones. The available GIS database and metadata were used as basic materials for conducting figure ground analyses and interpretations of urban green infrastructure systems in the selected model areas. The figure ground analysis is complemented by graphical interpretation and percentual quantification of the overall land use structure (Fig. 3), in order to support the statements and conclusions.

3.1 The Urban Atlas as a tool for comparing urban agriculture in European city regions

The most important precondition for comparing the presence and quantitative importance of agriculture as a land use in different European city regions is a consistent and comparable data base. The comparison cannot be done in a reliable way with local land-use survey as geographical data base because the surveys would provide different land-use categories which, more importantly, were also collected with different methods. Land-use surveys which cover the whole territory of the EU are not detailed enough to assess green infrastructure and urban agriculture in city regions, which are touched by the phenomenon of urban sprawl and a strong fragmentation of land-use units. CORINE land cover, an important tool for land-use monitoring on the EU level has minimum mapping units of 25 ha size and 100 m width (Copernicus Land Monitoring Services, 2016a).

A solution to fill the knowledge gap on land-use with green infrastructure potential in city regions is the Urban Atlas. This land-use survey has been elaborated for the first time in 2006 by the European Environment Agency (EEA, 2016) and covers Large Urban Zones (LUZ) in Europe. The Urban Atlas is much more precise than other pan-european land-use mappings with a minimum mapping unit of 0.25 ha and 10 m width (Copernicus Land Monitoring Services, 2016b, p. 7). It is elaborated on the basis of Earth Observation by satellite, topographic maps and navigation data (ibid, p. 3–4). Detailed information on methodology and availability of Urban Atlas 2012 is provided by Copernicus Land Monitoring Services (2015).

While the Urban Atlas 2006 was insensitive to the importance of agriculture in city regions by integrating "Agricultural areas, semi-natural areas and wetlands" under one land-use category, the Urban Atlas 2012, which is currently under elaboration, delineates a larger variety of agricultural land uses: (i) Arable land (annual crops), (ii) Permanent crops (vineyards, fruit trees, olive groves), (iii) Pastures, and (iv) Complex and mixed cultivation patterns. With 695 Large Urban Zones the 2012 edition also will cover a lot more regions than the 2006 edition (306 LUZ) did.

The elaboration of the Urban Atlas 2012 is still in progress and data already available for download are not validated. Due to this preliminary state of the data, the intention of the thematic maps and diagrams in this paper is to present the potential of the Urban Atlas as a tool for assessing and monitoring agricultural land use and urban agriculture potential in European city regions, not to provide a fully validated assessment of the situation of agriculture in the regions presented. This paper is an additional research on the case study regions analysed by the COST Action UAE (Lohrberg et al., 2016). It adds to the previous research by making the regional situations comparable thanks to the unified database of the Urban Atlas (see Fig. 1 for the location of case study regions in Europe). Out of the seven COST Action UAE case study regions, only four are currently available in the Urban Atlas 2012, which are analysed and assessed in this paper.

3.2 Figure-ground diagrams as a spatial analysis tool

For a better readability and comparability of urban fabric, agriculture and non-agricultural open spaces in the compared case studies, we have decided to base the spatial analysis on figure-ground diagrams, since these provide a better contrast in the map design, and thus a more effective cartographic communication and a better visual comparability of different sizes and scales as assessed by Byer and Kent (1999) and Reicher (2004, p. 48). They allow forming conclusions on the overall urban structure, urban density, urban development stages and organisation principles of a city as an organism (Mayr and Mayr, 2014). Figure-ground plans are widely used as well in planning practice as in classic literature on urban design from the 19th century or in urban research from the 20th century (Nöfer, 2002, p. 71).

Using binary maps (figure-ground diagrams) represents a procedure specifically designed to characterise settlement properties and patterns, which can be applied at high spatial resolution. Figure-ground diagrams have thus a potential to provide key information to quantitatively and qualitatively characterise settlement properties and patterns in any spatial detail and at arbitrary spatial scales (Esch et al., 2014). Their potential as an analysis-tool is not limited to the assessment of the built urban fabric as a figure. In the 1960s already the inversion of figure and ground has been used (Jenkins, 2008, p. 2). It helps imaging the non-built urban space as a figure of its own right. Especially the network characteristics of green spaces can be analysed by the help of inverted figure-ground plans (Schöbel, 2010). The spaces of green infrastructure, which for a long time have been perceived as only the background of urbanisation, are represented as a figure so that their importance and spatial character becomes readable.

We use figure-ground diagrams to analyse the spatial distribution of major land-use categories relevant for green infrastructure. The case study regions were analysed based on three different map types:

1. An overall map of the regions including the whole variety of land-uses mapped by the Urban Atlas. This map allows to interpret the density of the urban fabric and the diversity of land-uses. Its scale depends on the size of the region. (see e.g. Fig. 4);
2. A combination of three figure-ground plans for each of the regions. Each of these compilations shows the whole region, its scale is chosen based on the size of the region. These plans allow to get an overview of the importance

of agricultural land-use and other land-uses which could be a part of green infrastructure in the regions (see Figs. 5, 7, 8 and 9);

3. A combination of four figure ground plans of the central area of the analysed cities. These maps show a square of 20 on 20 km measured from the city centre, which in the case of Dublin has been moved from the city centre towards west to include more land instead of sea surface. This compilation of figure-ground plans allows to interpret the spatial structure of green infrastructure at the local level. The separate and overlaid representation of agricultural land-use and other open space land-uses allows to assess the importance of agriculture in the local green infrastructure network (see e.g. Fig. 6).

4. Results

4.1 Size and land-use diversity of metropolitan regions

As illustrated by the case study regions in Figure 2, European metropolitan regions can be very variable in size and scale. This is caused by diverse cultural, geographical and

natural conditions, which make European cultural landscapes so diverse and variable. Many metropolitan regions cover a relatively large geographical area, such as Ruhr, Sofia and Dublin regions, while the region of Geneva is a significantly smaller geographical unit, but with a significantly higher urban land use share than that of Dublin or Sofia regions. This is caused by the diversity of cultural, geographical and natural conditions in Europe. Dublin is set in traditional Irish agricultural landscapes, which is reflected mainly by vast pastures. Sofia has plenty of open space, the urbanisation in the metropolitan region is not very strong, agriculture has a long-term tradition and is characteristic for the region. Ruhr is the most industrial region of Germany, with strong and dense urbanisation, many brownfield sites and a high land-use competition, yet agriculture still plays an important role. Geneva, considering its different scale and density, also faces strong urbanisation and land-use competition. The interconnection between the four metropolitan regions is given by their importance in the regional and national context in terms of economy and population. At the same time they reflect the diversity of European metropolitan regions in terms of scale, density, growth and land use structure. It manifests



Fig. 1: Location of case study regions in Europe

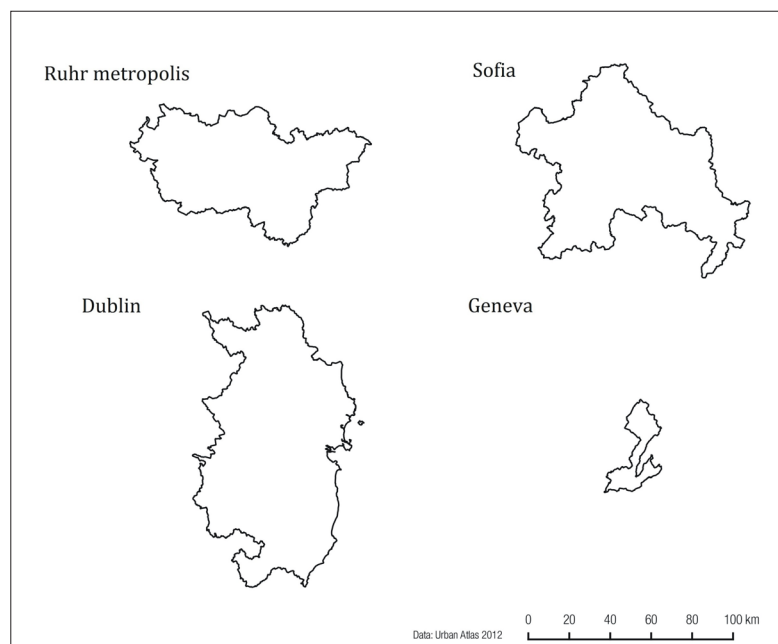


Fig. 2: Size comparison of case study regions

the fact, that independently from diverse geographical and cultural conditions, urban agricultural landscapes play a crucial role in building resilient and multifunctional metropolitan green infrastructures. Figure ground analyses prove that agricultural landscapes increase the connectivity and spatial distribution of urban green infrastructure in all four research samples.

The land-use diversity of case study regions is illustrated by Figure 3. It reveals that the Ruhr metropolitan region has the highest proportion of urban land-use (reaching 34% when combined with undefined land-use), while Sofia has a more than three times smaller share of urban or undefined land-use (10%). Agricultural land uses are in the presented diagrams limited to arable land and pastures as the spatially most important agricultural land uses, while the land-use characteristics of Geneva include also permanent crops as a separate category. Arable land prevails in Ruhr metropolis (56%) and Geneva (81% of the overall agricultural land use), while pastures have a higher land use share in Sofia (65%) and Dublin (86% of the overall agricultural land use). This imbalance is caused by a set of cultural, geomorphological and climate conditions and therefore, we consider agricultural land use as one complex unit and do not divide it into subcategories. Agricultural land-use covers more than one third (Ruhr 39%, Sofia 46%, Geneva 43%) or even more than one half of the entire regional area (Dublin, 64%), representing thereby an important land use category in metropolitan urban landscapes.

In all case study regions, agricultural landscapes cover larger areas than other open spaces, see Figure 3 (agricultural open spaces are on average 1.65-times larger than other open spaces). When considering agricultural landscapes equal to other types of open spaces and integrating them into the urban green infrastructure of metropolitan regions, a significant spatial and functional extension of the system can be achieved. In all four analysed case studies, this approach would extend the system more than 2-times (2.65-times on average), reaching from 2.05-times in Sofia up to 3.78-times in Dublin). Thus, agricultural landscapes should be taken into account when planning and designing regional green infrastructure systems and landscape strategies.

4.2 Agriculture in diverse metropolitan green infrastructure systems

The analysed case study regions presented in this paper provide an overview of different urban agriculture and metropolitan green infrastructure situations across Europe. From the geographical perspective, they provide a cross-section from Northwestern (Dublin), through Western (Ruhr metropolis and Geneva) to Southeastern (Sofia) Europe. The aim is to reflect the spatial and structural diversity on the one hand and highlight similarities on the other hand. The Greater Dublin Area, also referred to as Dublin Metropolitan Region provides an example of a large coastal city surrounded by extensive agricultural landscapes, dominated mainly by vast pastures, see Figures 4 and 5. The urban fabric spreads all over the metropolitan area in a rather extensive and dense way. Urban agriculture in this case serves as an integration medium of the urban landscape to the surrounding landscape on the regional level and facilitates a continuous transition from urban agriculture to rural landscapes, which is well reflected on Figure 6. The Dublin case study region is also specific thanks to its natural border on the Irish Sea, so the entire metropolitan region can be seen from a green-blue infrastructure perspective.

The Ruhr metropolis represents a densely urbanised landscape, where the continuous urban fabric does not form a distinct centre, but much rather a patchwork structure, where the urban areas are interlaced by diverse open spaces (see Fig. 7). Agricultural open spaces, including arable land with annual crops, complex and mixed cultivation patterns, pastures and permanent crops cover large continuous areas towards the boundaries of the region and penetrate the urban fabric spread over the centre of the metropolitan region at several points. At the same time, non-agricultural open spaces consist of rather scattered small-scale patterns distributed throughout the metropolitan region.

Therefore, agricultural and non-agricultural open spaces, when combined together and considered equal parts of the urban green infrastructure, can create a spatially integrate and well functioning system, which not only surrounds the urban fabric but at the same time intersperses it, providing thereby all the benefits and

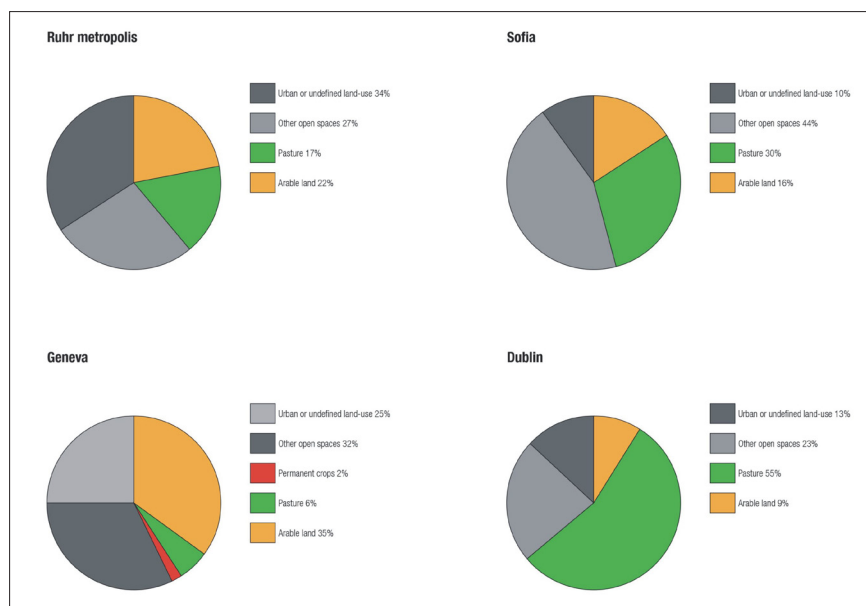


Fig. 3: Share of different agricultural land-use categories in case study regions compared to urban or undefined land use and other open spaces

qualities for the urban environment and its residents. In Ruhr metropolis, agricultural and other open spaces create together distinct green corridor structures oriented in North-South direction.

These corridors are connected in East-West direction by additional green-blue corridors of the two main rivers Ruhr and Emscher. The corridors consist mainly of agricultural areas on the margins of the region and are connected by

other open spaces in central areas. Thus, agriculture forms the link between central green spaces and open landscapes along regional boundaries.

The urban fabric of Geneva forms a spatially distinct urban centre concentrated at the waterfront of the Geneva Lake, spreading towards the surrounding boundary landscapes (see Fig. 8). Agriculture forms a rather consistent and continuous area around the urban fabric, while creating a spatially

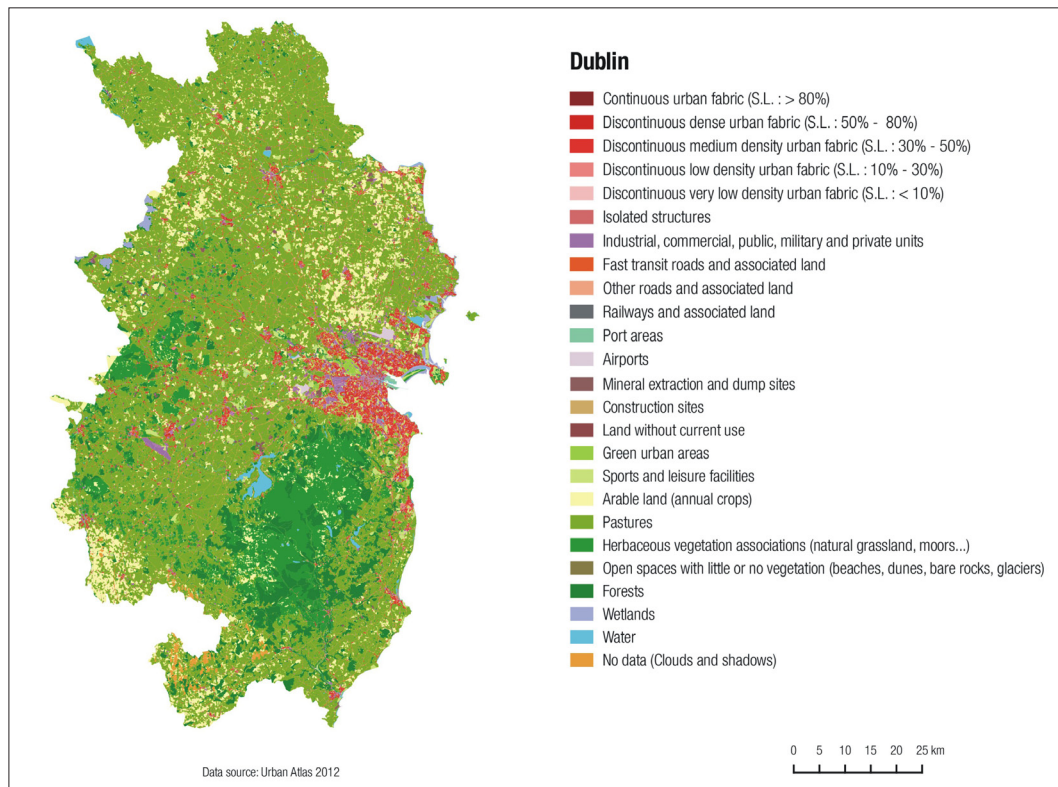


Fig. 4: Land-use structure of the Dublin metropolitan region
Source: Data from Urban Atlas 2012; authors' elaboration

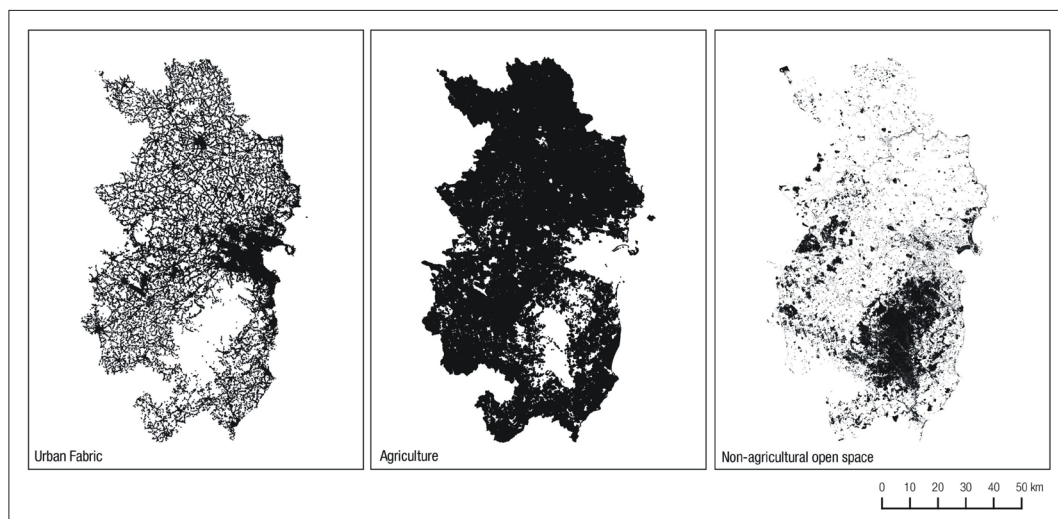


Fig. 5: Figure ground diagrams of urban fabric, agriculture and non-agricultural open spaces in the Dublin metropolitan region. Source: Data from Urban Atlas 2012; authors' elaboration

Note: In all figure-ground plans, black colour represents: 1) Urban Fabric (airports; construction sites; continuous and discontinuous urban fabric; industrial, commercial, public, military and private units and isolated structures); 2) Agriculture (arable land – annual crops; pastures; complex and mixed cultivation patterns; permanent crops – vineyards, fruit trees, olive groves); 3) Non-agricultural open space (forests, green urban areas, sports and leisure facilities, herbaceous vegetation associations, open spaces with little or no vegetation, forests, wetland and water bodies)

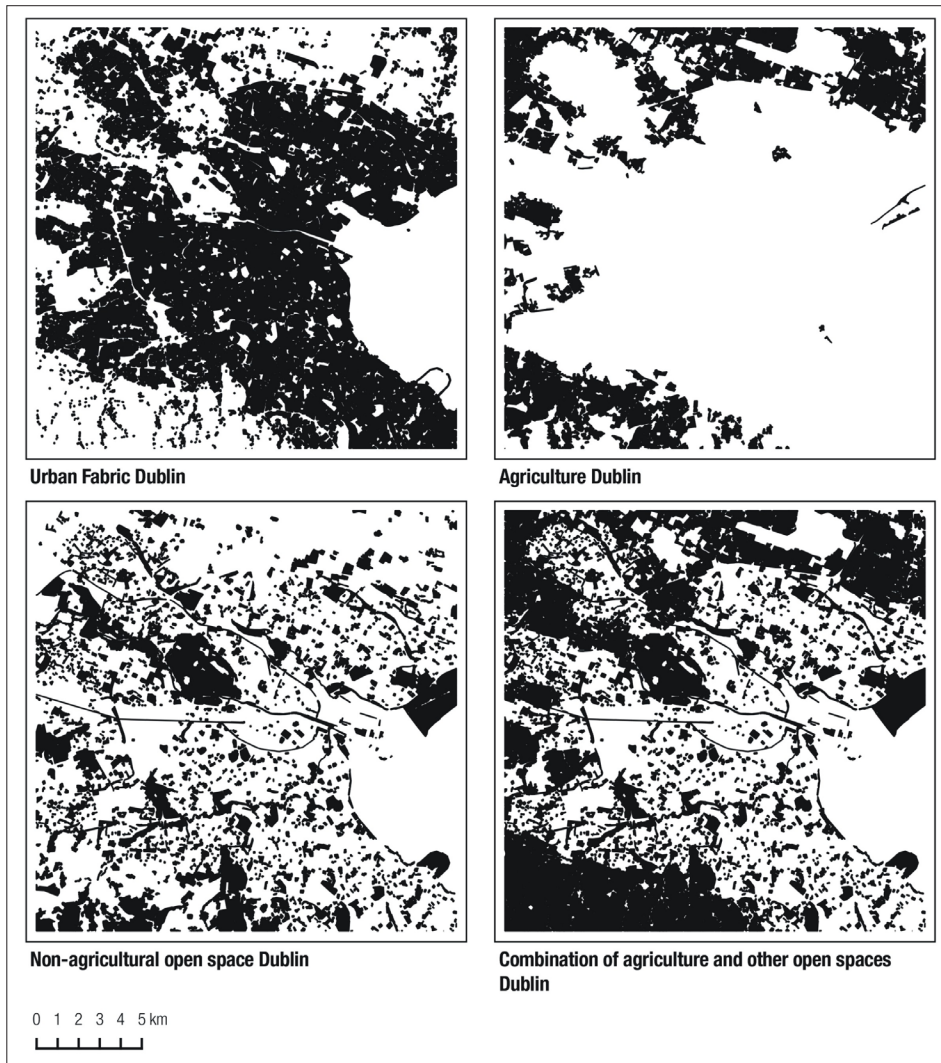


Fig. 6: A set of 20 × 20 km figure ground square sections of the central area of the Dublin metropolitan region
 Source: Data from Urban Atlas 2012; authors' elaboration

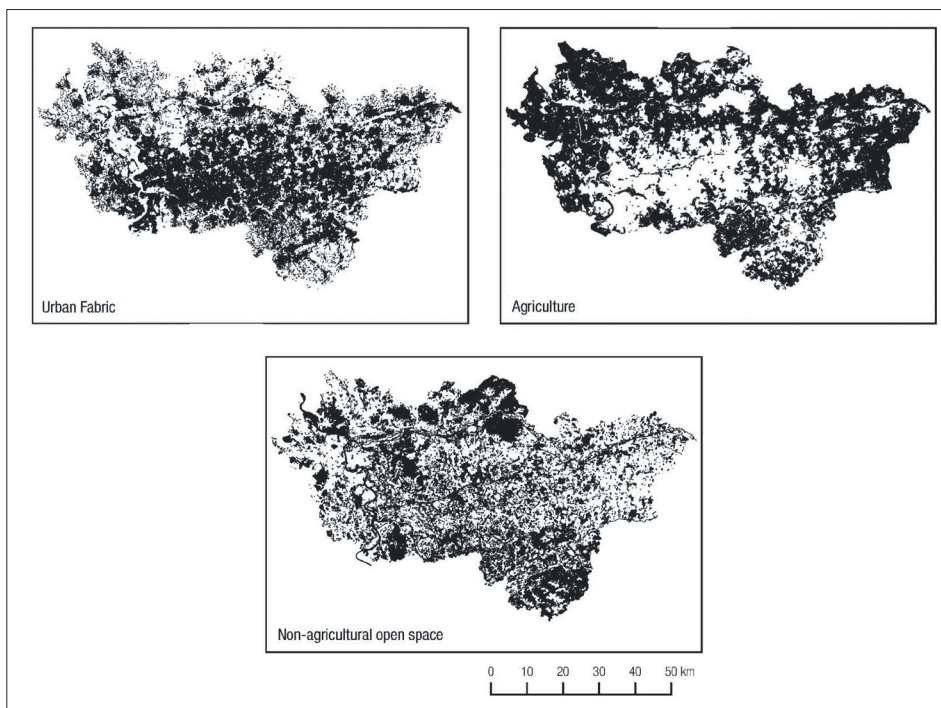


Fig. 7: Figure ground diagrams of urban fabric, agriculture and non-agricultural open spaces in Ruhr metropolis

significant greenbelt. Thus it provides an important buffer function around the city. The greenbelt function provided by agricultural land use is effectively complemented by adjacent non-agricultural open spaces, mainly the extensive forests and grasslands in the north of the region and patterns of green urban areas spotted throughout the concentrated urban fabric. These penetrate the urban fabric, where agriculture does not permeate. The Geneva case serves for a nice example of agricultural land being the main greenbelt of a city, while its functioning is supplemented and enhanced by other open spaces in the city and its hinterlands.

In some cases, for instance in Sofia, agricultural and non-agricultural land uses play a spatially equal role in forming the greenbelt of a city. Sofia has a concentrated urban fabric, which spreads along several axes into the surrounding metropolitan landscape and forms satellites of the urban fabric core. On the metropolitan scale, agricultural and non-agricultural open spaces complement each other as two pieces of a huge jigsaw puzzle, forming a massive greenbelt around the city. Agriculture does not tend to penetrate the concentrated urban fabric, but this function is well complemented by non-agricultural open spaces (see Fig. 9).

5. Discussion and conclusions

The utilisation of geodata from Urban Atlas as a research material in this paper indicates the applicability of this database for a European-wide comparative geographical and

landscape research. We consider the main method used in this article – figure ground diagrams – as an efficient tool for conducting landscape research. It might be questioned for its subjectiveness, since it does not directly rely on quantitative methods or exact numbers as it is a common practice in other research disciplines. Unlike quantitative methods, figure ground maps allow a much easier interpretation of the overall spatial system, its structure and the distribution of its elements (Deming and Swaffield, 2011).

We have not found any direct criticism against the figure ground method, but some authors claim that it is only colour that can clarify and define space, form and structure as it complements the traditional visual elements of line, structure, form and detail (Minah, 2008). Yet, figure-ground maps stand for the simplest possible representation of urban texture (Ratti and Richens, 1999) and they allow an easier readability and comparability thanks to a better contrast in map design (Byer and Kent, 1999; Reicher, 2004) and understanding the system as a whole (Mayr and Mayr, 2014). This method has of course its limits compared to multiple-colour map interpretations used in conventional cartography, as it uses only two colours – black and white. Therefore, it is not as efficient for distinguishing diverse elements of the system, such as different land uses at the same time. But it is visually more powerful and interpretative and allows a better and faster communication. With this article, we aim at manifesting that qualitative graphical methods can be just as useful in landscape research as quantitative methods.

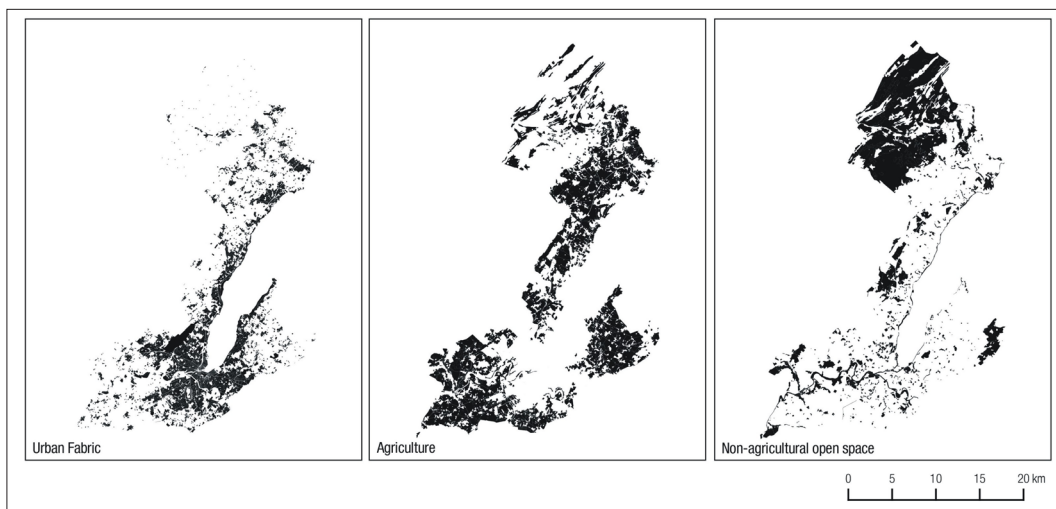


Fig. 8: Figure ground diagrams of urban fabric, agriculture and non-agricultural open spaces in the Geneva metropolitan region

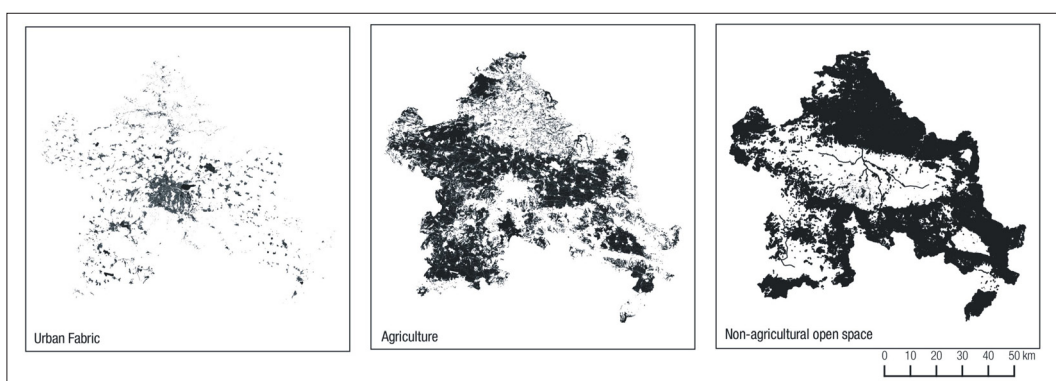


Fig. 9: Figure ground diagrams of urban fabric, agriculture and non-agricultural open spaces in the Sofia metropolitan region

It is obvious that agriculture has a significant land-use share in metropolitan urban landscapes across Europe and thus it has the potential to enhance different green infrastructure concepts and strategies, such as green belts, green wedges or green corridors. These green infrastructure systems make sense only if agriculture is considered an integral part of them. The figure-ground grids of Dublin (Fig. 6) clearly show that the inclusion of agriculture significantly enhances the spatial integrity and connectivity of green infrastructure, which consequently facilitates the functioning of urban ecosystems and increases their capacity to provide ecosystem services. In many cases, agriculture forms the link between central green spaces and landscapes along regional boundaries. This role of agriculture can be observed in Ruhr Metropolis and in a similar way on the local green infrastructure of Sofia and Dublin. Without the inclusion of agricultural areas in green infrastructure, a junction between inner city green spaces and larger green belts would not be made. The synergic effect of this inclusion is also represented by the Geneva region, where non-agricultural spaces create a linkage between two large-scale agricultural land units.

As a policy implication resulting from the analysis of case study regions, it can be suggested that agriculture should be considered an equal part of green infrastructure planning concepts and documents on the regional and local level. This goal can be implemented in master plans, landscape plans or similar planning schemes, including their thematically relevant parts, such as green space plans. Considering future research agenda in this field, it can be suggested to extend the database of Urban Atlas by other European cities, metropolitan areas and regions, in order to develop a database of comparable map data. A promising feature for monitoring of agricultural land-use in urban regions is the comparison of different editions of the Urban Atlas.

The 2012 edition includes this possibility for the first time. An identification of loss or gain of agricultural surfaces and the location of these changes in the urban landscape will be useful to discuss opportunities and threats for urban agriculture on the European level. As the 2006 edition did not yet differentiate between agriculture and other semi-natural spaces, this analysis could not be provided in this paper, but will make future editions of the Urban Atlas especially important for the further development of urban agriculture as a part of green infrastructure. Furthermore, the application of figure grounds in future geographical and landscape related research should be strongly considered, since these allow a visual simplification of map data and thereby an easier analysis of different aspects, such as land-use categories.

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Fig 2: Different forms of urban and peri-urban farming: from top Malmö (Sweden), Sofia (Bulgaria) and Milano (Italy). (Photo: B. Duží)

Illustration related to the paper by B. Duží et al.

