
Urban agriculture in Europe

Patterns, challenges and
policies



IN-DEPTH ANALYSIS

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This paper aims to provide an overview of the concept and practice of urban agriculture in the European Union. In addition to examining the typology of urban agriculture, it looks at the scale and practice of this phenomenon, along with the factors that have operated to influence its development. Examples are provided to illustrate the diversity of urban agriculture, including the potential contribution that it can make to food security and sustainable development. Drawing on research studies and reviews from both Europe and the USA, the paper identifies a number of challenges and limitations facing the development of urban agriculture, in both policy and practice terms.

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EXECUTIVE SUMMARY

In recent years, there has been an upsurge of interest in urban agriculture, accompanied by a broad range of research publications that have become available on the subject. While this trend is not new, in the past it had often been associated with times of crisis and food shortages, as experienced during both world wars. Today, the recent financial crisis has also contributed to an increased uptake of agriculture practices in cities.

Urban agriculture takes many forms. These can range from household, school and community gardens to rooftop, vertical and indoor farms. A fundamental distinction is often made between urban agriculture (involving food production in an urban area) and peri-urban agriculture, which occurs on the fringes of cities. In the case of the latter, farming is largely undertaken by professional farmers on land that has often already been used for farming for decades.

Besides providing fresh food to urban areas, urban agriculture is a source of significant environmental, social and health-related benefits as well as economic development opportunities. Each of these has been well documented in the research literature. In concrete terms, key benefits include contributing to employment and the development of small-scale rural entrepreneurs; to improved health and education; and to social inclusion, through integrating those at risk of social exclusion, such as migrants. Environmental benefits associated with urban agriculture include increased biodiversity, a potential impact on the 'urban heat-island effect' and a reduced risk of flooding.

At the same time, urban agriculture faces a number of challenges, such as pressure on open space and farmland, barriers to cooperation with more traditional farmers, a lack of entrepreneurial skills, achieving and maintaining profitability, lack of finance, sources of pollution arising from industrial activity, and soil contamination.

From an entirely European perspective, findings from case studies show how a range of factors – existing urban layout, perceptions and attitudes towards the use of urban space, and the prevalent political climate – operate at the city-specific level to influence the development of urban agriculture.

In policy terms, urban agriculture appears to fall between different policy areas, despite assurances from the European Commission that Member State rural development programmes can be used for the benefit of urban agriculture. To some, it may not be sufficiently agricultural in nature to secure support under Pillar I of the Common Agricultural Policy (as typified by more conventional agriculture). To others, it is not considered sufficiently rural to secure support under the above-mentioned rural development programmes. Looking to the future, the challenge for urban agriculture is how to achieve the necessary integration across all EU policy areas over the next programming period, post-2020.

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List of main acronyms used

COST:	Cooperation in the field of scientific and technical research
EFCF:	European Federation of City Farms
ILVO:	Institute for Agricultural and Fisheries Research
OECD:	Organisation for Economic Co-operation and Development
NGO:	Non-governmental organisation
PAN:	Percentage of urban area needed to produce sufficient vegetables through urban agriculture
PUA:	Peri-urban agriculture
RDP:	Rural Development Programme(s)
RUA:	Resources centres on urban agriculture and food security
UA:	Urban agriculture

Glossary

Aquaponics:	A system combining aquaculture and cultivation of plants in water
Community garden:	Any piece of land (publicly or privately held) that is cultivated by a group of people rather than a single family or individual.
Allotment:	A legally fixed form of (here: urban) gardens, tended individually by plot holders and their families
Backyard garden:	A private garden that could include balconies or terrace gardening.
Hydroponics:	A method of growing plants without soil, using mineral solutions in a water solvent
LED Farming:	The use of light-emitting diode technologies to support indoor farming
Rooftop farm/garden:	Organised privately or collectively
Urban/city farm:	Within the city or urban fringe of a city, operated by innovative entrepreneurs or charity organisations. Can provide social or environmental services, such as training and school gardening, as well as food production.

Source: Adapted from: I. Opitz, R. Berges, A. Piore, T. Krikser: '[Contributing to food security in urban areas: differences between urban agriculture and peri-urban agriculture](#)', *Agriculture and Human Values*, Vol. 33, Issue 2, June 2016, pp. 341-358.

1. Introduction

Urban agriculture (UA) has been the subject of growing interest and significant research over recent years. This is reflected in both the number and range of research publications dedicated to it.¹ In light of concerns about climate change and food security, city authorities, planners, economists, environmentalists as well as individual citizens are becoming increasingly involved in this subject area. This paper provides insight into the current evidence base on the scale and patterns of urban agriculture practised across the EU today. Drawing on a range of different research sources, including findings from the COST programme-funded Urban Agriculture Europe project ('COST project' in short),² the paper lists examples and short case studies to show the diversity of urban farming practices. From this literature, four dimensions to urban agriculture are used as a framework to examine it in practice, including findings and estimates on its impact, either actual or potential. A number of challenges and limitations facing the future development of urban agriculture are identified along with a short overview of the policy context within which it operates.

2. Urban agriculture

2.1. Concept and definition

In light of the strong interest in urban agriculture, there are a number of definitions in the literature on the subject. Exploring a few of these provides a starting point for insight into its different forms and practices. Recently, it has been defined as: '...the growing, processing and distribution of food or livestock within and around urban centres with the goal of generating income'.³ Another definition considers urban agriculture to encompass 'the production of food and non-food plants, as well as husbandry, in urban and peri-urban areas'.⁴ It makes reference to the concept of peri-urban agriculture (PUA), which it considers to be 'agriculture at the boundaries of cities, in the transition or "buffer zone" zones between rural and urban areas'. Sometimes, authors of texts on urban agriculture restrict it to mean peri-urban production. However for the purposes of this analysis, it is recognised that urban agriculture embraces many forms, including a broad range of meanings and perspectives on what it entails. Taking account of the extensive literature on the subject, the following observations explain what its essential aspects are in contrast to conventional agriculture:

¹ One research brief published in 2015 examined the frequency of scientific articles on urban agriculture from 1975 to 2014 using SCOPUS, one of the largest scientific peer-reviewed article databases. Articles related to urban agriculture and climate had increased from 1975, with a steady growth between 2005 and 2010, coupled with more recent surges since. (See: I. Game and R. Primus, '[Urban Agriculture](#)', Global Sustainable Development Report 2015 Brief).

² [COST](#) is an EU-funded programme enabling researchers to set up interdisciplinary research networks in Europe and beyond. A COST action (or '[COST project](#)') funded under this programme ran from 2012 to 2016. Its publication, [Urban Agriculture Europe](#), is the first comprehensive trans-disciplinary publication on the subject in Europe.

³ R. Roggema (ed.), *Sustainable urban agriculture and food planning*, Routledge, 2016, p 3.

⁴ R. Santo, A. Palmer and B Kim, '[Vacant lots to Vibrant Plots: A review of the benefits and limitations of urban agriculture](#)', Johns Hopkins Center for a Livable Future, May 2016, p. 1.

- In the context of urban agriculture, a distinction is sometimes made between urban gardening and urban farming. The former may involve '...agricultural activities with low economic dependence on material outputs, while using the production of food for achieving other, mostly social, goals'.⁵ In contrast, urban farming is based on a business model that takes advantage of proximity to a city by offering local or regional agricultural products or services.
- Urban agriculture is considered to be different from conventional or traditional agriculture. Greg KEEFFE⁶ explains that this is reflected in the way in which urban agriculture engages with the technologies of growing, makes choices regarding the crops to be grown and brings them to the market. He explains that urban agriculture has to engage new technologies that are different than the ones employed by rural agriculture. Soils within many urban areas may be polluted due to the presence of contaminated land and, as a consequence, food production within cities depends on alternatives to soil-based practices.⁷ These alternatives can include technical food systems involving hydroponics and aquaponics. Unlike traditional agriculture, where there can be a rather tenuous link between producers and consumers, urban agriculture can be connected more directly to consumers.
- Urban agriculture has a scale of implementation that is considered to be 'relatively small compared to conventional production methods' (Keeffe, 2016, p. 17). Keeffe explains that this means it is difficult for urban agriculture to compete against industrialised production on a purely economic basis.

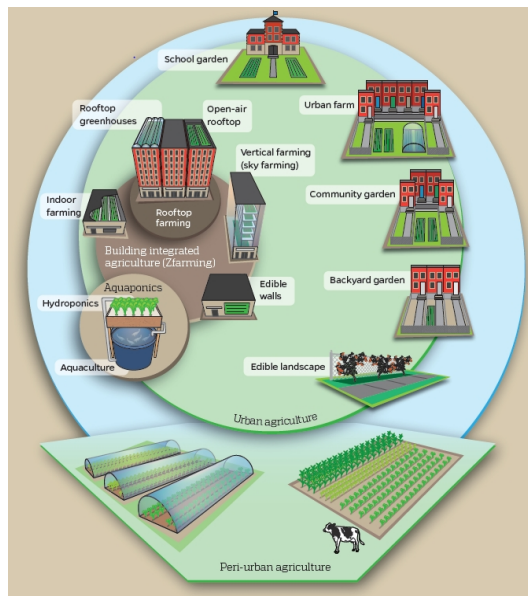
⁵ S. Rojo et al., 'From urban food gardening to urban farming', Chapter 1.2 in F. Lohberg, L. Licka, L. Scazzosi and A. Timpe (eds.), [Urban Agriculture Europe](#), Jovis, 2015.

⁶ G. Keeffe, 'Hardware software interface – A strategy for the design of urban agriculture' in R. Roggema (ed.), *Sustainable urban agriculture and food planning*, Routledge, 2016 pp. 15-37.

⁷ A. Jenkins, G. Keeffe and N. Hall, 'Planning urban food production into today's cities', *Future of Food: Journal on Food, Agriculture and Society*, 3 (1), 2015, pp 35-47.

2.2. Scope and typology

Figure 1 – Scope of urban agriculture



Source: Adapted from: R. Santo, A. Palmer and B. Kim, '[Vacant lots to Vibrant Plots: A review of the benefits and limitations of urban agriculture](#)', Johns Hopkins Center for a Livable Future, May 2016, p. 1.

gardens, and areas where more collective actions are performed, such as educational, therapeutic and community gardens.

In the case of urban farming, the areas have been subdivided into different types, such as those linked to on-site services (for instance, leisure and educational gardens), and others that include local food farms. The latter foster a more direct link with their consumers and operate through short food-supply chains.⁹ These classifications are summarised in the form of a typology of urban agriculture in Europe (Figure 2).

In respect of the distinction between peri-urban and urban agriculture, an extensive literature review undertaken up to November 2014¹⁰ (hereafter Opitz et al., 2016) stresses that a core

Urban agriculture can take many different forms (Figure 1). They include, for example, household, school and community gardens, as well as rooftop, vertical and indoor farms. The COST project referred to earlier sought to develop a common language in order to communicate more effectively the potential offered by urban agriculture from a European perspective.

Drawing on the distinction between urban gardening and urban farming made earlier,⁸ further subdivisions have been developed for these categories.

In the case of urban gardening, a distinction has been drawn between areas for individual production, such as allotments and family

Figure 2 – Typology of urban agriculture



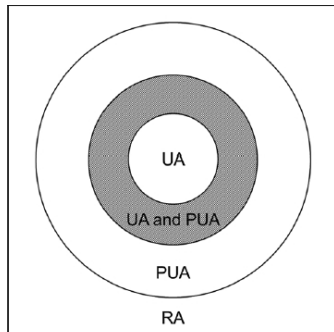
Source: Adapted from a [presentation](#) of the COST project results and the book *Urban Agriculture Europe* by Prof. F. Lohrberg, 23 February 2016.

⁸ S. Rojo et al., op. cit.

⁹ M.-L. Augère-Granier, [Short food supply chain and local food systems](#), EPRS, European Parliament, 2016.

¹⁰ I. Opitz, R. Berges, A. Piore and T. Krikser, 'Contributing to food security in urban areas: differences between urban agriculture and peri-urban agriculture in the Global North', *Agriculture and Human Values*, Vol. 33, 2016, pp. 341- 358.

Figure 3 – Location of urban agriculture (UA), peri-urban agriculture (PUA) and rural agriculture (RA) within the rural-urban continuum



Source: Opitz et al., 2016.

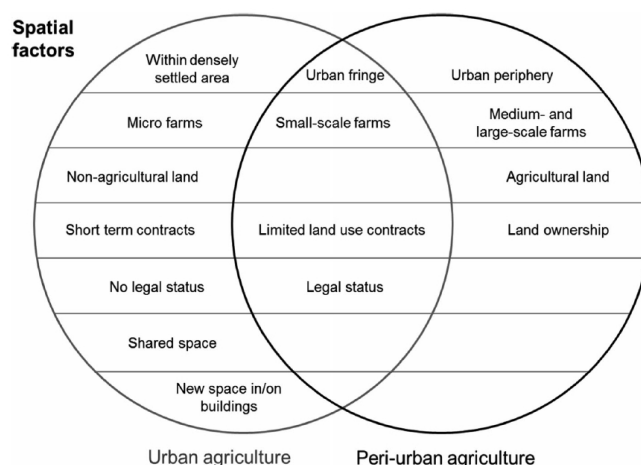
concept related to urban agriculture involves food production in the urban area. Peri-urban agriculture is defined as a residual form of agriculture at the fringes of cities, in areas that may be described as the transition zones between urban and rural areas; while they are not purely urban, these transition zones have a limited amount of agricultural and natural land, and are therefore not purely rural, either. Such areas suffer from urban pressures but also benefit from proximity to urban areas and markets. PUA takes place in this transition zone. It is sometimes referred to as 'urban fringe agriculture'. In contrast, the research review notes that urban agriculture is predominantly located in the densely settled areas of a city.

While PUA is situated in the urban fringe, urban agriculture can take many forms, as indicated above, which are taken forward by urban dwellers in their neighbourhood. A key point made in the research review is that the distinction between the two areas is not absolute or rigid in nature. Instead, in many cases there are overlapping zones, as illustrated in Figure 3. In this diagram, rural agriculture is located outside the urban or metropolitan areas.

The distinction between UA and PUA is further illustrated in Figure 4, which highlights differences in terms of the scale of the activities undertaken, legal status, land use, contractual arrangements, as well as types of cultivation undertaken.

According to the same literature review, UA is 'micro to small scale agriculture cultivated on non-agricultural land predominantly within the densely settled area of cities'. It can involve small-scale gardening and be undertaken on rooftops or in backyards. In general, urban agriculture is performed on land that is not agriculturally zoned. In contrast, PUA is '... small-scale to large scale agriculture that cultivates agricultural land predominantly on the fringes of cities'. It will have often been zoned for

Figure 4 – Spatial differences and common features of urban and peri-urban agriculture



Source: Opitz et al. 2016.

agricultural purposes. It is economically motivated by professionals, as the land is closer to professional farms. Examples of planning strategies aimed at protecting agriculture in peri-urban areas are the finger plan in Copenhagen and the Baix Llobregat Agricultural Park near Barcelona.

The authors of the literature review also note differences in the backgrounds and socio-economic status of those undertaking such activities. For example, community gardeners will usually be local residents, migrants and children without any formal agricultural education. In contrast, PUA farmers are found to be mainly agricultural professionals, with the ability to apply modern management practices. The authors also suggest that this group may include lifestyle or hobby farmers – possibly defined as 'urbanites who have left a city to start farming as leisure activity while generating their main income outside the farm.

3. Four dimensions to urban agriculture

3.0 Background

Historically, there has always been a link between the development of organised agriculture and the process of urbanisation.¹¹ The Garden City Movement as represented by Ebenezer Howard in his book, *Garden Cities of Tomorrow* (1902), offered an alternative to living in overcrowded urban areas through his depiction of The Garden City, offering the best of both town and country living, ringed by an agricultural belt. More recently, Nathan McClintock¹² has noted that with the rise of urbanisation during the industrial era, urban agriculture has emerged as part of a counter-movement to protect the population from social dislocation or as a form of coping strategy.

Historically, community gardens in the USA and allotment gardens in the United Kingdom grew in number during times of economic hardship and austerity. Municipal governments provided garden plots and seeds. Garden programmes in the USA developed during World Wars I and II,¹³ as they were seen as a way to increase food security and patriotism.¹⁴ Serious food shortages in Europe during WWI were alleviated by US food exports facilitated in part by reliance on war gardens. WWII saw the emergence in the USA of Victory Gardens (similar to the War Gardens of WWI). In the case of the UK, a similar role was played by allotments in WWII with the launch of the Dig for Victory campaign. It is estimated that by 1944, they were providing about 10 % of the nation's food by weight and about half of its fruit and vegetables.

Since these periods of crisis, developed countries have seen an increased interest in urban agriculture initiatives. Researchers have encapsulated this momentum with the example set by former First Lady, Michelle Obama, who, together with a group of fifth graders, planted a vegetable garden, the first of its kind for nearly 60 years, in the grounds of the White House.¹⁵ McClintock concludes that the notion of local food production as a safety net for city dwellers drives many of today's initiatives.

¹¹ G. Keeffe op. cit., p. 16.

¹² N. McClintock, 'Why farm the city? Theorizing urban agriculture through a lens of metabolic rift', *Cambridge Journal of Regions Economy and Society*, 2010.

¹³ Under the National Victory Garden Programme during World War II, it is estimated that 20 million Victory Gardens produced 40 % of America's fresh vegetables by 1944.

¹⁴ H.-F. Mok, V. G. Williamson, J. R. Grove, K. Burry, S. F. Barker and A. J. Hamilton, '[Strawberry fields forever? Urban agriculture in developed countries: a review](#)', *Agronomy for Sustainable Development*, Vol. 34, Issue 1, 2014, pp. 21-43.

¹⁵ N. McClintock, op. cit.; H.F. Mok et al., *ibid.*

This point raises a fundamental question concerning what factors in the developed world help to explain both the rationale for this activity and the increased interest it has experienced in recent years.¹⁶ This can be addressed by examining urban agriculture across the following four dimensions in respect of food security, economic, social and environmental considerations.

3.1. Food security

At the global level, it has been estimated that by 2050, 67 % of the world's population will be living in urban areas, so the focus will be on feeding such a population. At the European level, a 2013 report¹⁷ by the International Federation of Red Cross and Red Crescent Societies (IFRC) on the humanitarian impacts of the recent economic crisis indicated that in 22 European countries, the number of people dependent on food aid increased on average by 75 % between 2009 and 2012.

Keeffe (2016) makes the point that there has been an increasing separation between places of food production and those of consumption. Urban areas rely heavily on a multitude of food systems to meet their food needs. This makes them vulnerable to any crisis in the food supply chain. One corollary of this commentary is that cities will have to consider the issue of food security, including strategies on how to develop more localised food production systems, more carefully. This argument has been presented in a robust and explicit way by different authors. For example, reference is made to London, where it has been calculated that it needs 'around 150 times its own footprint just to feed itself'... (Keeffe 2016, p. 16). Another commentary¹⁸ from 2016 by Saverio Miccoli et al. notes that as the larger urban areas and the income of their residents grow, the demand for food also grows. As a consequence, the world's agricultural production will have to respond to this increased demand by increasing production from between 70 % to 100 % of current volume. The same commentary points out that it is expected that the area of arable land will not be able to grow by more than 12 % compared to today. In the authors' words, '...one of the most important challenges related to the future sustainability of large cities is becoming able to produce a sufficient amount of food in urban areas, where the largest number of individuals live and where a low-impact agriculture, characterized by a short food supply chain and under citizens' control may be possible' (p. 130).

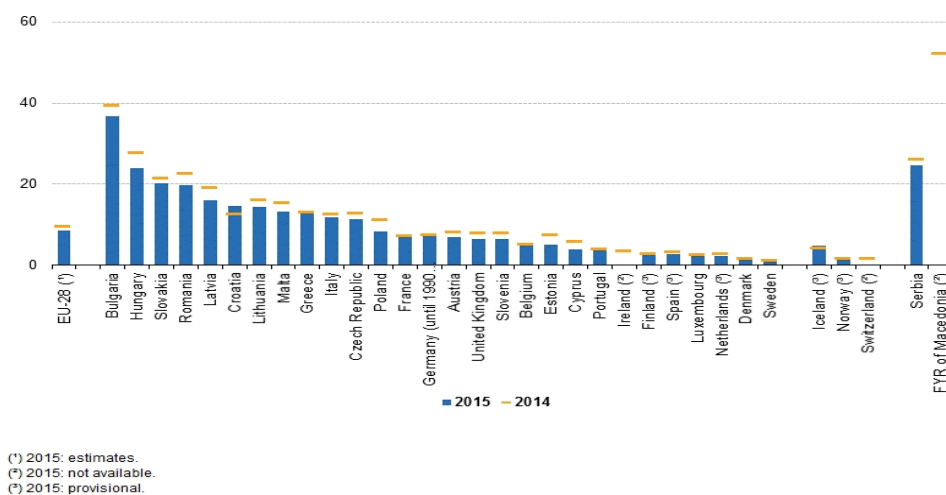
¹⁶ There is an important distinction to be made in terms of the different contexts within which urban agriculture occurs. In the case of developing countries, urban agriculture is seen as contributing to fighting hunger and poverty in the cities (see the [RUAF Foundation](#)). The present paper focuses on the rationale for urban agriculture in the context of developed countries.

¹⁷ 'Think differently – Humanitarian impacts of the economic crisis', [IFRC](#), 2013.

¹⁸ S. Miccoli, F. Finucci, R. Munro, 'Feeding the Cities Through Urban Agriculture. The Community Esteem Value', *Agriculture and Agricultural Science Procedia* 8 (20), 2016, pp. 128-134.

Miccoli et al. (2016), argue that urban agriculture provides the community, '...especially the poorest families, with access to fresh food, a fact which has positive effects on the health and quality of life'. Their study also explains that urban agriculture '...can improve the psychological status of individuals by allowing them to guarantee a secure supply of food to their household and helping them to acquire skills in a new field of work'. The relevance of such points is further reinforced when it is considered that in 2015, 8.5 % of the EU's population reported that they could not afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day. Though this represents a decrease of 1 % compared with 2014, the percentage of those reporting an inability to afford such a meal every second day ranged from 2.9 % or less in Finland, Spain, Luxembourg, the Netherlands, Denmark and Sweden, to 20.1 % in Slovakia, 23.8 % in Hungary and 36.8 % in the case of Bulgaria (Figure 5).

Figure 5 – Population unable to afford a meal with meat, fish, chicken (or a vegetarian equivalent) every second day 2014-2015



Source: Eurostat (ilc_mdes).

The food security dimension has been given added weight in light of reports from the USA on the existence of 'food deserts' in urban areas.¹⁹ These are characterised by poor access to healthy and affordable food through lack of access to supermarkets experienced by low-income households. Such situations are not unique to the USA as noted by H.F. Mok et al.

3.2. Economic

Though the economic literature on urban agriculture is considered to be 'very limited',²⁰ there are a number of important economic dimensions to it. First, as already noted during times of crisis, urban agriculture has made important contributions to food production. Second, according to author Joshua Zeunert,²¹ the peri-urban fringe of cities has been identified as

¹⁹ H. F. Mok et al, op. cit., p. 24.

²⁰ S. Golden, 'Urban agriculture impacts: social, health and economic: a literature review', University of California Sustainable Agriculture Research and Education Programme, 2013.

²¹ The reference to the City of Enfield Council in the UK is quoted in J. Zeunert, 'Urban agriculture up-scaled: economically and socially productive public green space, Chapter 7, in R. Roggema (ed.), *Sustainable urban agriculture and food planning*, Routledge studies in food, society and environment, London, Routledge, 2016 p. 110.

the location of larger agricultural activities, where 'significant scope exists for up-scaled social and public enterprises...'. One local authority example from the UK quoted by this author, highlights a market garden strategy aimed at generating 1 200 jobs 'catalysed through urban agriculture interventions on municipal land'.

Third, Zeunert argues that evidence from the potential use of several well-known green spaces of various sizes in North American, Australian and European cities indicates the potential of such areas to generate 'significant economic returns', if urban agriculture was executed at 25 % or a more substantial 50 % of their area, based on calculations of potential horticultural crop yields and economic data.²²

Fourth, a further element in terms of the economic dimension to urban agriculture relates to the potential opportunities for the development of small-scale rural entrepreneurs. A key finding by Wolf Lörleberg (the COST project), based on an analysis of more than 100 case studies of urban agriculture enterprises over three years, was how they are (or have the potential to become) the 'hidden champions' of an urban green development strategy.²³ In-depth interviews with urban farmers from the city of Uppsala in Sweden and the Barcelona Metropolitan Region in Spain showed they were 'generally the prototype of professional entrepreneurs, adapting their business to market demands and seeing proximity to the city more as an opportunity than a threat'. The COST project's working group 'Entrepreneurial models of urban agriculture' involving some 26 scientists, found that a range of business strategies had been adopted by the initiatives they examined. The strategies identified included those based on: (i) cost reduction, (ii) differentiation, (iii) diversification, (iv) shared economy, and (v) experiment and experience. Many cases were found where elements of more than one of these strategies were used. These findings demonstrate how urban agriculture has to adjust to the urban environments. Some businesses build on existing opportunities, such as proximity to customers. Others are able to differentiate their products from the main markets by distinguishing their product features from others, building on their direct links to the consumer. Urban farms can diversify their business by offering services for example: agro-tourism, social care, kindergarten farms or nursery-school services (see box illustrating an example of an Italian kindergarten farm).

Example of a social farming initiative from Italy

Located in the Marche Region, Italy, though its main business activity is farming, an Italian kindergarten farm provides educational services where children learn to appreciate and respect both nature and agriculture. The kindergarten is a form of farm diversification. In Italy, the spread of kindergarten farms has a greater penetration in regions that have adopted a regional law regulating the manner of kindergarten accreditation. (Rete Nazionale 2007-2013).

Source: Chiara Paffarini et al., 'Bridging the gap – education and farming in specialized kindergarten farms', 2015, pp 82-83, paper submitted to the Second International Conference on Agriculture in an Urbanizing Society, 14-17 September 2015, Rome, Italy).

²² Zeunert explains that the inclusion of these areas in the subsequent calculations was not intended to suggest their suitability to urban agriculture. This could only be determined through detailed site-specific studies (ibid., p. 111).

²³ W. Lörleberg, 'Urban agriculture has an economic dimension', Chapter 3, in *Urban Agriculture Europe*, F. Lörleberg, L. Licka, L. Scazzosi, A. Timpe (eds.), European Cooperation in Science and Technology (COST), Berlin, Jovis, 2016.

3.3 Social

Research also highlights the potential social impact of urban agriculture, whether for recreation and leisure time, for education or health issues, or for disadvantaged people in the form of specialised-care farming.²⁴ There are examples of urban agriculture projects that include target groups, such as drug addicts, juvenile offenders and immigrants, who are at risk of social exclusion. Examples include the Jardins de Cocagne in France, the Schultenhof in Dortmund, La Cordata (covering people with disabilities) and the social cooperative Cascina Bollate (covering prisoners), both in the Milan metropolitan area.²⁵

Further evidence on the role urban agriculture can play in promoting social cohesion and renewal has been identified in a comparative study²⁶ of allotment gardening in Dublin and Belfast based on data collected between 2009 and 2013. A key feature of these sites was that they facilitated opportunities for social mixing and interaction with others. The context facing both cities at the time of the study is significant. In the case of Dublin, the study highlighted the impact of the financial crisis of 2008 on the city and a 'demonstrable rise in urban agriculture practices in the city...'. In Belfast, the study explains that 'despite the political resolution of the conflict in Northern Ireland, Belfast remains a city divided along religious and ethno-national lines'. A key finding was how the allotment sites facilitated opportunities for social mixing and interaction with others, including facilitating the striking up of easy interactions between plot-holders, where there was a 'shared commitment to cultivation...'. For advocates of urban agriculture, the allotments were seen as an important resource facilitating social interaction. For plot-holders, the allotments promoted and enhanced the construction of a sense of belonging to a place.

These findings on the social processes involved in urban agriculture have a parallel with findings from research on migration. For example, the authors of the Dublin – Belfast comparative study point to the development of intercultural gardens in Germany. In an overview on these gardens, a study²⁷ published in 2013 highlights how such gardens fostered mutual respect. The study found how migrants gained respect for themselves and others by developing a sense of their own worth through working in the gardens. It noted from other studies that this was particularly the case for migrant women: the gardens helped restore their socio-economic role, which is central to a person's self-respect. Some key features of these gardens are described in the box below.

²⁴ See Chapter 3.2: 'Creating Added Value: Societal benefits of Urban Agriculture', in *Urban Agriculture Europe*, F. Lohrberg, L. Licka, L. Scazzosi and A. Timpe (eds.), European Cooperation in Science and Technology (COST), Berlin, Jovis, 2016.

²⁵ For more information see the project websites: [Jardins de Cocagne](#) (FR); [Schultenhof](#) (DE); [La Cordata](#) (IT); [Cascina Bollate](#) (IT).

²⁶ Mary P. Corcoran, P. C. Kettle, 'Urban agriculture, civil liberties and moving beyond difference: the experiences of plot holders in Dublin and Belfast', *Local Environment*, Vol. 20, No 10, pp. 1215-1230, 2015.

²⁷ Claire Moulin-Doos '[Intercultural gardens: the use of space by migrants and the practice of respect](#)', *Journal of Urban Studies*, Vol. 36, No 2, pp. 197-206, 2013.

The Gottingen experience – intercultural gardens in Germany

The Gottingen gardens were established in 1996, when the local government gave a group of female refugees from Bosnia a piece of land for cultivation. One of the gardens' founding members decided to teach basic German skills on site, enabling formerly illiterate persons to do an apprenticeship or get a driver's license. During winter months, language and computer courses were also offered. As a consequence, the gardens became a place for building social capital through learning processes, reflecting the networks they established and the shared values they fostered. The above-mentioned study indicates that most intercultural gardens in Germany since then have been inspired by the Gottingen example.

3.4 Environmental

Recent US overviews²⁸ on the state of knowledge surrounding the social, economic and environmental attributes of urban agriculture highlight the potential environmental benefits which it may offer. A wide range of issues are included in such overviews, relating to: waste recycling; air quality; potential impact on the 'urban heat island' (where temperatures in urban areas are higher relative to nearby surrounding areas); carbon sequestration; wastewater filtration; and impact on biodiversity. It is argued that vegetation filters certain airborne pollutants and that plants and trees facilitate temperature moderation, thereby reducing the urban heat island effect. Furthermore, vegetation collects and retains precipitation, reducing storm-water run-off into urban waterways. Evidence also suggests that urban agriculture supports local biodiversity through the provision of habitats and forage for bees (Santo et al, 2016).

Table 1 provides a summary of documented environmental benefits of urban agriculture based on a report from the Johns Hopkins Center for a Livable Future. Covering a total of 167 separate research references relating to the socio-cultural, health, environmental and economic-development outcomes of urban agriculture, the report notes how rooftop gardens and vertical farms have the ability to re-use waste water waste heat and organic waste. Reference is also made to a multi-country study²⁹ of the environmental impact made by integrated rooftop farms located in retail parks in Europe and South America. This found that 'such operations could reduce the carbon dioxide emissions and energy inputs needed to produce tomatoes compared to conventionally produced ones and with appropriate rainwater harvesting could almost universally acquire enough water to avoid additional inputs'.

²⁸ L. J. Pearson, 'Sustainable urban agriculture: Stocktake and opportunities', [International Journal of Agricultural Sustainability](#) 8 (1&2), 2010. See also: Santo et al., op. cit., 2016.

²⁹ E. S. Mangual, '[Sustainability assessment of urban rooftop farming using an interdisciplinary approach](#)', PhD thesis in environmental sciences and technology, Universitat Autònoma de Barcelona, June 2015.

Table 1 – Urban agriculture: summary of environmental benefits

Reported benefits	Reported limitations
Local ecosystem services	
<ul style="list-style-type: none"> • Increased biodiversity • Habitat for pollinators • Reduction in 'urban heat island effect' • Increased rainwater drainage, reducing risk of flooding, ground water contamination and groundwater depletion • Recycling of organic waste 	<ul style="list-style-type: none"> • Soil management, irrigation and fertilizer use practices by UA growers may not be ecologically sound
Climate change mitigation	
<ul style="list-style-type: none"> • Potential reduction in greenhouse gas (GHG) emissions • Carbon sequestration by vegetation and crops • Potentially reduced energy and resource inputs using some technological UA operations • Adds to collective memory of food production and protects urban green spaces reinforcing cities' capacity to produce food in times of crisis 	<ul style="list-style-type: none"> • If plants are grown in energy or resource-intensive locations, this may increase GHG emissions • Small-scale, fragmented UA may be less efficient in resource use and transport emissions than conventional agriculture • If UA became ubiquitous in cities, it could reduce population density, requiring more driving and greenhouse gas emissions than the current system.

Source: Adapted from: Santo et al., 2016.

The same report however points to a number of environmental limitations. These include:

- gaps in research relating to urban agriculture practices (such as the sustainability of pest-management practices);
- the potential loss of economies of scale associated with larger production systems;
- the impact on GHG emissions and water use if plants were grown in for example more energy and resource-intensive facilities such as indoor/ vertical farms, greenhouses or hydroponic farms;
- the environmental sustainability of artificially-lit vertical farms in comparison with solar-powered greenhouse systems.

Other limitations raised in the literature concern the issue of contaminated land, the sources of which could pose adverse effects. For example, in a study³⁰ on vegetables grown in central Berlin, researchers found that they contained higher concentrations of metal contaminants than those compared to supermarket vegetables. To reduce contamination levels and health risks, they suggest growers should be advised to choose planting sites carefully, based on distance and barriers to traffic.

³⁰ 'Science for Environment Policy', DG Environment News Alert Service, Issue 291, European Commission, 5 July 2012.

4. Urban agriculture in practice

4.1. Scale

Despite the intense interest and research into urban agriculture as evidenced by the extensive review articles on this topic covering both developing and developed countries, a 2014 study³¹ recognises that 'the current scale of urban agriculture is difficult to assess' and accepts that urban agriculture is 'a reality for many households in developing countries'. Overall figures on the percentage of existing urban areas devoted to urban agriculture either at global or European level appear to be absent. There is no global-scale dataset on the actual areas available for urban agriculture.

Nevertheless, the 2014 study attempted to calculate the percentage of the existing urban areas that would need to be devoted to urban agriculture to meet the vegetable consumption of urban dwellers in different countries. For this purpose, it sought to quantify the percentage of each nation's total urban area that would be needed to meet two different vegetable production targets. It found that urban agriculture would require approximately one third of the global urban area to meet the global vegetable consumption of urban dwellers. However this masks considerable differences across the globe.

In addition, the study showed that the amount of space available per capita is a major limiting factor for urban agriculture. A further finding that emerged concerns the role of smaller urban areas. As more than 50 % of the world's urban population lives in cities with fewer than 500 000 inhabitants, urban agriculture potential there 'is likely to be higher due to lower population densities'. A conclusion that the study draws at the global level is that urban agriculture policies should not focus exclusively on major urban centres, but also on smaller ones.

In terms of the EU context, one source of information on urban agricultural practice is the COST project referred to earlier in this paper. A pan-European network involving academics and professionals in the areas of urban development and agriculture, its objective was to gain a deeper understanding of Europe's different forms of urban agriculture including its potential from a European perspective. The project visited seven places exemplary of Europe's urban agriculture. These covered the urban regions of Barcelona, Dublin, Geneva, Milan, the Ruhr metropolis, Sofia and Warsaw. More than 200 case studies were collected and made accessible online in an [Atlas](#) of Urban Agriculture Europe. Figure 7 identifies the location of the projects covered in the research.

³¹ F. Martellozzo, J.-S. Landry, D. Plouffe, V. Seufert, P. Rowhani and N. Ramankutty, '[Urban agriculture: a global analysis of the space constraint to meet urban vegetable demand](#)', *Environmental Research Letters* 9, 2014, pp. 1-8.

Figure 7 – Distribution of COST Urban Agriculture Europe projects

Data source: [COST project](http://www.cost-project.eu), 2016.

The COST project website³² provides detailed information about each site. Though the project is not a database of all urban agriculture projects across Europe, the dataset it is based on provides useful case studies reflecting a diversity of experience in urban agricultural practices across the seven metropolitan areas. If combined with other research sources (such as individual studies of cities), further insight can be gained into the relative scale of urban agriculture across Europe. For example, the area of cultivation within the City of Rome has increased between 2 000 and 2010 by nearly 17 % (registering a growth of 6 236 ha) and the number of urban gardens has risen considerably.³³

In mapping out the pattern of urban agriculture across Europe, the COST project notes the following findings in relation to urban farming:

- There is a zone of urban farming running from the Benelux countries to Italy. Subject to a form of controlled urbanisation, urban farming has reacted to the different demands of the city, starting with food supply and then moving onto recreational, environmental, social and other purposes.
- In contrast, the process of adaptation did not occur to the same extent in eastern Europe. Socialist economic systems and the restriction of private investment held back the development of small-scale entrepreneurship. As explained in the study, despite an end to the Cold War, opportunities for farmers could not be turned into successful businesses.

³² See <http://www.urban-agriculture-europe.org/>.

³³ A. Cavallo, B. Di Donato, D. Marion '[Mapping and assessing urban agriculture in Rome](#)', *Agriculture and Agricultural Science Procedia* 8, 2016, pp. 774-783.

In short, the farming that did develop was 'non-urban adapted'.

- In terms of examples of urban agriculture innovation, these are mainly drawn from western Europe, such as the agricultural parks found in Barcelona³⁴ and Milan³⁵.
- Greater cooperation is taking place between municipalities and chambers of agriculture. France is one such example: there, professional urban farmers and citizens are brought together through the organisation Terres en Villes.³⁶

Though the COST project considers that urban farming in former socialist countries lags behind other parts of Europe, it does not mean the situation is static. For example, in the Czech Republic and Poland, a network of educational farms have been established. In terms of trends, the COST project points to: (i) a rise in community gardens as a new type of urban-food gardening reflecting a form of 'active citizenship' (see box below on urban community gardens in Prague); (ii) a renaissance in the form of allotment gardens. As explained in the study on the cultivation of allotments in Dublin and Belfast, both cities could point to an increase in demand for allotments. It is reported that between 2006 and 2014, the number of plots in allotment and community gardens in Spain increased by a factor of six. Similarly in Rome, the number of small urban plots of land tended to by single households has risen considerably. Overall, as the COST project suggests, the economic crisis has helped to promote these trends.

Urban community gardens in Prague

Survey findings³⁷ indicate a trend involving the establishment of new urban community gardens in Prague. Interviews with the founders of such gardens indicate that they were motivated by a desire to do something with their neighbourhood environment and to create a place for meeting and sharing ideas and activities. The gardens were seen as representing another means of communication and the creation of quality social relations. That said, the survey indicated that most of the gardens also fulfilled the function of co-system services, i.e. benefits people can derive from ecosystems, such as food, ornamental flowers, nature education, as well as regulating services such as air filtration, noise reduction, and surface water drainage.

³⁴ Established in 1998, the Baix Llobregat agricultural park lies to the south of Barcelona, fully within its metropolitan area. This 2 938 ha park serves the purpose of conserving the agriculture and environmental value of the area and is the source of fresh, high-quality products, such as artichokes and chickens, that bear the European Protected Geographical Indication. One study describes it as 'the most important agricultural area in terms of land and crop production values in Barcelona' (P. Serra, D. Sauri and L. Salvati, '[Peri-urban agriculture in Barcelona: outlining landscape dynamics vis à vis socio-environmental functions](#)', *Landscape Research*, 2017).

³⁵ The South Milan Agricultural Park in Italy was created in 1990, involving 61 municipalities and covering 47 000 ha.

³⁶ [Terres en Villes](#) is a French network of elected members and agricultural stakeholders that brings together local players around the sustainability of agriculture in urban and peri-urban areas.

³⁷ J. Spilkova 'New urban gardening trends in Prague: community and ecosystem services on stage' in [Second International Conference on Agriculture in an Urbanizing Society](#), 'Reconnecting Agriculture and food chains to Societal Needs', Rome, Italy, 14-17 September 2015, pp. 237-238.

4.2. Potential impact

In terms of assessing the impact of urban agriculture, both in actual terms and in potential terms, some insight can be gained from case studies and the considerable literature covering this subject area. Besides the earlier reference to assessing the global scale of urban agriculture, the contribution that urban agriculture is capable of making to food production can be gauged as follows:

- A case study³⁸ from **Bologna**, published in 2015, suggests that rooftop gardens in cities could potentially provide more than three quarters of all vegetables consumed in them. If all rooftop gardens in Bologna were utilised they could supply around 12 500 tonnes of vegetables a year. Based on actual consumption data, this could meet 77 % of residents' needs for vegetables.
- In the case of **the Amsterdam area**, research³⁹ has found that 12.5 % of the surface area (without counting roofs, ecological spaces or private areas) of the city is easily transformable into food productive space. This could provide 25 % of the population of Amsterdam with vegetables, herbs and fruits. If this result was combined with potential roofs, underground spaces, private areas and space inside buildings, it has been estimated that the number would rise to 90 % (Roggema, 2015). It should be noted that a 2015 analysis of total food consumption in the Netherlands and the estimated production of food within urban boundaries demonstrate that only 0.0018 % of the consumption is currently produced within the city. In order to increase this percentage, more space would need to be offered for urban agriculture.
- Research findings⁴⁰ on the potential offered by an elevated aquaponic food system spanning the top floor and exterior roof space of a disused mill in **Manchester** have been extrapolated across the whole city. They show that if the total surface area of Manchester is taken into account, 33 % is capable of growing food (see box below).
- An analysis of land use in **Rome** shows that it is the most agricultural municipality in Europe. In the context of the rise in the number of gardens there, a number of best urban agricultural practices have been identified.⁴¹ One of them is the **Agricoltura Nuova** multi-functional agricultural cooperative, occupying some 250 ha in two locations to the south of Rome. Established by a group of young people in 1977, the cooperative is viewed as one of Italy's first experiments in social agriculture and has been described as 'an exemplary agricultural model that uses educational and environmental activities to

³⁸ European Commission, '[Science for Environment Policy](#)' Rooftop gardens could grow three quarters of city's vegetables. DG Environment News Alert Service edited by SCU, The University of the West of England, Bristol. Issue 409, 26 March 2015.

³⁹ See R. Roggema, 'Towards fundamental new urban planning for productive cities: the quest for space', proceedings at the Agriculture in an Urbanising Society Conference, Rome, 17-19 September, 2015. See also: R. Roggema, 'On the brink of why and how: sustainable urban food planning grows up', introduction to *Sustainable Urban Agriculture and Food Planning*, edited by R. Roggema, Routledge, 2016.

⁴⁰ A. Jenkins, G. Keeffe and N. Hall, '[Planning urban food production into today's cities](#)' in *Future of Food: Journal on Food, Agriculture and Society* 3 (1), 2015, pp. 35-47.

⁴¹ A. Cavallo, B. Di Donato and D. Marion, '[Mapping and assessing urban agriculture in Rome](#)' in *Agriculture and Agricultural Science Procedia* 8, 2016, pp. 774-783.

restore a strong bond between the territory and the citizens who live there'.⁴² It sells all of its food directly to local markets. It is also involved in the social integration of marginalised individuals. Educational gardens linked with the municipality are reported to be increasing, involving school groups and young people.

Measuring the agricultural capacity of cities – evidence from a study in Manchester

This study sought to devise a method of analysis to determine the agricultural productive capacity of a northern European city through the use of real-world data on technical food systems. As part of the Manchester International Festival, Queen's University of Belfast was approached to design and implement an elevated aquaponic food system within a disused mill in Manchester. The project led to the development of a prototype 'façade farm' – a twin-walled glass façade, capable of growing crops within its cavity.

A subsequent research paper recognised that not all surfaces within a city are capable of supporting the growth of crops; this capability is determined by their orientation and/or the effects of overshadowing on them. Consequently, a methodology was developed to capture the direct sunlight falling upon each surface. To create a virtual model of Manchester, more than 2 800 building plots were created in three-dimensional form, with each plot containing information on building form and height. Using this three-dimensional model, data on light capture was combined in the form of annual lighting data. This was used to help predict the total annual crop production of the city.

Overall, between both vertical and horizontal surfaces, the researchers calculated that the city centre of Manchester is capable of 'growing an estimated 180.4 million crops per year, representing a potential maximum sale value of £712.6 million per annum.

Source: A. Jenkins, G. Keffe, N. Hall, 'Planning urban food production into today's cities' in *Future of Food: Journal on Food, Agriculture and Society* 3 (1), 2015, pp. 35-47.

5. Challenges and limitations facing urban agriculture

5.1. Challenges

Any analysis of urban agriculture in Europe would be incomplete without assessing both the challenges it faces, and some of its limitations. Research⁴³ into the challenges facing agriculture in the PUA has been undertaken by the Flemish Institute for Agricultural and Fisheries Research⁴⁴ in the Belgian cities of Ghent (population: 248 242 inhabitants) and Kortrijk (population: 220 194). Using multiple sources of evidence such as geographic information system (GIS) data, focus groups and semi-structured interviews, the subsequent analysis identified four key 'real world' challenges facing PUA:

- **Tensions between 'traditional farmers' and 'new style' farmers:** Traditional farmers (such as large-scale dairy farmers and farmers running mixed arable farms) considered those promoting new farming initiatives a threat. The former may have the perception that the city is giving the new farmers advantages and that urban initiatives receive more policy support. The research suggests that such perceptions contribute to tensions which

⁴² M. Fraticelli, '[Agricoltura Nuova: a multifunctional cooperative farm, integrated in its community and territory](#)', Periphery of Rome, Italy, 2011.

⁴³ E. Rogge, E. Kerselaers and C. Prové, '[Envisioning opportunities for agriculture in peri-urban areas](#)' *Metropolitan Ruralities*; published online: 26 July 2016, pp. 161-186.

⁴⁴ See hyperlink to [website](#).

can form a strong barrier to cooperation between the two groups.

- **Pressure on open space and farmland:** Both cities could point to pressure on farmland, making it 'almost impossible to start up a new city-oriented initiative'. The research team identified three pressures on agricultural land in PUA: (i) land being irreversibly converted to urban use; (ii) counter-urbanisation, or migration from the towns and cities to the countryside (especially for new residential developments), which can have a significant impact on agriculture; (iii) within the agricultural sector itself, changes involving intensification, scale enlargement and diversification, as well as competition for land amongst farmers.
- **Skills and competences gap:** Farmers were found to be lacking in experience and specific skills in areas such entrepreneurship, networking and marketing, and to have limited access to strategic information.
- **Legislation** was identified as a source of complication in the development of urban-oriented farming initiatives. More particularly, this covered legislation relating to European competition policy, food safety as well as spatial planning.

As a follow up to these findings, the researchers highlighted the issue of pressure on farmland and the implications this has for spatial planning and the protection of open spaces. In looking to resolve these issues, the researchers stressed the importance of multifunctional land-use and the role which can be played by local authorities in the process of facilitating and implementing urban agriculture and other urban-oriented initiatives, such as on-farm selling and farm tourism.

5.2. Limitations

A number of limitations to urban agriculture are identified in the literature. Section 3 highlighted these in relation to environmental dimensions. The box below summarises a series of potential limitations in terms of economic, social and food security perspectives. These draw heavily on the findings of a review on urban agriculture by Santo et al., 2016, which focuses on research 'predominantly from the Global North'.

Summary of possible limitations facing urban agriculture

Economic

- Potential impact on property values and displacement of marginalised low-income residents
- Vulnerability of community gardens to redevelopment
- Competition from other building use, such as rooftop solar energy systems
- Economic viability (e.g. high capital costs of large-scale rooftop greenhouses)
- Dependency on public funds, grants, donations, etc.
- Profitability and financing
- Social goals versus profitability – need for long term financial support

Food security and public health

- Potential health risks, e.g., pollution or soil contamination
- Need for support among urban dwellers to participate in food growing
- Evidence needed on contribution of vertical farming to food security

Social

- Additional expertise and resources needed to address educational and skills needs of marginalised participants
- Who benefits?
- Potentially overlapping aims.

Source: Adapted from: R. Santo, A. Palmer, B. Kim, '[Vacant lots to Vibrant Plots: A review of the benefits and limitations of urban agriculture](#)', Johns Hopkins Center for a Livable Future, May 2016.

Closer analysis of the limitations identified in the review highlights the following points. First, a significant number of limitations relate to economic issues. For example, the high capital costs arising from the retro-fitting of buildings and other capital investments may limit their viability. Second, the review notes that 'most urban agriculture projects are sustained through public funds, grants, donations and volunteer labour, not food sales...'. This could imply a high dependency on public funding, especially if urban agriculture projects in the future wish to provide opportunities for social goals. Such conclusions or observations have implications for the way in which urban agriculture is promoted. Other researchers⁴⁵ have advised against raising expectations that urban agriculture can realistically provide food for local communities, job training and work experience and at the same time generate income for producers and create jobs funded by profits from sales. Without sufficient outside support, the researchers explain that urban agriculture organisations are being encouraged to pursue goals which are 'unattainable'.

Other limitations mentioned in the review relate to the potential health risks to food growers arising from sources of pollution from industrial activity, waste dumps and soil contamination. References are also made to the need for significant interest and support from urban dwellers to participate in food growing and to adopt more seasonal eating patterns. The review acknowledges efforts taken to increase the productive capacity of urban agriculture through, for example, vertical farming, but questions whether these would substantially increase its contribution to food security, especially for lower-income residents who would be

⁴⁵ S. Daftary-Steel, H. Herrera and C. M. Porter, '[The unattainable trifecta of urban agriculture](#)', *Journal of Agriculture, Food Systems and Community Development*, 6(1), 2015, pp. 19-32.

constrained by 'higher prices typically associated with such operations'. Finally, whilst acknowledging the contribution urban agriculture can make to the social capital of communities, such initiatives may require greater external financial support as they will often need additional expertise, such as in remedial education. Evidence from a survey⁴⁶ of US urban farmers indicates that they see profitability and financing as the top challenges they face.

5.3. Lessons learned from case studies

Further insight into the nature of the challenges and limitations facing urban agriculture from an entirely European perspective can be derived from case studies⁴⁷ of urban agriculture in Warsaw and Ghent published in 2016. Undertaken by researchers at the University of Ghent, three sets of factors operating at the city-specific level were identified as having an influence on urban agriculture. These are:

- the existing urban layout – reflecting the need for space for urban food growing;
- perceptions and attitudes towards the use of such space;
- the political climate reflecting the existing broader political frameworks in which UA policies operate.

In both cities, though many diverse forms of urban agriculture have developed, interviewees in a survey undertaken by the researchers complained about the many difficulties they faced in realising novel urban agriculture initiatives. They found that the majority of UA projects involved traditional vegetable gardening. Innovations, such as aquaponics, hydroponics or LED-farming initiatives, were either 'scarce or non-existent in both cities'. However, the number of novel urban agriculture initiatives in Ghent was relatively higher than in Warsaw. In comparing the experience of the two cities, the researchers noted the absence of municipal government stakeholders in the case of Warsaw. In contrast, Ghent had benefitted from the presence of such stakeholders and a focus on networking; these two factors had combined to create a strong platform for urban agriculture.

Social and cultural institutions, entrepreneurs and academics were found to be more strongly represented among stakeholders in Ghent than in Warsaw. Ghent also benefitted from a large number of organisations and initiatives supporting urban agriculture. In 2013, the City of Ghent launched its food strategy 'Gent en garde'⁴⁸, which aims to achieve a sustainable food system for the city. Furthermore, in January 2015 Ghent's City Council approved a Climate Plan 2014-2019⁴⁹ aspiring to make the city climate neutral by 2050. The plan includes actions to promote urban farming, through, for example, space for urban agriculture, guidance for schools wishing to start a kitchen garden and an urban farming project with social employment designed to offer healthy and affordable food. On 15 October 2015, the City of

⁴⁶ Quoted in Santo et al., op. cit., 2016. Survey findings from: L. Oberholtzer, C. Dimitri and A. Pressman, 'Urban agriculture in the United States – characteristics, challenges and technical assistance', *Journal of Extension*, 52 (6), 2014.

⁴⁷ C. Prové, J. Dessein and M. de Krom, 'Taking context into account in urban agriculture governance: Case studies of Warsaw (Poland) and Ghent (Belgium)', *Land Use Policy* 56, 2016, pp. 16-26.

⁴⁸ See 'Gent en garde'.

⁴⁹ Stad Gent, [Ghent climate plan](#) 2014-2019.

Ghent signed the Milan Urban Food Policy Pact⁵⁰, which involves a commitment to measures in support of sustainable urban food systems.

In the case of Warsaw, the research noted that cultural institutions, such as the Warsaw Centre for Contemporary Art, had hosted individual projects. Stakeholders in Warsaw had 'either no or very imprecise expectations of the municipal government in terms of how it could support UA development'. The researchers attributed this to a 'poor understanding of UA within the municipal government and the large socio-economic and cultural institutions'. Moreover, agricultural land and green spaces in Warsaw, such as allotments, were considered to be under threat from investors. The research findings for both cities are summarised in Table 2. An earlier publication⁵¹ on urban agriculture in Warsaw arising from a short-term scientific mission to the city as part of the COST project, highlighted the major role allotment gardens are still playing in the city.

A key conclusion the researchers derived from this comparative study is that city government and a strong network of advocates are 'crucial aspects for creating an environment that fosters UA development'. This conclusion throws further light on the challenges and limitations facing urban agriculture in both cities.

Table 2 – Research findings on urban agriculture in Ghent and Warsaw

Ghent	Warsaw
<ul style="list-style-type: none"> Urban land and space is limited The city has a stated goal to make itself climate-neutral by 2050 Socio-ecological problems are high on the policy agenda Strong municipal government support for UA Idea of local food is popular and there is broad support for gardening projects in public spaces Dynamic network supports multiple UA initiatives 	<ul style="list-style-type: none"> UA has not been adopted either in Polish agricultural policy or in the spatial development policy of Polish cities Spatial policy in Warsaw may facilitate the conversion of agricultural land into other uses 28 % of Warsaw is categorised as green areas Investors keen to build residential or service areas Absence of local government support for UA

Data source: EPRS adaptation from C. Prové et al., 2016, pp. 16-26.

6. European policy context

6.1. European Parliament

Over the years, Members of the European Parliament have raised the issue of urban agriculture through questions put to the European Commission. For instance, in June 2010 one asked⁵² the Commission to identify what it has been doing to support, encourage and

⁵⁰ [Milan Urban Food Policy Pact](#), 15 October 2015.

⁵¹ B. Szulczewska, A. Cieszeńska and C. Prové, 'Urban agriculture and "early birds" initiatives in Warsaw', *Problems of Landscape Ecology*, Vol. XXXVI, Issue 36, 2013, pp. 155-165.

⁵² [Question for written answer](#) to the Commission on city farms, submitted on 10 June 2010, and [answer](#) given by Mr Ciolos on behalf of the Commission on 20 July 2010.

fund city farm initiatives in Europe. In another question from⁵³ July 2012 the Commission was probed further, asked to indicate whether specific attention had been devoted to the role that urban farming could play in feeding urban populations as part of plans to reform the EU's agricultural policy. In July 2015, a question⁵⁴ for written answer was submitted asking the Commission to clarify its stance on UA and PUA and to identify measures it was adopting to foster it.

At its meeting⁵⁵ on 20 March 2017, the Parliament's Committee on Agriculture and Rural Development (AGRI) agreed to commission a study that would reinforce the evidence base in the area of urban agriculture and would throw further light on the role that different actors play in the development of urban agriculture, along with the implications for policies at different levels.

6.2. European Commission

The responses to MEPs' questions provide an insight into the Commission's position on urban agriculture. They show that the Commission recognises that 'city farms' could have a positive impact on the environment, though this depends on the farming practices adopted. Though the EU rural development policy over the period 2007 to 2013 did not include any specific support for city farms, urban farms could be subject to support in the framework of that policy but only insofar as they were located on land fulfilling the respective eligibility criteria established by the Member States. These could potentially include aid for activities such as modernisation of agricultural holdings, development of new products, processes and technologies in the agricultural and food sector or for participation in food quality schemes, as well as other forms of aid, such as agri-environmental measures. The Commission also confirmed in August 2012 that support to urban farms was available under both pillars of the CAP so long as the eligibility conditions were met. The Commission has also acknowledged that urban farming could contribute to the objectives of sustainable development in an area, so long as the principles of sustainable farming were followed.

Agriculture and Rural Development Commissioner, Phil Hogan, has also indicated that the operations funded within the rural development programmes 2014-2020 could be used for the benefit of UA or PUA. He acknowledged, however, that none of the available measures is targeted towards the promotion of urban agriculture. It is up to Member States to choose the types of operation or measures they want to include in their rural development programmes. These include: support to investments in agricultural holdings; agri-environmental measures; organic farming; quality schemes; co-operation actions, including assistance towards involvement in short supply chains; LEADER-type projects;⁵⁶ support for fruit and vegetable growers through producer organisations; support for young farmers; support through the

⁵³ [Question for written answer](#) to the Commission on urban farming, submitted on 10 July 2012, and [answer](#) given by Mr Ciolos on behalf of the Commission on 31 July 2013.

⁵⁴ [Question for written answer](#) to the Commission on fostering of urban and peri-urban agriculture, submitted on 20 July 2015, and [answer](#) given by Mr Hogan on behalf of the Commission, 15 September 2015.

⁵⁵ AGRI [Minutes](#) of meeting, 20-21 March 2017.

⁵⁶ LEADER is a Community-led local development method for mobilising and developing rural communities through local public-private partnerships (local action groups).

Community-led local development tool (CLLD), which can address the issue of urban – rural linkages.

6.3. European Economic and Social Committee

For its part, the European Economic and Social Committee (EESC) has acknowledged the need for peri-urban areas across Europe to be given social, political and administrative recognition, at an early stage. In a 2004 own-initiative opinion on agriculture in peri-urban areas,⁵⁷ the EESC recognised the role such areas play in the relationship between city and country, as well as the specific difficulties they face. The opinion recognised that PUA presents unique characteristics, which in its view 'must be exploited to the full'. These include the opportunities provided by the proximity of PUA sites to consumer markets, growing demand for food quality and a social demand for new activities such as leisure, training, environmental education and ecotourism.

The EESC argues for specific measures in support of the conservation, planning and management of peri-urban areas with agricultural activity. Included amongst its suggestions is the need for establishing a European Observatory for PUA and for clarifying the role of charters⁵⁸ on PUA. In order to develop the roles of a specific PUA area, the opinion suggests the drawing up and adoption of 'sustainable management and development plans'. Subsequent developments in the city of Ghent, as outlined in the previous section, illustrate how such actions can be taken to ensure the dynamic and sustainable development of PUA in Europe.

6.4. Stakeholders

In terms of stakeholders, the research undertaken by Opitz et al (2016)⁵⁹ points to the involvement of a range of stakeholders in urban agriculture initiatives. They include umbrella or supporting organisations and advocacy groups. This research also highlights the involvement of public institutions, municipal councils, volunteers, farmers and landowners, the latter two groups being significant for PUA.

Further insight into the range of stakeholders involved in urban agriculture initiatives can be obtained from the action research project examining the vision, plans and strategies needed to embrace the potential of agriculture in peri-urban areas through case studies in the Flemish cities of Ghent and Kortrijk (mentioned earlier in the present document). The stakeholders who were engaged in the action research were 'government employees of different policy areas and levels, 'traditional' and 'new style' farmers, representatives of farmers' unions, nature organisations, NGOs and activists. One conclusion from the research was on the need to involve as broad a group of individual stakeholders as possible (for instance, hobby farmers, horse owners and rural entrepreneurs) in planning for PUA initiatives.

⁵⁷ [Opinion](#) of the European Economic and Social Committee on Agriculture in peri-urban areas NAT/2014, Brussels, 2004.

⁵⁸ See M. Hardman, P.J. Larkham, 'The rise of the 'food charter: A mechanism to increase urban agriculture', *Land Use Policy* 39, 2014, pp. 400-402. This article notes how 'food charters' are being used to facilitate and expand urban agriculture activities.

⁵⁹ Opitz et al, (2016, p. 349).

At the European scale, reference can also be made to the PURPLE⁶⁰ network, which aims to promote greater recognition of peri-urban regions in European policy and regulation. It does this by enabling a sharing of knowledge and good practices among its members and by assuming a role as a primary interlocutor with EU institutions. The network also has a Peri-Urban Charter,⁶¹ which supports the call for the development of a common vision for Europe's peri-urban areas. Recognising the multi-functionality of such areas, reference is made in the charter to food production close to large populations.

7. Conclusions and outlook

7.1. Conclusions

This document began by acknowledging the growing popularity of urban agriculture among a wide range of stakeholders and individuals. A number of factors combine together to help explain this trend. In part, it reflects increasing concern over food security at a time when the world's population is largely urbanised.⁶² In recent years, an increasing number of municipal governments have been developing policies to address the relationship between urban areas and their surrounding rural areas. In the past, urban agriculture was associated or linked with times of crisis. In recent years, it has been suggested that the interest of urban planners, researchers and the media in urban agriculture may be due to its links with the three pillars of sustainability: economics, society and the environment.⁶³ As a consequence, this has enabled those concerned with urban food strategies to make more explicit the connections between urban agriculture and its potential contribution to economic, social and environmental objectives.

These connections reflect the capacity of urban agriculture initiatives to address a range of issues, such as climate change, health and social inclusion of particular vulnerable groups and marginalised communities, as reflected in the range of urban agriculture initiatives existing across Europe. One key conclusion to draw out from studies on urban agriculture initiatives time and time again is the need for what one researcher has called 'an integrated view' of this subject area.⁶⁴ This is where it can be seen not only as a source of fresh food but also as a mechanism of social integration, economic development and environmental sustainability. Charlotte Prové in research examining the governance of urban agriculture has stated 'urban agriculture ... certainly isn't about farming or food production alone...'.⁶⁵ It goes beyond food and agriculture and can include social, economic as well as environmental dimensions as

⁶⁰ Established in 2004, the Peri-Urban Regions Platform Europe ([PURPLE](#)) network brings together regions from across the EU.

⁶¹ The [Peri-Urban](#) Charter, PURPLE.

⁶² R. Sonnino, 'The new geography of food security: exploring the potential of urban food strategies', *The Geographical Journal* 182 (2), 2016, pp. 190-200.

⁶³ K. Ackerman, M. Conrad, P. Culligan, R. Planz, M. P. Sutto and L. Whittinghill, 'Sustainable food systems for future cities: the potential of urban agriculture', *The Economic and Social Review*, Vol. 45, No 2, 2014, pp 189-206.

⁶⁴ W. van der Schans, 'Urban agriculture in the Netherlands', *Urban Agriculture Magazine*, No 24, 2010, pp. 40-42.

⁶⁵ C. Prové, 'The role of urban agriculture in Philadelphia: A sociological analysis from a city perspective', summary report, 2015.

explained in Section 3 of this paper. This point is further reinforced when the range of different policy areas are considered where urban agriculture can potentially have an impact as illustrated in the box below.

Role of urban agriculture: policy areas of potential impact from UA activities		
Health	Poverty	Food production
Nutrition	Social inclusion	Sustainable / profitable agriculture
Education	Racial integration	Local economy
Culture	Community development	Environment
Recreation	Crime Reduction	Food Access
Data source: EPRS adaptation from C. Prové, ' The role of urban agriculture in Philadelphia: A sociological analysis from a city perspective ', summary report, 2015.		

As this last point shows, this briefing has drawn on research studies, literature reviews and experience from the United States of America. Despite the differences which exist in terms of farm structure, employment and food consumption patterns, the US sources have provided a useful basis for comparative research as there are a number of commonalities on certain themes in relation to urban agriculture. These include for example, the assessment of impact; the role of public policy, the identification of research gaps as well as the challenges facing urban agriculture and how they can be addressed.

Many of the diverse research gaps identified in a recent review of urban initiatives in the USA⁶⁶ would be equally applicable to the European situation. For example, research on the profitability of commercial urban agriculture projects offers the potential opportunity for mutual learning as well as the exchange of best practice. There are a number of issues of common interest to both the EU and the USA. This is further reinforced by the fact that a number of European researchers have undertaken and published research on urban agriculture in US cities.⁶⁷

7.2. Outlook

The research studies and commentaries relating to urban agriculture have helped to demonstrate the complexity of factors which come together to influence its development, spread and adoption. Much has been written on the potential benefits that urban agriculture can make to food security and sustainable development as demonstrated in the findings of the COST project. These included positive effects that urban agriculture can bring in relation to employment, social inclusion, poverty reduction, education, mitigation of climate change, preservation of biodiversity and promotion of cultural diversity.

Despite the potential benefits that urban and peri-urban agricultural initiatives have to offer, the scale of the challenges, limitations and bottlenecks they face should not be

⁶⁶ Adapted from: Santo et al., op. cit.2016.

⁶⁷ C. Prové, 'The role of urban agriculture in Philadelphia: A sociological analysis from a city perspective', Philadelphia, USA, full report and summary, 2015. See also: K. Specht, R. Siebart, I. Hartmann, U.B. Freisinger, M. Sawicka, A. Werner, S. Thomaier, D. Henckel, H. Walk, A. Dierick, 'Urban agriculture of the future: An overview of sustainability aspects of food production in and on buildings', *Agriculture and Human Values*, 31, 2014, pp. 33- 51; K. Morgan and R. Sonnino, 'The urban foodscape: world cities and the new food equation', *Cambridge Journal of Regions, Economy and Society*, 3, 2010, pp. 209-224. (This article examines urban food strategies in both London and New York).

underestimated. These can include a lack of available agricultural land,⁶⁸ a lack of compatibility with spatial planning policies, or certain bottlenecks on small-scale production in short food-supply chains.

In a targeted review of key European policies (with a particular focus on the Bristol City-Region, UK) that are likely to have an impact on urban agriculture, Curry et al.⁶⁹ argue that 'European policy so far has not had the "transformative effect" it could have on urban agriculture, at least in part because such policy resolutely conceives of food production as a rural activity'. The review identified nine policy areas considered to have relevance to urban food.⁷⁰ The possible link between other areas of EU policy (for instance, those related to healthy living and alleviation of social problems) and urban agriculture was also recognised. In addition when the regulatory framework relating to issues such as plant health, animal health and food quality is considered, it can be seen that the policy landscape relating to urban agriculture is a complex one and that the issue requires a more cross-cutting approach.

In relation to the Common Agricultural Policy (CAP), interviews with stakeholders in the UK's Bristol City-region pointed to a general view that it had 'no relevance to local food', with an imbalance in the relative levels of support between Pillar I and Pillar II, with Pillar II offering the most potential for embracing urban agriculture. One interviewee made the point that if one innovates in food production through aquaponics or biotechnology, 'you innovate yourself out of the CAP support because you are no longer using land...but other factors of production.' Other viewpoints conveyed in this review refer to a perception that 'the role of urban food specifically, on urban regeneration, too, is not high on the European policy agenda'. Overall, Curry et al conclude that given the multifunctional context within which urban agriculture has to operate, policies from a wide range of sectors have to be accounted for. In this context, they note that the sectorial nature of EU policies 'does not suit the holistic temperament of urban agriculture'.

In policy terms, there has been a call for greater recognition to be given to urban agriculture. In June 2013, the COST Action project issued the Barcelona Declaration⁷¹ on Urban Agriculture and the CAP. This made the point that urban agriculture had been largely neglected in Europe's policies and especially in the CAP. It had neither been institutionalised within the EU administration level nor within the Member States. As a consequence, the declaration asked for a 'stronger consideration of urban agriculture' and its recognition as a 'driving force for innovation...'. Looking to the future, it remains to be seen how the current modernisation and simplification of the CAP and the ongoing discussions on the future of cohesion policy post-2020 will impact on future prospects for urban agriculture in Europe. A key challenge for urban agriculture is how to achieve the necessary integration across all EU policy areas.

⁶⁸ See E. Mettepenningen, M. Koopmans, G. Van Huylenbroeck, 'Exploring the growth potential of (peri-)urban short food chain initiatives: a case study of Ghent', *Spanish Journal of Rural Development*, Vol. V (Special I), 2014, pp. 79-90.

⁶⁹ N. Curry, M. Reed, D. Keech, D. Maye and J. Kirwan, '[Urban agriculture and the policies of the European Union: the need for renewal](#)', *Spanish Journal of Rural Development*, Vol. V (Special 1), 2014, pp. 91-106.

⁷⁰ The nine policy areas identified in this research were: Agriculture, fisheries and food; Business; Sustainable Development; Climate action; Employment and social rights; Energy and natural resources; Environment, consumers and health; Regions and local development; and Science and technology.

⁷¹ COST Action Urban Agriculture Europe, [Barcelona Declaration on Urban Agriculture and the Common Agricultural Policy](#). 2pp. 24 June 2013.

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It is estimated that by 2050, 67 % of the world's population will live in urban areas. Increasing concerns over food security coupled with concerns over climate change have helped to promote interest in urban agriculture and the role it can play in respect of food security.

The present paper aims to provide an overview of urban agriculture by examining it as it relates to issues of food security, the economy, social dimensions and the environment. Using short case studies and drawing on research from both Europe and the USA, the paper further explores the potential impact that urban agriculture can have and sets out its policy context. Looking to the future, one of the many challenges facing urban agriculture will be how it will achieve the necessary integration across all relevant EU policy areas.

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