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ORIGINAL RESEARCH

The 'Covid-Trigger': New Light on Urban Agriculture and Systemic Approach to Urbanism to Co-Create a Sustainable Lisbon

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Abstract
In 2018, Lisbon won the title of Green capital of Europe 2020. It was described by the Expert Panel as an inspirational city which had started its journey towards sustainability during a period of economic crisis. A year later, Covid-19 had become a global pandemic. Imposed confinements highlighted the extent to which globalisation has spread the virus, as well as the particular fragility of places like cities where people, living together, were asked to not physically interact anymore. Exploring further that very particular global crisis can help to identify the faults in our economic systems and to ask why Lisbon was neither resilient nor sustainable in the face of that adversity. In addition to highlighting how weak our health is, Covid-19 has exacerbated vulnerabilities in Lisbon such as job losses (especially in the touristic sector), food supply (Portugal imports 70% of its food) and food waste. This paper explores how the activity which, '*par excellence*', meets the most basic of our needs (food), through the example of Urban Agriculture (UA), could contribute to discussions on what makes a city sustainable. A literature review on UA in Lisbon highlights its various benefits, complemented by a broader literature review which converges to showing how UA can help to address the vulnerabilities generated or exacerbated by Covid. Having shown its potential contribution to addressing crises, this article then suggests to examine how systems approaches could help to incorporate UA further in a new type of more participatory urbanism aimed at creating sustainable cities.

Keywords Urban agriculture · Resilient sustainable Lisbon · Food networks · Social urbanism · Systems approaches to urbanism

Introduction

With its title of Green capital of Europe 2020 and its 27 hectares of UA initiatives, Lisbon is a good example of a city that has found the way to produce its food and integrate food production into its environmental strategy. A rich literature on the subject

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(Mougeot 2015; Oliveira and Morgado 2016; Delgado 2017, 2018a; Dias and Marat-Mendes 2020) has been describing the wealth of existing UA initiatives over the last decade. Yet, this same literature deplores the fact that UA is not further integrated in urban strategies aimed at making Lisbon more sustainable.

That UA has the capacity to help citizens deal with crises has been proven throughout time. In Western Europe, authorities encouraged urban allotments in the 19th c. and, during the major humanitarian crisis of World Wars I and II, UA provided urgent food provision. In Portugal, people's ability to produce their own food was further reinforced when Portugal joined the EU in 1986 and turned its back to agriculture. With the Covid-19 crisis hitting hard the economy and, in particular, its tertiary sector (with a then-vibrant touristic industry), with more than 30% of people having lost their jobs (mainly in the tourism industry) and food banks getting overwhelmed (Correio da Manha 2020), a paradigmic shift may have taken place, enabling to approach UA in a new light.

The main questions this article asks are: i) Will the Covid crisis trigger a shift in the way in which 'sustainable strategies' for the city are being designed as well as in the content of these strategies with a stronger focus towards resilience and ii) Could UA help as a catalyst to develop systemic urban planning?

To answer them, **Part I** first presents a literature review on the benefits of UA in Portugal and elsewhere – since research on UA has gained interest in Northern countries after being mainly carried out in 'the South' (Morgan 2014; Mougeot 2015) – and shows how these benefits contribute to addressing the Covid crisis in various ways. In **Part II**, having observed that these benefits deal with the various dimensions of 'sustainability', the article explores whether lessons drawn from UA could contribute to the development of a more participatory type of 'social urbanism', aimed at progressively transforming a city into a sustainable one. This research examines to what extent systems approaches could, with the help of a practical case study such as UA, demonstrate that creating a sustainable city goes beyond greening it.

The Benefits of UA: Addressing the Covid Crisis and Illustrating the Multiple Dimensions of Sustainable Practices

This first part presents the outcomes of a literature review on the various benefits derived from UA. In the last twenty years, there has been a renewal of interest in UA in the context of *urban studies* and finding ways to *make cities more sustainable*, in particular in view of operationalising the sustainable development goals SDG11 identified by the UN. Research has also been carried out in the domain of *alternative agriculture,* with projects on agro-ecology, permaculture, hydroponics, small-scale agriculture, which highlighted the importance of UA as a means of subsistence and critically addressed the environmental impacts of industrial agriculture. The use of search engines with key words focused on both *urban issues* and *agriculture* led to that of '*food security'*, which itself, in the current context, tightly relates to questioning of globalisation, jeopardised food supplies, and short-supply food chains. Synthesising the findings of the literature review led us to conclude that UA can be beneficial in social, ecological and economic ways. In Lisbon, it also addressed vulnerabilities that had been either created or exacerbated with the Covid Crisis. Before giving more detail on the findings of the literature review, it is worth first examining what the vulnerabilities mentioned above are.

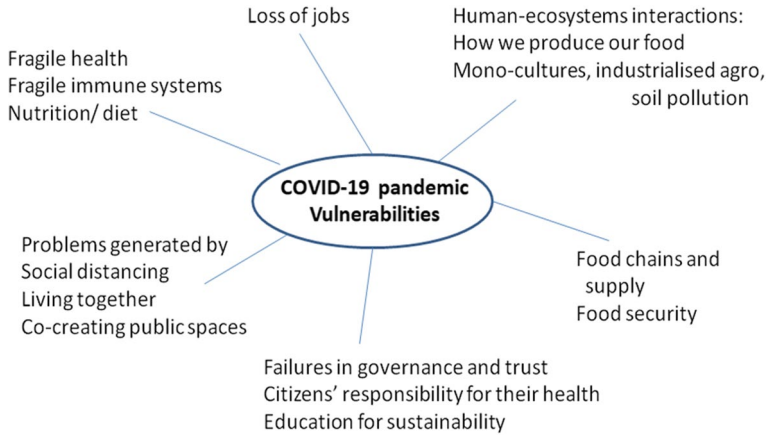

Fig. 1 Vulnerabilities exacerbated or generated by the Covid-19 crisis. Source: Author

UA as a Response to the Covid Crisis

Some of the most preoccupying effects that the Covid-19 crisis has had on inhabitants of Lisbon include loss of lives (17,798 up to now) and the realisation that people's health and immunity are fragile (there were 1.05 M cases so far[1]), as well as loss of jobs[2] and a brutal interruption in the momentum and impetus given to the economy through strategies based mainly on the touristic and industrial sectors. In addition, new urban challenges appeared, emerged from the need to respect social distancing. Another immediate and very tangible effect of the crisis has been a food crisis. At the end of April 2020, articles in the Correio da Manha indicated that calls for help in the form of charitable food donations had increased by 50% in one month, with 150 000 families suffering from hunger. In total, 600 000 people had been reported as not being able anymore to meet their own needs and earn a living because of the Covid Crisis.

Figure 1 synthesises the types of vulnerabilities that the Covid crisis has generated in Lisbon.

A new interest for developing agriculture in urban areas has emerged in Western cities as part of 'food movements', and UA is now seen as having the potential to becoming a key part of strategies for reducing cities' ecological footprint, recycling urban wastes, containing urban sprawl, protecting biodiversity, building resilience to climate change, stimulating regional economies, and reducing dependency on the global food market (Poli 2017). UA is considered "the growing of plants and the raising of animals within and around cities. It is integrated into the urban economic and ecological system and is embedded in – and interacting with – the urban ecosystem. Such linkages include the use of urban residents as labourers, the use of urban resources (organic waste as compost, for instance), direct links with urban consumers, direct impacts on urban ecology, being part of the urban food system, competing for land with other urban functions and being influenced by urban policies" (Delgado 2018a:170).

[1] Worldometers.info/coronavirus/country/portugal

[2] Silva, J., K. Kouhen, M. Gaspar and M.Leitao (2021) and Demony, C. (March 2021)

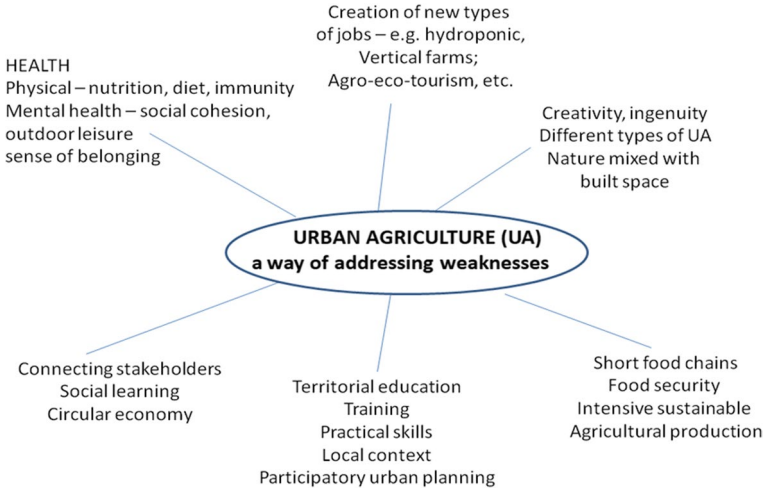

Fig. 2 UA's potentials to address vulnerabilities generated or exacerbated by Covid-19. Source: Author

Focusing more research efforts on UA issues to face the Covid-19 crisis is necessary and urgent. This is not only because current agricultural practices, especially those associated with large-scale or industrialized systems, are considered to have negative impacts on environmental, social, and health factors (Nicholls et al. 2020). It is also because UA seems to have the potential to positively address many aspects of the Covid crisis (See Fig. 2).

These benefits can be classified into ecological, economic and social types of benefits.

The Ecological Benefits of UA in Lisbon

Since its entry into the EU in 1986, Portugal has experienced a re-orientation of its economic activities towards the secondary and tertiary sectors—industries and services such as financial, IT and tourism. This was accompanied by a rapid increase in urbanisation and it has been estimated that nearly two thirds of Portuguese people now live in cities (Léonard 2018). These changes triggered concerns regarding certain environmental issues, mainly an increased dependency on energy, difficulties in providing efficient facilities for waste management and sometimes lack of access and quality of natural resources, in particular water and soil. More specifically in cities, "climate change, over-consumption, plastic waste and biodiversity loss have been major threats[3]". In addition, as explained by the Architects Council of Europe (2020), "Over many decades, the city has faced aggressive urban development in its peripheral neighbourhoods, coupled with depopulation in the historical centre due to a combination of abandoned and aging buildings, aging population, lack of infrastructures and general deterioration of the quality of life". Addressing these challenges led to the development of measures focused on waste recycling, reduction of CO_2 emissions and greening of the city. Their success was recognised through Lisbon being awarded the title of 'Green capital

[3] https://ec.europa.eu/environment/europeangreencapital/lisbon-is-the-2020-european-green-capital-award-winner/

of Europe 2020' in June 2018. In terms of CO_2 emissions and energy consumption, Lisbon was the first European capital city to sign the New Covenant of Mayors for Climate and Energy in 2016, after achieving a 42% reduction in CO_2 emissions from 2002 to 2014, surpassing the 40% initial goal for 2030; and reducing energy consumption by 28% from 2012 to 2017 (EU 2020: 10).

However, the overall environmental plan of the city went further. Thus, in 2012, changes were made to the city's Master plan for 2012–2022, resulting in a considerable increase in green corridors, a strong emphasis on public transport, walking and cycling, and the development of a Climate Adaptation plan which includes a programme to plant 100,000 trees and the installation of green infrastructure to help reduce temperatures. The Lisbon municipality established the Lisbon Strategy (2010–2024), whose objectives focus on city regeneration, climate change adaptation and connecting green spaces (Santos et al. 2015; Alcoforado et al. 2009). The city expended its green strategy to ensure an increase of 250 hectares of green space between 2008 and 2019, and a total of 350 hectares until 2022.

Lisbon's original Master Development Plan and Biodiversity Action Plan designed by the municipality of the city of Lisbon had been inspired by Ribeiro Telles (1996), famous Portuguese landscape architect who battled, as Lisbon's Municipality Councilor in1998, for the Ecological Structure of the city and whose efforts were recognized in 2007 with the approval of "Lisbon's Green Plan", integrated in the Master Plan for the city´s development. The "Portuguese Association of Landscape Architects" (APAP), entity of which he was a founding member (1976), and President (2001 to 2005), still carries on the defence of a sustainable development models. Ribeiro Telles' ideas stressed the need to conceive the sustainability of a city beyond its mere greening. Lisbon's Master development plan (2014) and the Green Plan (http://www.cm-lisboa.pt/viver/ambiente/corredores-verdes), together with the Biodiversity 2020 Strategy, promoted UA, stressing that it can **e**nhance sustainable urbanisation, restore ecosystems, contribute to climate change mitigation and adaptation, and improve risk management (https://oppla.eu/casestudy/17624)**.**

The existence of 21 municipal horticultural parks and 750 allotment gardens for local organic farming (EU 2020: 38) results from green initiatives and the evolution of a strong UA tradition. If, as Cancela (2009) points out, such tradition already existed in the 16th c. in Portugal, with the '*quintas de recreio'* that provided the city centre with fresh products, the resurgence of UA nevertheless tended to be symptomatic, later on, of immediate basic needs that could only be met by city dwellers' autonomous initiatives. Thus, in the 1970s, with the degradation of the economic situation in Portugal and the return of people from former Portuguese provinces in Africa, some shantytowns grew in the peripheries of cities, in parallel with spaces for subsistence agriculture. Marginal spaces (roadsides, ancient farms, or unoccupied urban areas) have been used for subsistence agriculture throughout time and today, several squatter gardens still exist in Lisbon (e.g. *Horta do monte*, *Valede carnide* and *Oeiras*) (Santos 2011; Cardoso 2012; Saraiva 2011). Delgado (2017) identified that, in Lisbon, the 2008 economic crisis brought about a significant increase in allotment gardens.

In 2011, Lisbon municipality began the programme 'parquet Horticolas Municipais' (CML 2016), which today comprises 25 urban spaces, involving more than 500 families and in 2012, two of the most well-known urban agricultural parks were established; Granja Farm and Campolide Gardens. A year later, according to the Portuguese national report to habitat III (Branco 2016), 16 out of the 18 LMA districts had allotment gardens, covering 27 hectares (Delgado 2017: 140). Then, between 2009 and 2017, about 190 ha of new green areas were created, supported by 9 'green corridors' and anUrban Allotment Garden program.

The connection of existing and new green areas in continuous corridors is aimed at mitigating urban 'heat island' effects within the city, providing a range of measures that enhance sustainable urbanization, restore ecosystems and their functions, and aid in climate change mitigation. And indeed, during the last 20 years, research has shown that UA can contribute to minimising the effects of climate change and to improving the quality of life in urban areas. Combining concerns about the health of urban dwellers as well as the ecological health of the city environment, much research is now exploring how urban agroecology and permaculture could help to provide citizens with healthier food (Costa Pereira et al. 2020; Koohafkan et al. 2012; Altieri and Nicholls 2018), whilst helping combat climate change (Dubbeling 2015; Dubbeling and Halliday 2019; Alcoforado et al. 2009). But the benefits go further and, in particular, are also social and economic. These designated areas of UA also offer civic recreation to citizens and promote a healthier lifestyle through repurposing previously abandoned areas of the city.

In recent years, Lisbon has set up a working group to draw upon and enhance UA, called the Parallel Biodiversity Strategy (Curtin 2021). From the beginning of the 21st c. informal UA initiatives were backed up by more institutionalised ones and the question is now whether urban planners are going to facilitate further move towards city food-autonomy.

These green initiatives, including UA, align with more general research conclusions that showed that *growing trees* helps to tackle the set of environmental damages contributing to climate change generated by cities: although these cover only 2 to 3% of all land area in the world, they consume approximately 75% of the world's energy, generate 80% of the CO_2 emissions, utilise large quantities of water, create an enormous quantity of waste and pollute the air (Skar et al. 2020). Areas focused on growing plants in the form of *growing food* would contribute even more to sequestrating CO_2 since, as an international team of scientists from Western Sydney University and CSIRO has found, younger plants, including growing forests, are much more capable of taking carbon dioxide out of the air and storing it away than older established forests.[4]

The Economic Promises of UA in Lisbon

When Portugal joined the EU in 1986, its society and economic activities were radically and rapidly transformed and the agricultural sector lost its importance. Whilst, in 1950, 48% of the active population was working in the agricultural sector, it decreased to a mere 5% in 2001 and the Portuguese agricultural production in 2008 was less than 20% in weight of the total of agricultural products consumed in the country (INE 2009). This led the country to suffering from an imbalanced food system within which it needs to import food to meet its own needs—75% of fruits were in imported in 2009 (Cancela 2009).

In 2020, the imports of vegetables and certain roots tubers had grown by 24.9% and that of fruits by 18% in one year (https://bestfoodimporters.com/food-importers-and-food-import-trends-in-portugal-2020/#).

With the current Covid crisis, the transformation of world economies and serious questionings about globalisation and food supply chains (FAO 2020), concerns about food security and a return to more agricultural production is being envisaged. In particular, "an increase in food self-sufficiency in urban areas opens up the potential for better

[4] https://www.westernsydney.edu.au/hie/stories/young_growing_forests_offer_the_greatest_opportunity_for_carbon_storage

security of supply and a lower environmental impact associated with food production. First of all, due to the reduction of transportation distance, and secondly due to a greater scrutiny by consumers (who are closer) about the means of production. This does mean changes in land use, a shift towards more fruit-and-vegetables-based diets, and more efficient use of resources throughout the food chain ensuring significant reductions in food waste" (Museum of Lisboa and Lisboa Camara Municipal 2021:132). Various studies have focused on food security in Portugal (Alvares and Amaral 2014; Gregorio et al. 2018). From 2014 until now, these estimated food in-security in Portugal to be affecting on average 17% of the population.

Today the food consumed in the city of Lisbon is almost entirely produced outside its immediate borders. However, at the level of the Lisbon Metropolitan Area (LMA), farming and forests remain important, covering 50% of the area. "As such the region has the potential to be self-sufficient in certain food products. Given that the LMA adjoins the West, which is one of the country's foremost fruit and vegetable producing regions, there is a huge potential for covering the LMA's food needs from within a 150 km radius" (Museum of Lisboa and Lisboa Camara Municipal 2021: 131).

Following the realization that 15% of the world's food is grown in urban areas and that, at a global level, UA supplies food to a quarter of the world's population (Altieri and Nicholls, 2018), further research investigated the potentials of UA and the possibilities to 'apply it at home'. McDougall et al. (2019) focused on the high yields generated by small-scale UA and Altieri and Nicholls (2018) investigated how agro-ecology, which can currently provide 15 to 20% of global food, could help cities reach a state of food self-sufficiency.

In Portugal, Mougeot (2015) focused on *hortas urbanas* and studied how innovative short food chains can be drivers for sustainable urban development. Saavedra Cardoso et al. (2017) researched the potential of the Lisbon city region, Ribatejo e Oeste, to increase its Regional Food Self-Reliance (RFSR), through adopting demand restraint and food system relocalization. Branco (2016) explored the historical evolution of the revival of UA in Portugal, and identified the beginning of the twenty-first century as a turning point, with the opening of the first formal Portuguese allotment garden in 2003 and then the start, in 2011, of the ambitious program '*Parques Horticolas Municipais'*, resulting in 16 out of the 18 districts of the LMA having created allotment gardens. These initiatives were so promising that Portugal started benefiting from European programmes such as the Leader + initiative (2000–2006), which supported the PROVE programme (national short food chain initiative connecting producers directly with consumers).

Research also focused on how UA could trigger shifts in economic activities and urban planning by re-orientating the city strategy and its land use. Thus, Delgado (2015) explored whether UA could help to address the Portuguese 2008 crisis by turning vacant land into productive, environmentally healthier places of food production and gathering. This specific preoccupation was born out of concerns that people were losing their jobs, a concern which has since then been revived. As explained by Silva et al (2020), the COVID-19 pandemic came at a time when economic and job market growth were getting back to their pre-crisis levels. "Sectors which have stopped or nearly stopped for reasons of public health (restaurants and bars, lodging, travel and transportation, personal services, entertainment and leisure, wholesale and retail commerce, and sensitive transformative industry), represent around 20% of the payroll in Portugal". If, according to the Institute of labour Economics, in September 2020, the distribution of unemployment across the three main sectors of economic activity was as follows: 73% in the tertiary sector, 21% in secondary sector and 3.8% in the primary sector (https://bestfoodimporters.com/food-impor

ters-and-food-import-trends-in-portugal-2020/#), "the number of people registered as unemployed in Portugal jumped nearly 37% in February (2021) from 2020 to reach a level not seen since mid-2017" (Demony 2021).

UA could not only contribute to food self-sufficiency but also, through training processes and changes in land use, help in creating new jobs in UA, ranging from urban farms to highly modern hydroponic and vertical farming.

Socio-Political Dimensions of UA in Lisbon

Beside the productive and regulating ecological services that UA provides, it also generates numerous social services. Thus, UA can not only feed people but it can feed them *healthy food* and potentially trigger a long-term *change in diet*. In Portugal, the National Program for the promotion of healthy eating of the Directorate-General for health, initiated in 2012, implemented measures for improving dietary habits, nutritional status and health. Later, this effort grew into a national strategy throughout the decade 2010–2020 (Graça et al. 2020), complemented by an Appropriate Food and Nutrition Strategy by the FAO and the CPLP in 2017 (https://bestfoodimporters.com/food-importers-and-food-import-trends-in-portugal-2020/#).

The link between food production, nutrition and health is now more clearly made as a result of health related debates during the Covid crisis. Saavedra Cardoso et al. (2017) had already investigated food system transformation through changes of diet in the Lisbon area. They had considered three new diet scenarios (meat-based, plant-based and strict vegetarian) and showed the extent of local food production that could improve food self-reliance, with 72%, 76%, 84% of total food needs in the meat-based, plant-based, and strict vegetarian scenarios, respectively. They concluded that "food system transformation by means of re-localisation, is ecologically feasible and would ensure the sustainable use of the ecological basis of food security. Additionally, a dietary transition would imply significant land sparing, which strengthens the demand restraint perspective for a transition to food system sustainability" (Saavedra Cardoso et al. 2017:1).

UA has also been shown to help with mental health. Mendes-Santos et al. (2020) explain that being quarantined is a significant immediate and long-term risk factor to the mental health of both healthcare providers and the general population. Through a systematic literature review and 8 case studies, Lampert et al. (2021) concluded that community gardens are considered affordable and efficient way of promoting physical and mental health for their users of all ages. Nova et al. (2018) also showed the benefits of gardening in symptoms of anxiety and depression in adults with psychological issues. As Costa Pereira et al. (2020) concluded after interviewing numerous '*horteloes*' of Lisbon, "*hortas* are convivial places where solidarity, helping each other and sharing products excesses still exist. For unemployed people, this is a healthy alternative to television of much time spent in coffee shops. Working at the allotment allows them to be outdoor, in contact with nature" (p.70).

The social benefits of UA extend beyond physical and mental health but also positively affect other social issues. Some studies have focused on ways in which UA helps city dwellers, and in particular poorer communities, to feed themselves and keep their traditional agricultural practices alive. Thus, Howard et al. (2008) explored Globally Important Agricultural Heritage Systems (GIAHS) in various settings. Wascher et al. (2015) reviewed innovative UA initiatives in the 21st c. and showed that UA goes well beyond poverty alleviation and subsistence agriculture, opening up new perspectives and perceptions on agricultural activities and cities. Horst et al. (2017) and Fernandez (2017) saw in UA an

opportunity to address problems of food injustice enhanced by the Covid-19 crisis. Renting et al. (2012) worked on building food democracy through UA networks and showed how alternative civic food networks are helping urban planners to re-think governance and ways to meet the needs of their community.

Regarding Lisbon, Cabannes and Raposo (2013) carried out an extensive research project on UA, networks and social integration and cohesion. They explained that UA has been growing in importance as a potential solution to mitigate the economic crisis and some environmental groups inspired by the Transition Towns Movement are occupying space for urban farming, seeing them primarily as spaces of resistance. Cabannes and Raposo (2013) also concluded that "in these self-built neighbourhoods, UA plays an inclusionary role within the Cape Verdean community, and is a strong factor of social cohesion" (p. 243). It has often been found that UA creates possibilities for various nationalities, cultures and agricultural practices to mix in numerous of the UA sites of Lisbon. This is a promising prospect: as Ribeiro Telles explained, "the 21st c. citizen will neither be rural nor urban, but both. The city of the future will be re-integrated into rurality and agriculture" (1996: 19).

Another important social benefit brought by UA in Lisbon is its educational dimension. In Lisbon, about a third of the UA projects (including the LIPOR programme, Lisbon Allotments Parks, and Cascais allotments) focus on mandatory training on organic production or composting, education and capacity building (Abreu 2012). As Cancela (2009) showed, some UA initiatives created small-scale "Pedagogical allotments" where the public can visit and learn farming techniques, or even farm their own plot. "Olivais Pedagogical Farm" is one of the first examples, together with the "Alta de Lisboa" where, thanks to the organization of local residents, an "urban agricultural park" was born in a truly bottom-up approach (Cancela 2009: 7). Practically all the UA initiatives explored by Delgado (2017) include learning, enhanced both conceptually and through experience and skills. As Costa Pereira et al. (2020) explain, the great majority of Lisbon gardeners traditionally learnt their allotment skills from their families but newcomers often do not know much and learn from others in the *hortas*, or through the workshops organised by the municipality. Over a thousand horticultural families are now provided with appropriate training and consultation (Museo de Lisboa, 2021:9).

Within agro-ecological projects focused on permaculture, many insisted on providing an educational component. Thus, the HortaFCUL project[5] of the faculty of Science (University of Lisbon) created a 'horta' and a permaculture living lab (the 'Permalab') where permaculture has been practiced since 2009 (Ulm et al. 2019; Verhoeven 2019). In another context, a community project based in a low-income neighbourhood, the '*Bela Flor Respira'* project,[6] created an agro-forestry site, where open days and workshops were organised, to share people's knowledge and experience. Numerous pedagogic allotment gardens were also created in public or private schools. Besides, the project Caravana Agroecologica[7] facilitates the creation of networks for people to learn from each other on agroecological practices and contributed to the creation of the Exhibition *Hortas de Lisboa* at the Museum of Lisbon. At an international level, the European programmes 'Cost Urban Allotments Gardens in European Cities' (2012–2016) and 'Cost UA Europe' (2012–2016) strengthened the connections between Portugal and Europe. Besides, Portugal joined the Milan Urban Food Policy Act (Oikos 2017) (MUFPP 2015) and, in the context of this Pact,

[5] https://hortafcul.wixsite.com/home

[6] https:www.facebook.com/groups/2307086686180763/

[7] www.facebook.com/caravanaagroecologicapt

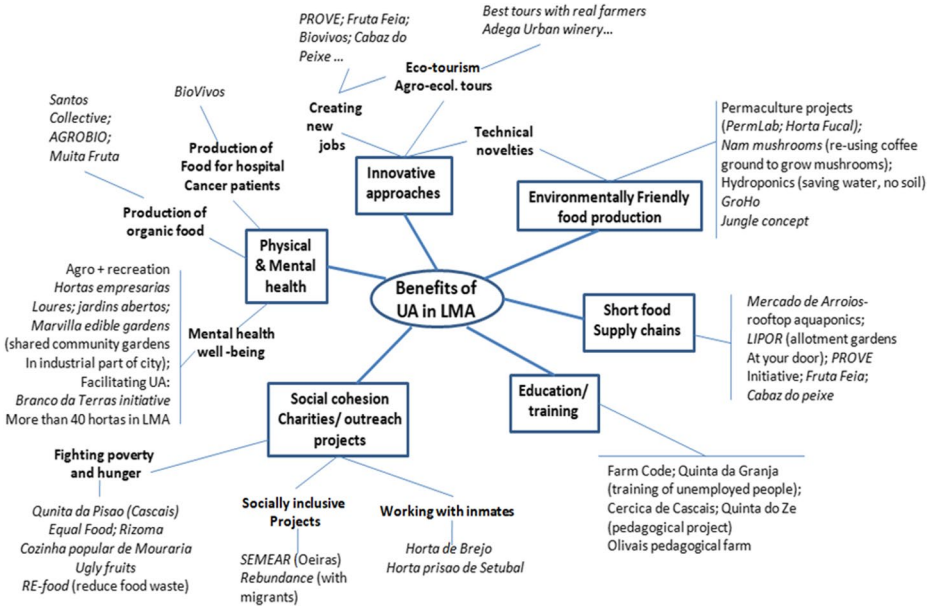

Fig. 3 Benefits brought by the Lisbon Urban Agriculture initiatives. Source: diagram compiled by the author using Delgado (2017), Dias and Marat-Mendes (2020), Rory Curtin (2021) and Hortas exhibition—Pimenta Museum, Lisbon (2021)

Portugal won three awards through projects carried out in Funchal in 2019 and 2020, with a focus on equity.[8]

Figure 3 illustrates the benefits brought by UA in Lisbon.

If Fig. 3 highlights the actual UA initiatives being carried out in practice in Lisbon, Table 1 presents the main publications focused on Portugal as well as general references on the benefits of UA. It highlights the fact that these benefits, on top of addressing the vulnerabilities generated or exacerbated by the Covid crisis, also address the multi-dimensions of what makes a city sustainable.

In the next Part, the literature review is extended to Systems thinking and practice and explores to what extent such approach, in the context of urban studies, and combined with a practical case study such as UA, could help conclude on what is needed to help urban governance make a city more sustainable.

Learning Lessons from UA Combined with Systems Approaches to Urbanism: towards Participatory Urban Governance and Sustainable Cities

This second part focuses on the systemic nature of urban sustainability. It shows how lessons drawn from the promotion of UA as a response to the Covid crisis might help in gaining a better understanding on what makes a city 'sustainable'. If interdisciplinary, systemic

[8] The "Palheiro Ferreiro Community orchard and garden" and "Promoting sustainable development in Funchal" projects in 2019 and the "Vital Basket" project, again in Funchal, in 2020.

Table 1 Literature review on the various benefits of UA

	General References	References focused on Lisbon
Ecological benefits	Urban agro-ecology; increase in biodiversity, productivity and resilience: Altieri and Nicholls (2018). UA as climate change strategy: Dubbeling (2015); Dubbeling and Halliday (2019). Addressing climate change and risks: Jabareen (2013) Linking better urban and rural environments: Jasma et al. (2013). Criteria to become a green capital of Europe EU (2020).	Climatic guidelines and urban planning: Alcoforado et al. (2009) Lisbon green corridors: Architects Council of Europe (2021); Ribeiro Telles (1996) Agro-ecology and UA : Costa Pereira et al. (2020)
Ecological benefits	Urban agro-ecology; increase in productivity : helps food security: Altieri and Nicholls (2018); Altieri (2012) Cities and circular economies for food: EMF (2019); UA to reduce ecological footprint and increase food security: Rashed (2018); FAO (2013); Increase food security thanks to green infrastructure for urban generation: Russo and Cirella (2020); Feeding the city thanks to UA: Morgan (2014)	Food insecurity and associated factors: Alvares and Amaral (2014); UA and localised food production: Cardoso et al. (2017) Food systems resilience: Curtin (2021) UA as answer to Portuguese crisis: Delgado (2015); Delgado (2017); Crisis response monitoring: Ferreira et al. (2020); Ecological footprints: Galli et al. (2020): Falcao Trovao Silveiro Marques (2018)
Social benefits	Constructing sustainability through reconnection (AFNs): Cox et al. (2008); sustainable food systems and networks of knowledge: Blay-Palmer et al. (2016) UA as planning strategy to address socio-ecological justice: Fernandez (2017). UA and food democracy: Renting et al (2012) Innovative education in agro-ecology: Francis et al (2011). UA benefits on health: Lampert et al. (2021); Mardsen and Sonnino (2012); Nova et al. (2018) Human scale of UA policies: Santos et al. (2018). UA and Citizen Science: Pollard et al. (2017); Ryan et al. (2018)	UA: participatory sustainability: Cardoso (2012) Municipal allotments: CML (2016) Contrasting perceptions of UA in Portugal: Delgado (2018) Communitarian involvement: Santos (2011) Peri-UA and social inclusion: Cabannes and Raposo (2013)

Source: compiled by author

approaches (Ferreiro et al. 2018; Núñez-Ríos et al. 2020; Ingegnoli 2021; Moscatelli et al. 2016) are advocated to ensure that urban planning becomes both more participatory and encompasses all dimensions of sustainability, our societies are also going to have the courage to question the interpretation of 'economics' we have favoured for so long – i.e. '*chrematistics*' (from the greek ethymology: the 'art of making money') and to re-explore another interpretation of economics, '*oikonomia*' (from the greek etymology: 'the management of resources to meet the households' needs').

In the first section, we'll start by gaining a better overall understanding of what a *systemic approach* can bring to the construction of a type of urban governance aimed at building a sustainable city.

Systemic Dimensions of 'Sustainable Cities'

Many studies on 'sustainable cities' provide suggestions of initiatives that cities could undertake to be 'more sustainable'. Typically, the 'characteristics of a sustainable city[9]' include making it easy to get around without a car; improving access to public resources and green spaces; improving water conservation and wastewater management; supporting urban farming, and implementing green architecture. What UA—in its various forms and through its various benefits—shows is that it does already link these various components. The way it does so might be a helpful guide to transform urban planning and governance.

UA therefore should not be considered as a set of detached initiatives but as a system of food production for the city that is more than the sum of these initiatives since much value added emerges from this 'assembly' (economically, ecologically and socially). Much research is going in this direction, emphasising the fact that UA should be approached by urban planners as part of the city *food system*.

This systemic approach of 'urban sustainability' has also been addressed by researchers who view cities as an ecosystem, with a metabolism (Girardet 2015), and whose resilience (Berkes and Folke 1998; Remmers (2011);) is an indicator of 'health'. From there, making the city more sustainable implies working on this resilience, on bridging the various activities in the city in a circular manner, and on viewing the overall sustainability of the city as a better functioning socio-ecological-economic system, a set of interactions between different systems in the way ecological economists describe them (Healy et al. 2013; Muradian and Martinez-Alier 2015).

The process of transformation of a city into a more sustainable one can also benefit from both the lessons from systems approaches and from the practical lessons derived from UA. Complex adaptive management (Armitage et al. 2008) and systemic action research provide methods that take account of various components as well as many stakeholders involved, making the transformation inclusive and therefore presenting potentials for helping to build a more participatory type of urbanism.

Table 2 presents a synthesis of the main contributions of these systems approaches.

In what follows, ways of integrating systemic approaches into urban planning are explored through the example of UA.

[9] As identified, for example, by Digi https://www.digi.com/blog/post/sustainable-city

Table 2 Systemic approaches to urban planning and UA's role in creating a sustainable city

	General References
Systemic approaches to urban sustainability	Urban ecosystems: Francis and Chadwick (2013); Creating regenerative cities: Girardet (2015); Continuous productive landscapes: Viljoen (2005) Human sustainable urbanism: ecological and socio-cultural sustainability: Oktay (2012).; Linking social and ecological systems for resilience: Berkes and Folke (1998); Mathevet and Bousquet (2014); Urban political ecology: Tzaninis et al. (2020); Ecological economics approaches: Healy et al. (2013); Muradian and Martinez-Alier (2015); Resilience et urban planning: Remmers (2011); Sustainable urbanisation: Condie and Cooper (2015)
Role of food and UA in creating sustainable cities	Sustainable food system: Moscatelli et al. (2016); Saavedra Cardoso et al. (2017); Reed et al. (2018); Feagan (2007); Horst et al. (2017); Nogeire-McRae et al. (2018); Deakin et al. (2016); Marsden and Sonnino (2012); Turner (2011); Role of food in re-imagining the city: Marat-Mendes and Borges (2019) UA and transformative sustainability: Zimmerer et al. (2021); Skar et al. (2020). Systemic design for food self-sufficiency: Nunez-Rios et al. (2020) Food revolution and agro-urban pubic space: Poli (2017) Integration of UA in cities: Mougeot (2015); Role of urban green infrastructure UA in city resilience: Panagopoulos et al. (2018). Contribution of small scale UA production to sustainable development goals : Nicholls et al. (2020); UA and place-based learning: Keeler (2011) Territorial learning and UA: Simon (2021); UA and sustainable cities: Deelstra and Girardet (2000); Intersection of planning, UA and food justice: Horst et al. (2017); Social, political and environmental dimensions of UA: Mougeot (2005)
Systemic approaches to change processes	Planning with complexity: Innes and Booher (2010); Kay and Schneider (1994) From degradation to creation: Closing the urban organic chain: Verhoeven (2019) Systemic design for the sustainability of food processes: Barbero and Tamborrini (2015); Systems thinking and practice in agriculture: Bawden (1991); Soft System methodology: Checkland and Scholes (1990); Bunch (2003); Transformation of systems: Walker et al. (2004); Design Thinking: Brown (2019); Citizen Science: Vohland et al (2021); Adaptive management: Holling (1978); Armitage et al (2008); Participatory approaches, systemic practice and action research: Ben-Chaung et al. (2010); Inclusive urbanism: Wende et al. (2020)
	References on Lisbon
Role of UA in making the city more sustainable	Abreu (2012); Cancela (2009); Delgado (2018); Dias and Marat-Mendes (2020); Firmino (2018); Serra (2021); Saraiva (2011); Marat-Mendes et al. (2021); Salvador (2019); Ferreiro et al. (2018); Núñez-Ríos et al. (2020); Ingegnoli (2021); Oliveira and Morgado (2016)

Source: author

Creating Sustainable Cities: Beyond 'Greening Approaches'

There is a danger in assuming that greening a city makes it 'sustainable'. The sustainability of a city goes well beyond its environmental health, also encompassing economic and social dimensions. It should also imply a certain resilience – an ability to bounce 'back on its feet' after suffering a shock, an achievement which, in the light of current Covid crisis, a 'green capital' such as Lisbon still needs to work on. The required transition towards a more sustainable state will need increased flexibility of the urban environment, more sustainable use and re-use of natural resources, as well as the adaptation of infrastructure systems (Skar et al. 2020).

What greening infrastructure implies, besides ensuring that a key part of the urban skeleton of the urban environment becomes vegetal, is that the underlying strength of the productive capacity of the city comes from nature and that the productive capacity is being maintained through regenerative approaches (Girardet 2015). Such ecological transformations of cities (Zimmerer et al. 2021) see in '*friches urbaines*' (urban wasteland) the potential to 'give urban productive spaces' a new nature (Russo and Cirella 2020; Rashed 2018). Brown fields could be given a new role, mixing primary and tertiary sectors into a set of activities focused on improving the city's food self-sufficiency both through UA initiatives of different types (outdoor allotments, rooftop farming, greenhouses, vertical farming, hydroponics, etc.), eco-tourism and educational and professional training projects. This is in line with the notion of Continuous Productive Urban Landscape (Viljoen 2005) and, as one of their main components, UA could help to better interconnect urban food producing landscapes within a city with the rural world. Within the city itself, such new-built green infrastructure would underpin a whole urban ecosystemic approach (Francis and Chadwick 2013).

Integrating UA projects within the greening of the city would therefore both affect the way in which land use is being allocated and prioritised and the way in which the productive role of the city is being envisaged. Following principles advocated both in ecological economics (Muradian and Martinez-Alier 2015)—encouraging 'healthier' linkages between economic activities and natural ecosystems and resources – and in 'Blue economics' (Pauli 2017) – in which economic activities not only meet human community's needs but also repair ecosystems they use resources and services from -, an ecosystemic approach of the city adopts a holistic approach of urban planning in which a 'sustainable city' is healthy from ecological, economic and socio-political perspectives. Considering that 'repairing damaged ecosystems' goes hand in hand with 'repairing damaged cities in transition' reflects the approach advocated by researchers in Political Urban Ecology, focused on how the production of settlements is metabolically linked with flows of capital (Tzaninis et al. 2020: 1).

Cooperative and Solidarity-Based Economics for Sustainable Cities: The Lessons from Circularity

As Cancela (2009) highlighted, in Portugal laws have been created that recognize agriculture as a compatible activity within the green infrastructure.[10] However, this needs to complemented by a new approach aimed at linking economic activities at the city scale.

[10] See, in particular, the "Decreto Regulamentar" nº 11/2009 and "Decreto Regulamentar" nº 9/2009.

Mougeot (2001) explained that, through its 'integrated characteristics' in using other resources streams such as water, energy and waste, UA can be assimilated into a 'circularity approach'.

For the Ellen MacArthur Foundation,[11] the benefits of such an approach are both social (it promotes 'green jobs' and eco-innovation), economic (improved productivity, efficient use of inputs and costs reduction) and environmental (reduction of raw material and energy consumption, of waste creation, of GHG emissions and improvement of soils' quality). Work on circular economies shows that circular economic models approach the current challenges related to the management of natural resources in a systemic way. Directly inspired by the way in which ecosystems function, i.e. with no production of waste, it also contributes to diminishing land pressure. Viewed through this light, UA activities cannot exist in isolation and need, instead, to be linked to each other and complement each other as well as, potentially other activities. Such a 'circular approach' leads to a redesign of the urban, peri-urban and rural spaces, and to a new conceptualisation of their inter-linkages (Skar et al. 2020).

Viewed through this spectrum, food production can be seen as an urban 'enterprise', engaging directly with the concept of Urban Metabolism. Developing 'barometers' of the circularity of economic activities could help (Ellen MacArthur Foundation 2019) and some researchers have shown how circular food production would reduce significantly the 'ecological footprint' of food consumed in cities—the sum of land and water required to meet material consumption and waste discharge of a city's population (Deelstra and Girardet 2000). In Portugal, the first institutional UA allotment gardens initiative started in 2003 and led by LIPOR (in 2017), was in fact a municipal waste management enterprise. LIPOR explained the importance of selective waste collection and home-based composting and its efforts lead to an innovative process involving six hectares of cultivated spaces (Delgado 2015). The Foodmeters project[12] also developed tools based on ecological footprints to estimate the potential capacity of the land available around London, Berlin, Rotterdam, Milan and Ljubljana, concluding that they had sufficient capacity to feed their respective urban populations with locally grown food.

Clearly, the circularity of cities calls for a reformed urban governance where stakeholders become better connected and interdependent (EMF 2019). The "ReFood Movement" (https://re-food.org/en/home/) is a good example of the potential for success of working together through volunteerism and humanitarian support to decrease the food wastage footprint and to help people in need. Lisbon showed its commitment to such enterprise through its involvement in the Horizon 2020 Project entitled Cities: Cooperating for a Circular Economy, which led to the creation of an online network tool application that helped to manage information about surplus meals and food surpluses, food donors, producers and beneficiaries, charity institutions and councils. The ReFood initiative could be integrated and coordinated with these schemes.

The urban governance changes that promoting a circular economy would induce could be facilitated by concepts such as 'social economy' and 'social entrepreneurship' which, although relatively new in Portugal (they emerged in the first decade of the 21st c.), led to the creation of the first social economy law appearing in early 2013 (Law No.30/2013) (Delgado 2017: 142).

[11] https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities

[12] FOODMETRES – (FP7-KBBE-2012–6-312185), http://www.foodmetres.eu/

Reflections on how to integrate the production of food in cities within a circular economy, also encourage to re-think "urban, localised, agriculture, as needing to be integrated into food systems and strategies" (Marsden and Sonnino 2012: 2). The FAO (2020: 2) describes food systems as "representing the entire range of actors, activities and the biophysical and socioeconomic environments involved in producing, processing, distributing, regulating and consuming foods" (p. 2). Exploring food systems leads, on the one hand, to ensuring an urban type of development that can guaranty jobs, a clean environment and a governance that is beneficial for all citizens, but also food security (FAO 2010). As Delgado (2018a, b:14) explained, "it is a political shortfall that existing policies do not consider UA as an opportunity for job creation and income generation (…) and efforts should be put into better connecting the productive stage of UA with market-oriented approaches, including processing, distribution and marketing. Such a program could lead to generation of income. These measures would consolidate a UA conceptual framework and set up the basis for a national food policy; one that does not exist today". Indeed, as a research project carried out by Serra (2021) recently showed, Lisbon still needs a comprehensive Food strategy to integrate the Food System into urban planning and spatial management.

The COVID-19 pandemic raises the alarm on the urgent need to transform the world's food systems and to include food in urban planning agendas: when deficits and surpluses create new food equations and disrupt established spatial fixes, new place-based food production initiatives can serve as turning points and will require innovative institutional and governance support, at both national and regional levels. "As we know from the past, sustainable transitions in the food sector are spatially created and maintained. The relationships between sustainable place-making and food transitions deserve to be a critical area for further sustainability science research" (Marsden and Sonnino 2012: 429).

Democratising Urban Governance: Shifts towards Networks and Social Urbanism

As Delgado (2017: 141) stressed, "So far, a key lesson is the absence of UA from a city food system approach that connects all stakeholders involved". As we saw in the previous section, these connections can relate to ways in which production processes can be linked so that waste is being minimised at the overall scale of the city food system. But for this to work, stakeholders also need to communicate and negotiate. This requires the existence of an urban governance system that is more participatory (Firmino 2018; Santos et al. 2018). In order to do so, Healy (1999), Oktay (2012), Innes and Booher (2010) and Healey (1999) suggested to critically revisit collaborative planning and contributed to the emergence of more inclusive and democratic decision-making processes. The work carried out on social urbanism and UA by Spada and Bigiotti (2017) stressed that a "new conception of the city could improve the use of UA to overcompensate for the empty spaces between industrial and rural areas, as well as sub-urban voids".

This has been helped by the New European Urban Agenda[13] and, in Portugal, by the Directorate General for territorial development which, in its 'Strategy for sustainable cities 2020', emphasised that "UA is a growing social urban phenomenon which can help the requalification of urban spaces with a positive contribution to social inclusion". The fact that, in the LMA, 37% of the land is used for agricultural purpose, justifies the need to integrate its food system better into urban planning strategies: as Sonnino

[13] https://habitat3.org/the-new-urban-agenda/

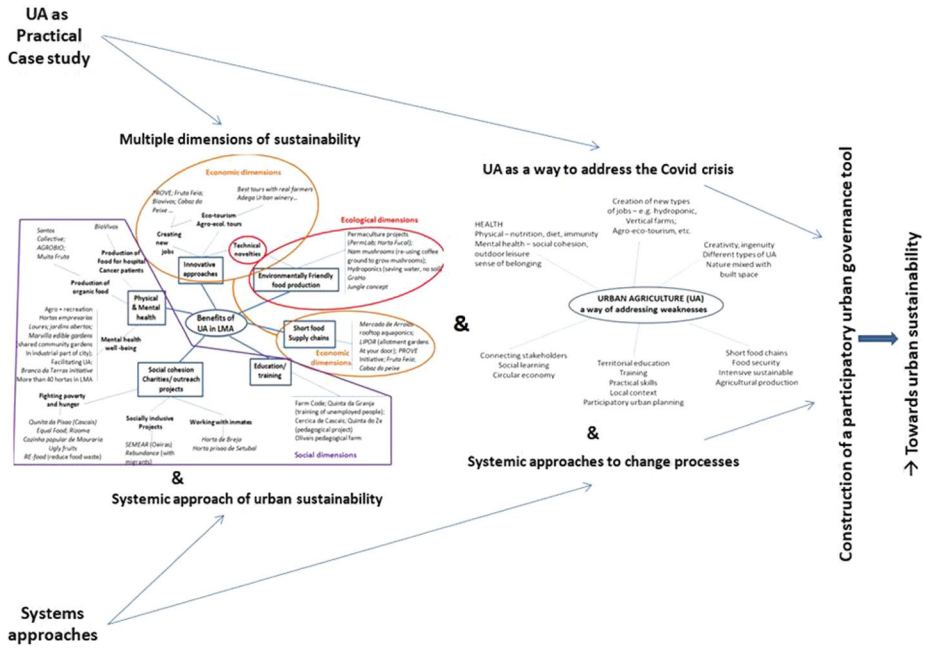

Fig. 4 Towards participatory urban governance to make Lisbon more sustainable. Source: Author

stresses (2009), it relates to territorial planning at all levels (food security, sustainability, social justice).

Authors such as Cina (2015), who have worked on a much needed shift towards sustainable food urban planning, deplore the fact that such shift "is impeded by a strongly limiting obstacle: the powerful prevalence of building land values on agricultural land values and the consequent preference to plan as developable large peri-urban agricultural areas (PAA)" (2015:57). The defence for urban sprawl relegated the PAA to the role of reserve for new urbanisation, and most city planning literature, at the start of the 21st c., ignored food issues (Pothukuchi and Kaufman 2000). The rise of the urban food question in the global North (Morgan 2014) has boosted an extensive system of networks, associations, research centres and training institutes, and regulations are being developed.

In Lisbon, the rural–urban divides approaches have persistently resulted in ill-conceived policy and planning tools (Tacoli 2006). The progressive broader participation of a wider spectrum of stakeholders, both through citizen science (Pollard et al. 2017) and inclusive urbanism (Wende et al. 2020), is slowly injecting some participatory learning in the urban planning process. The reverse is true too: as Jabareen (2013) observed, themes related to urban planning need to be less neglected in sustainability education which, overall, desperately needs reforming in view of providing learners with skills to operationalise sustainable transformations. New forms of education, better orientated towards territorial leaning (that take account of the context and perspectives of local communities – Simon (2021)) would have to be better linked to action and decision-making (Kolb 1984).

All these systemic views of what making a city more sustainable entails and how citizens could take part in such transformation could therefore contribute to current efforts to make urbanism more social and participatory and to achieve urban sustainability.

Conclusion

This article focused on both the benefits brought by UA initiatives in Lisbon, in particular in response to vulnerabilities created and exacerbated by the Covid-19 crisis, and on how systemic approaches could contribute to social urbanism. As Fig. 4 illustrates, the combination of lessons derived from UA as a practical case study and systems theories on both sustainable cities and processes of transformation, change and learning, could contribute to the construction of a more participatory type of urban governance.

In Lisbon, the significant mix of different demographics in UA reflects the demographics mix of this multi-cultural city. The numerous UA projects involve the inhabitants of varied '*bairros*' of the city: *children and teenagers* within the context of neighbourhoods and school UA projects; *students* (e.g. the students-initiated University of Science project on permaculture), *entrepreneurs* involved in innovative investments and/or training in UA (roof top UA, hydroponics, production of mushrooms on used coffee grounds, hydroponics…), *unemployed people* and *poorer communities*, *elderly people* cultivating plots for food self-sufficiency, *mixed cultures communities* enjoying the sharing of allotment gardens within the city. Other big cities with similar demographic mixes (such as Paris and Montreal, for instance) are also enjoying a plethora of UA initiatives. The success of UA as a whole, in cities with various demographic characteristics, relies on the capacity of urban planners to link these initiatives by integrating them in overarching urban strategies (focused on food systems, for instance, and the overall sustainability of the city, from an environmental, economic and social perspective) and to facilitate the participation of citizens in urban governance. The transferability of an overall UA city project therefore depends, to a large extent, on its urban planners' will to adopt a participatory and systemic approach. Working on.

- making green areas also productive urban public places that contribute to food security and social cohesion,
- food systems production as initiators of circular processes, innovative new jobs and short food supply-chains and
- the consolidation of networks of various types (e.g. AFN)

can all help in understanding how to improve urban planning decision-making processes in view of making it more participatory and better turned towards all dimensions of sustainability.

With the Covid Crisis questioning the way in which we live and attempt to meet our needs, alternative approaches to 'economics' (including circular, ecologically regenerative, collaborative and in constant evolution with social learning) desperately need to come to life, transforming the way in which we identify our societal strategies.

As the article concludes, both new forms of urban governance and community participation and learning seem to be emerging as the best 'glue' between parts of a system that need to be united for the system to make sense. At the level of the city, a microcosm of our economic systems, seeking to create a 'sustainable place' might well start with focusing on more autonomy in the production of our food.

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Declarations

Conflict of Interest The authors have no competing interests to declare that are relevant to the content of this article.

References

Abreu A (2012) Hortas Urbanas – Contributo para a sustentabilidade. Caso de Estudo: Hortas Comunitárias de Cascais, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa

Alcoforado MJ, Andrade H, Lopes A, Vasconcelos J (2009) Application of climatic guidelines to urban planning. The example of Lisbon (Portugal). Landsc Urban Plan 90(1–2):56–65. https://doi.org/10.1016/j.landurbplan.2008.10.006

Altieri MA (ed) (2012) The scaling up of agro-ecology: spreading the hope for food sovereignty and resiliency. SOCLA's Rio + 20 pétition paper. SOCLA, Rio

Altieri MA, Nicholls CI (2018) Agroecología urbana: diseño de granjas urbanas ricas en biodiversidad, productivas y resilientes. Agro Sur 46(2):49–60. https://doi.org/10.4206/agrosur.2018.v46n2-07

Alvares L, Amaral TF (2014) Food insecurity and associated factors in the Portuguese population. Food Nutr Bull 35(4):395–402. https://doi.org/10.1177/156482651403500401

Architects Council of Europe (2021) Lisbon Green Corridor. https://www.ace-cae.eu/activities/eu-funded-projects/connect-arch/20-projects-architectural-projects-against-climate-change/lisbon-green-corridor/ (accessed 10/09/2021)

Armitage D, Marschke M, Plummer R (2008) Adaptive co- management and the paradox of learning. Glob Environ Chang 18:86–98. https://doi.org/10.1016/j.gloenvcha.2007.07.00

Barbero S, Tamborrini P (2015) Systemic design goes between disciplines for the sustainability in food processes and cultures. In: Cina, G, Dansero, E (eds.) Localising urban strategies. Farming cities and performing rurality. 7th International Aesop sustainable food planning conference proceedings, 7–9 October. Politecnico de Torino, Torino, pp. 517–525

Bawden RJ (1991) Systems thinking and practice in agriculture. J Dairy Sci 74(7):2362–2373. https://doi.org/10.3168/jds.S0022-0302(91)78410-5

Ben-Chaung W, Fang-Yi C, Yung-Jaan L (2010) Awareness of residents regarding the construction of a sustainable urban community: a case study of action research in Taiwan. Syst Pract Action Res J 23:157–172. https://doi.org/10.1007/s11213-009-9152-x

Berkes F, Folke C (1998) Linking social and ecological systems for resilience and sustainability. Linking social and ecological systems: management practices and social mechanisms for building resilience. Nat Hazards 41(2):283–295. https://doi.org/10.1007/s11069-006-9036-7

Blay-Palmer A, Sonnino R, Custot J (2016) A food politics of the possible? Growing sustainable food systems through network of knowledge. Agric Hum Values 33:27–43. https://doi.org/10.1007/s10460-015-9592-0

Branco C (2016) Relatorio national 1 Habitat III. http://habitatiii.dgterritorio.pt/sites/default/files/ficheiros_publicos/PT_UN-HabitatIII_NationalkReport_2016_08_04_EN.pdf: Direcao Geral do Territorio (accessed on 20/10/2021)

Brown T (2019) Change by design; How Design thinking transforms organisations and inspires innovation. Harper Collins Publishers, Pittsburgh

Bunch MJ (2003) Soft systems methodology and the ecosystem approach: A system study of the Cooum River and environs in Chennai, India. Environ Manag 31(2):182–197. https://doi.org/10.1007/s00267-002-2721-8

Cabannes Y, Raposo I (2013) Peri-urban agriculture, social inclusion of migrant population and Right to the City: Practices in Lisbon and London. City 17(2):235–250. https://doi.org/10.1080/13604813.2013.765652

Cancela J (2009) Urban agriculture in city planning process. 45th ISOCARP Congress 2009. http://www.isocarp.net/Data/case_studies/1402.pdf (accessed on 21/12/2021)

Cardoso S (2012) Arquitectura e o espaco Agricola. Sustentabilidade participada: um projeto ara o Vale de Carnide. Tese de Mestrado. Faculdade de Arquitectura da Universidade de Lisboa

Camara Municipal de Lisboa (2016) Parques hortícolas municipais. http://www.cm-lisboa.pt/viver/ambiente/parques-horticolas-municipais: Camara Municipal de Lisboa. (accessed on 18/10/2021).
Checkland PB, Scholes J (1990) Soft Systems Methodology in action. Wiley, Chichester
Cina G (2015) Somewhere the city slows down and the country comes back. Features of a starting change of course in many Italian urban fringes. In: Cina G, Dansero, E (eds) *Localising urban strategies. Farming cities and performing rurality*. 7th International Aesop sustainable food planning conference proceedings, 7–9 October. Torino, Politecnico de Torino, Torino, pp.57–66
Condie J, Cooper AM (2015) Dialogues of sutainable urbanisation. Social science research and transitions to urban contexts. University of Western Sydney, Penrith
Correio da Manha (2020) 150 mil familias a beira da fome. pp. 4–31 (28th of April 2020).
Costa Pereira I et al (2020) Um passelo de caravana pela agroecologia Lisboeta. Rossio Lisboa
Cox R, Kneafsey M, Venn L, Holloway L, Dowler E, Tuomaimen H (2008) Constructing sustainability through reconnection: the case of 'alternative' food networks. In: Robinson GM (ed) Sustainable rural systems. Sustainable agriculture and rural communities. Ashgate re-Books, Burlington, pp 67–82
Curtin R (2021) Exploring food systems resilience in Lisbon, Portugal. Resilience Quaterly April. https://medium.com/resilience/exploring-food-systems-resilience-in-lisbon-portugal-a12c2a67b330
Deakin M, Borrelli N, Diamantini D (2016) The governance of city food systems: case studies from around the world. Fondazione Giangiacomo Feltrinelli, Milan
Deelstra T, Girardet H (2000) Urban agriculture and sustainable cities. In Bakker N, Dubbeling M, Gundel S, Sabel-Koshella U, de Zeeuw H (eds) Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda. ZEL, Feldafing, pp. 43–66
Delgado C (2015) Answer to the Portuguese crisis: turning vacant land into urban agriculture. Cities Environ (CATE) 8(2):5
Delgado C (2017) Mapping urban agriculture in Portugal: Lessons from practice and their relevance for European post-crisis contexts. Moravian Geogr Rep 25(3):139–153. https://doi.org/10.1515/mgr-2017-0013
Delgado C (2018a) Contrasting practices and perceptions of urban agriculture in Portugal. Int J Urban Sustain Dev 10(2):170–185. https://doi.org/10.1080/19463138.2018.1481069
Delgado C (2018b) Connections and missing links within Urban Agriculture, food and food systems. In: Delgado C (ed) Connections and missing links within Urban Agriculture, food and food systems. Nova Universidade Lisboa, Lisbon, p 86
Demony C (2021) Portugal's jobless numbers jump nearly 37% worst since 2017. https://www.reuters.com/article/health-coronavirus-portugal-unemployment-idUSL8N2LK2Y6 (accessed on 29/10/2021)
Dias AM, Marat-Mendes T (2020) The morphological impact of municipal planning instruments on urban agriculture: The case of Lisbon's Greater Area. Cidades 41(41):156–176. https://doi.org/10.15847/CCT.20485
Dubbeling M (2015) Policy Brief: Urban Agriculture as a Climate Change Strategy. Resources Centre on Urban Agriculture and Farming, 1–6. http://www.ruaf.org/sites/default/files/PolicybriefUrbanagricultureasaclimatechangestrategy.pdf
Dubbeling M, Halliday J (2019) Urban agriculture as a climate change and disaster risk reduction strategy. Field Actions Sci Rep 20:32–39
Ellen MacArthur Foundation (2019) Cities and circular economy for food. ellenmacarthurfoundation.org
EMF (2019) Cities and Circular Economy for Food. Ellen MacArthur Foundation, 1–66. https://www.ellenmacarthurfoundation.org/assets/downloads/Cities-and-Circular-Economy-for-Food_280119.pdf
European Union (2020) Lisbon: European Green Capital 2020. Bietlot, Belgium
Falcao Trovao Silveiro Marques F (2018) A economia circular em Lisboa e vale do Tejo. Relatório de Estagio no mestrado em gestão do território. Faculdade de Ciencias Sociais e humanas, Nova universidade, Lisboa
FAO (2010) Développer des villes plus vertes. FAO, Rome
FAO (2013) Food Wastage Footprint. impacts on natural resources; summary report. Food Wastage Footprint, FAO, Rome
FAO (2020) Policy brief: the impact of Covid-19 on food security and nutrition. FAO, Rome
Feagan R (2007) The place of food: mapping out the local in local food systems. Prog Hum Geogr 31(1):23–42. https://doi.org/10.1177/0309132507073527
Fernandez A (2017) Can UA become a planning strategy to address social ecological justice? Degree project in the built environment, Stokholm University

Ferreira P, Cerejeira J, Portela M (2020) Crisis response monitoring. Country report: Portugal. https://covid-19.iza.org/crisis-monitor/portugal/ (accessed on 17/10/2021)
Ferreiro M, Marat-Mendes T, Salavisa I, Santos S (2018) The Importance of Interdisciplinary approaches to Urban Agriculture and Transitions in Food Systems: Research on Lisbon Metropolitan Area. In: Delgado, C (ed) Connections and missing links within Urban Agriculture, food and food systems. Proceedings of the international scientific event, 26 – 27 April, Lisbon, Nova Universidade Lisbon, pp.17–20.
Firmino A (2018) CSA in Portugal – missing links with urban agriculture. In: Delgado, C (ed) Connections and missing links within Urban Agriculture, food and food systems. Proceedings of the international scientific event, 26 – 27 April, Lisbon, Nova Universidade Lisbon, pp 32–35
Francis CA et al (2011) Innovative Education in Agroecology: Experiential Learning for a Sustainable Agriculture. Crit Rev Plant Sci 30(1–2):226–237. https://doi.org/10.1080/07352689.2011.554497
Francis RA, Chadwick MA (2013) Urban Ecosystems. Urban Ecosystems, January. https://doi.org/10.4324/9780203133644
Galli A et al (2020) Sustainable food transition in Portugal Assessing the footprint of dietary choices and gaps in national and local food policies. Sci Total Environ 749:141307. https://doi.org/10.1016/j.scitotenv.2020.141307
Girardet H (2015) Creating regenerative cities. Creating Regen Cities. https://doi.org/10.4324/9781315764375
Graça P, Gregório MJ, Freitas MDG (2020) A Decade of food and nutrition policy in Portugal (2010–2020). Portuguese J Public Health 38(2):94–118. https://doi.org/10.1159/000510566
Gregorio MJ et al (2018) Food insecurity is associated with low adherence to Mediterranean diet. Front Public Health 6:38. https://doi.org/10.3389/fpubh.2018.00038
Healey P (1999) Institutionalist analysis, communicative planning and shaping places. Journal of Planning and Environment Research 19(2):111–122
Healy H, Martinez-Alier J, Temper L, Walter M, Gerber J (2013) Ecological economics from the ground up, Earthscan from Routledge, London
Holling CS (ed) (1978) Adaptive environmental assessment and management. Wiley, New York
Horst M, Mcclintock N, Hoey L (2017) The intersection of planning, urban agriculture, and food justice: a review of the literature. J Am Plann Assoc 83(3):277–295. https://doi.org/10.1080/01944363.2017.1322914
Howard P, Puri R, Smith L, Altierri M (2008) A scientific conceptual framework and strategic principles for the globally im- portant agricultural heritage systems programme from a social-ecological systems perspective. Food and Agriculture Organization of the United Nations, Rome
INE (2009) Estatisticas Agricolas 2008. Lisboa: Instituto Nacional de Estatistica
Innes JE, Booher DE (2010) Planning with complexity: an introduction to collaborative rationality for public policy. Routledge, London
Ingegnoli V (2021) Global and planetary health need landscape bionics. Life Organization and Human Health From Traditional Ecology to Bionomics. Academia Letters, 1–5
Jabareen Y (2013) Planning the resilient city: concepts and strategies for coping with climate change and environmental risks. Cities 31:220–229. https://doi.org/10.1016/j.cities.2012.05.004
Jasma JE, Veen EJ, Dekking AGJ, Visser AJ (2013) Urban agriculture: how to create a natural connection between the urban and teh rural environment in Almere Oosterworld (NL). Proceedings REAL CORP 2013 Tagungsband, 20–23 May, Rome.
Kay JJ, Schneider E (1994) Embracing complexity: the challenge of the ecosystem approach. Alternatives 20(3):32–39
Keeler H (2011) Considering the Urban Farm program and the role of place-based experiential education in the pedagogy of landscape Architecture. Masters Dissertation, Department of landscape Architecture. University of Oregon
Kolb D (1984) Experiential learning: experience as the source of learning and development. Prentice-Hall Inc., New Jersey
Koohafkan P, Altierri MA, Holt Gimenez E (2012) Green Agriculture: Foundations for biodiverse, resilient and productive agricultural systems. Int J Agric Sustain 10(1):61–75. https://doi.org/10.1080/14735903.2011.610206
Lampert T, Costa J, Santos O, Sousa J, Ribeiro T, Freire E (2021) Evidence on the contribution of community gardens to promote physical and mental health and well-being of non-institutionalized individuals: A systematic review. PLoS ONE 16:1–19. https://doi.org/10.1371/journal.pone.0255621
Léonard Y (2018) Histoire du Portugal contemporain de 1890 à nos jours. Chandeigne, Paris
Marat-Mendes T, Borges J (2019) The role of food in re-imagining the city, Proceedings of the 55th International ISOCARP Congress 2019, 605–623
Marat-Mendes T et al (2021) Drivers of change: how the food system of the Lisbon Metropolitan Area is being shaped by activities, initiatives and citizens needs towards a sustainable transition. CIDADES, Communidades e Territorios (2021): 41–62. https://doi.org/10.15847/cct.20490

Marsden T, Sonnino R (2012) Human health and wellbeing and the sustainability of urban-regional food systems. Curr Opin Environ Sustain 4(4):427–430. https://doi.org/10.1016/j.cosust.2012.09.004
Mathevet R, Bousquet F (2014) Résilience et Environnement. Penser les changements socio-ecologiques. Buchet, Chastel
McDougall R, Kristiansen P, Rader R (2019) Small scale urban agriculture results in high yields ut requires judicious management of inputs to achieve sustainability. PNAS 116(1):129–134. https://www.pnas.org/https://doi.org/10.1073/pnas.1809707115
Mendes-Santos C, Andersson G, Weiderpass E, Santana R (2020) Mitigating COVID-19 Impact on the Portuguese population mental health: The opportunity that lies in digital mental health. Front Public Health 8:1–8. https://doi.org/10.3389/fpubh.2020.553345
Morgan K (2014) Nourishing the city: The rise of the urban food question in the Global North. Urban Studies 1:1–16
Moscatelli S, El Bilali H, Gamboni M, Capone R (2016) Towards Sustainable Food Systems: a Holistic, Interdisciplinary and Systemic Approach. Agrofor, 1(1). https://doi.org/10.7251/agreng1601103m
Mougeot L (2001) Urban Agriculture: definitions, presence, potential and risks. In: Bakker N et al (eds) Growing cities, growing food. Fefdafing, DSE, pp 1–42
Mougeot L (2005) Agropolis. The social, political and environmental dimensions of Urban Agriculture. Routledge, London
Mougeot L (2015) Urban Agriculture in cities of the global south: four logics of integration. In: Imbert D (ed) Food and the city: histories of culture and cultivation. Harvard University Press, Cambridge MA, pp 163–193
MUFPP (2015) Milan Urban Food Policy Pact. http://www.milanurbanfoodpolicypact.org/text/ (accessed on 10/ 02/2021)
Muradian R, Martinez-Alier J (2015) Handbook of ecological economics. Edward Elgar, Cheltenham
Museum of Lisboa and Lisboa Camara Municipal (2021) Lisbon vegetable gardens. From Middle Ages to the 21st century, Edicoes Lisboa Capital verde Europeia 2020, Museo de Lisboa
Nicholls E et al (2020) The contribution of small-scale food production in urban areas to the sustainable development goals: A review and case study. Sustain Sci 15:1585–1599. https://doi.org/10.1007/s11625-020-00792-z
Nogeire-McRae T et al (2018) The role of urban agriculture in a secure, healthy and sustainable food system. BioScience 68(10):748–759. https://doi.org/10.1093/biosci/biy071
Nova P, Pinto E, Chaves B, Silva M (2018) Growing health and quality of life: benefits of urban organic community gardens. J Nutr Health Food Sci 6(1):1–7. https://doi.org/10.15226/jnhfs.2018.001124
Núñez-Ríos JE, Aguilar-Gallegos N, Sánchez-García JY, Cardoso-Castro PP (2020) Systemic design for food self-sufficiency in urban areas. Sustainability 12(18):7558. https://doi.org/10.3390/su12187558
OIKOS (2017) OIKOS – Apelo Pacto de Milao sobre politica de alimatacao urbana. http://www.oikos.pt/pt/participe/envolva-se-em-capanhas-de-obilizacao/item/2119-apelo-pacto-de-Milao (accessed on 17/01/2022)
Oktay D (2012) Human sustainable urbanism. In pursuit of ecological and social-cultural sustainability. Procedia -Soc Behav Sci 36:16–27. https://doi.org/10.1016/j.sbspro.2012.03.003
Oliveira R, Morgado MJ (2016) Planning the urban food system of the lisbon metropolitan area in Portugal: a conceptual framework. Agriculture in an Urbanizing Society Volume One: Proceedings of the Sixth AESOP Conference on Sustainable Food Planning, 7–30
Panagopoulos T, Jankovska I, Bostenaru DM (2018) Urban green infrastructure: The role of urban agriculture in city resilience. Urban Archit Constr 9(1):55–70
Pauli G (2017) Nous devons passer à une économie bleue. La nature pour modèle; Hors-Série juin Sciences 40–45
Poli D (2017) Food revolution and agro-urban public space in the European bioregional city. Agroecol Sustain Food Syst. https://doi.org/10.1080/21683565.2017.1331178
Pollard G, Roetman P, Ward J (2017) The case for citizen science in urban agriculture research. Future Food J Food Agric Soc 5(3):9–20
Pothukuchi K, Kaufman LJ (2000) The food system: a stranger to the planning field. J Am Plan Assoc 66(2):113–124. https://doi.org/10.1080/01944360008976093
Rashed R (2018) Urban agriculture: A regenerative urban development practice to decrease the ecological footprints of cities. Int J Environ Sci Sustain Dev 2(2):85. https://doi.org/10.21625/essd.v2i2.170
Reed M, Mettepenningen E, Swagemakers P, Garcia MDD, Jahrl I, Koopmans ME (2018) The challenges of governing urban food production across four European City-Regions: identity, sustainability and governance. Urban Agric Reg Food Syst 3(1):10. https://doi.org/10.2134/urbanag2016.11.0006
Remmers G (2011) City resilience: building cultural repertoires for urban farming in Almere. Urban Mag 25:47–50

Renting H, Schermer M, Rossi A (2012) Building food democracy: exploring civic food networks and newly emerging forms of food citizenship. Int J Sociol Agric Food 19(3):289–307
Ribeiro Telles G (1996) Um novo conceito de cidade: a paisagem global. Masinhos, Contemporanea Editora, Camara Municipal de Masinhos
Russo A, Cirella GT (2020) Edible green infrastructure for urban regeneration and food security: case studies from the campania region. Agriculture 10(8):1–14. https://doi.org/10.3390/agriculture10080358
Ryan SF et al (2018) The role of citizen science in addressing grand challenges in food and agriculture research. Proc R Soc B 285:20181977. https://doi.org/10.1098/rspb.2018.1977
Saavedra Cardoso A et al (2017) Mapping the lisbon potential foodshed in Ribatejo e Oeste. Sustainability 9:2003. https://doi.org/10.3390/su9112003
Salvador MS (2019) Shaping the city through food: the historic foodscape of Lisbon as case study. Urban Des Int 24:80–93. https://doi.org/10.1057/s41289-019-00084-8
Santos F (2011) Hortas Urbanas de iniciativa communitarian – Participacao e desenvolvimento: dois casos de estudo. Tese de Mestrado. Instituto Universitario de Lisboa – ISCTE, Lisbon
Santos A, Branquinho C, Goncalves P, Santos-Reis M (2015) Lisbon, Portugal. May. https://doi.org/10.13140/RG.2.1.4000.9121. Accessed 7 Feb 2022
Santos N, Celso DL, Pires I (2018) The human scale in UA policies: a methodological contribution. In: Delgado, C (ed), Connections and missing links within Urban Agriculture, food and food systems. Proceedings of the international scientific event, 26 – 27 April. Lisbon, Nova Universidade, Lisbon: pp.72–75
Saraiva RA (2011) As hortas urbanas na reconfiguracao fisica, social e ambiental do Concelho de Oeiras. Tese de Mestrado, Universidade Nova. Faculdade de Ciencias Sociais e Humanas da Universidade Nova de Lisboa, Lisbon
Serra A (2021) Lisbon food strategy. A guide to approach food systems. Técnico Lisboa, Lisbon
Simon S (2021) Territorial education through Urban Agriculture: contributing to building sustainable cities in times of a pandemic. Curr Issues Comp Educ 23(1):31–47. https://doi.org/10.52214/cice.v23i1.8136
Silva J, Kouhen K, Gaspar M, Leitao M (2020) Pantemia antingiu Portugal quando economia e mercado de trabalho chegavam aos níveis anteriores a crise de 2008. https://www.clsbe.lisboa.ucp.pt/pandemia-antigiu-portugal-quando-economia-e-mercado-de-trabalho-cegavam-aos-niveis-anteriores-crise (accessed on 29/01/2022)
Skar SLG et al (2020) Urban agriculture as a keystone contribution towards securing sustainable and healthy development for cities in the future. Blue-Green Syst 2(1):1–27. https://doi.org/10.2166/bgs.2019.931
Spada M, Bigiotti S (2017) Peri-urban agriculture and cultural heritage. The public potential of the in-between areas. J Public Space 2(2):51–62. https://doi.org/10.5204/jps.v2i2.92
Sonnino R (2009) Feeding the city: towards a new research and planning agenda. Int Plan Stud 14(4):425–35. http://www.tandfonline.com/doi/abs/10.1080/13563471003642795
Tacoli C (2006) The Earthscan reader in rural-urban linkages. IIED, London
Turner B (2011) Embodied connections: sustainability, food systems and community gardens. Local Environ 16(6):509–522. https://doi.org/10.1080/13549839.2011.569537
Tzaninis Y, Mandler T, Kaika M, Keil R (2020) Moving urban political ecology beyond the 'urbanization of nature.' Prog Hum Geogr 45:1–24. https://doi.org/10.1177/0309132520903350
Verhoeven M (2019) From degradation to creation: closing the urban organic chain. Research Report. Lisbon, Faculty of Science, University of Lisbon
Viljoen A (ed) (2005) Continuous productive urban landscapes. Architectural press, Oxford
Vohland K et al (eds) (2021) The science of citizen science. Springer, Cham. https://doi.org/10.1007/978-3-030-58278-4
Walker B, Holling CS, Carpenter SR, Kinzig A (2004) Resilience, adaptability and transformability in social–ecological systems. Ecol Soc 9(2):5. https://doi.org/10.5751/ES-00650-090205
Wascher D et al (2015) Food metres: metropolitan food planning. Connecing the local with the global. Urban Agriculture Magazine Number 29 (May 2015).
Wende W, Nijhuis S, Jong AM, Humann M (2020) Inclusive Urbanism: Advances in research, education and practice. Research in Urbanism Series (RiUS) (Vol.6)
Ulm F et al (2019) Sustainable urban agriculture using composting and an open-pollinated maize variety. J Clean Prod 212(1):622–629. https://doi.org/10.1016/j.jclepro.2018.12.069
Zimmerer KS et al (2021) Grand challenges in urban agriculture: ecological and social approaches to transformative sustainability. Front Sustain Food Syst 5:1–8. https://doi.org/10.3389/fsufs.2021.668561