LUISS Guido Carli
LIBERA UNIVERSITA' INTERNAZIONALE DEGLI STUDI SOCIALI

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Urban Agriculture in Europe: State of Play and Future Perspectives

Supervisor:

Marcello Di Paola

Co-supervisor:

Alfonso Giordano

Candidate:

Cristiana Lucentini

620002

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Introduction

A good introduction to a master thesis should contain the research question that oriented the student during its investigation and the specific viewpoint from which she decided to act. Moreover, those information should be coupled with the reasons that stimulated the author's interest in the subject matter, which, in turn, should be backed by reliable data showing its real weight in everyday life, since the ultimate goal of every scientific research is to increase our well-being.

Therefore, I would like to briefly describe why I am interested in the state of play and future perspectives of urban agriculture in today's Europe. Then, I will better clarify the demands that led my investigation and I will summarize how I proceeded in elaborating them.

Almost one year and a half ago, I discovered new urban places where I felt right at home. They were extra-ordinary gardens, designed by people having in mind a different way of living the city (**figure 1**). They were open to everyone and devoted to the production of fresh and healthy food. Such activity, however, was often conceived as a tool and not a goal. The importance, there, was to build up again a sense of community, sharing knowledge and competencies on food production, healthy eating and sustainable urban lifestyles. The people I met liked to define themselves as little "seeds" of change for their own city. At that time I thought that urban agriculture is at least an interesting social experiment, so I chose to commit

Figure1 - Prinzessinnengarten, Berlin

myself to further investigating the nature and features of what was presented to me as a “silent revolution”.

Merging my curiosity with the university studies, I elaborated the following research questions: is the (re)localization of the food production at the city level a suitable and desirable solution for the promotion of resilient and sustainable food systems? And, in turn, could a city engaged with food production be considered more sustainable and resilient to change?

Therefore, the aim of this dissertation is to investigate an engagement with food production at more localized levels. In particular, the specific focus is on the role of urban agriculture as adaptation strategy in Europe’s cities.

Main point of departure is, on the one hand, the world’s urbanization prospects and, on the other hand, the current dynamics of food production and consumption and their impact on the ecological footprint of a country and its cities.

Historically, cities have been places of opportunities coupled with higher level of employment, benefits due to scale economies, and improved living standards (FAO, 2014). Since the industrial revolution, urbanization started and the cities have gradually increased their size and population. The UN Department of Economic and Social Affairs (UN DESA) estimates every two years the major trends and challenges of the phenomenon (**figure 2**). According to the 2014 report, at present, more people are living in urban areas than in rural ones, with 54% of the world’s

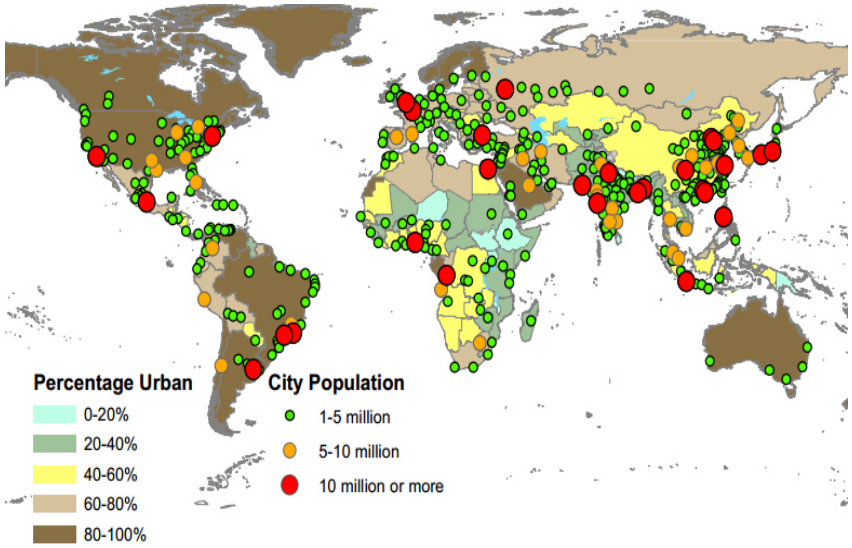


Figure2 - PercentageUrban City Population, source UN DESA, 2014

population residing in cities. The fact is projected to be 66% by 2050. Europe is listed among the most urbanized regions of the world (73%), whereas Asia and Africa remain mostly rural (40-50%), still they are expected to urbanize faster than others. To understand why it is urgent to act today, it should be bore in mind the very recent evolution of such trend (**figure 3**). The world's urban population was 746 million in 1950, it is currently 3.9 billion, and it is expected to be 6.4 billion by 2050. In contrast, rural population is now close to 3.4 billion and it is expected to decline to 3.2 billion by 2050. As far as the size of current cities is concerned, the report estimates that half of the world's urban population resides in small settlements of less than 500,000 inhabitants, while only one in eight live in mega-cities with more than 10 million inhabitants, which currently exist in the number of 28 but are projected to become 41 by 2030. Therefore, the overall picture is a majority of urban agglomerations composed of medium-sized cities and cities with less than 1 million inhabitants, with some considerable exceptions of huge urban settlements.

Despite the fact that today's cities occupy only 3% of the earth's lands, they consume most of the world's energy and materials and are responsible for 3/4 of the overall GHG emissions (TAYLOR, 2012). The world's ecological footprint provides comprehensive data on humanity's demand on natural resources. According to the Global Footprint Network, we are using more resources than the ones the Earth can provide (**figure 4**), and namely we use the equivalent of 1.5 planets to produce what

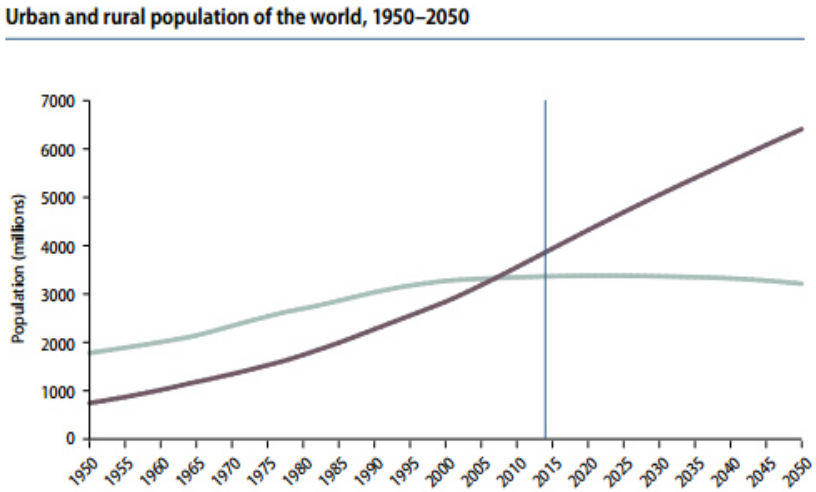


Figure 3 - **Light blue line** = Rural population, **Dark blue line** = urban population, source UN DESA, 2014

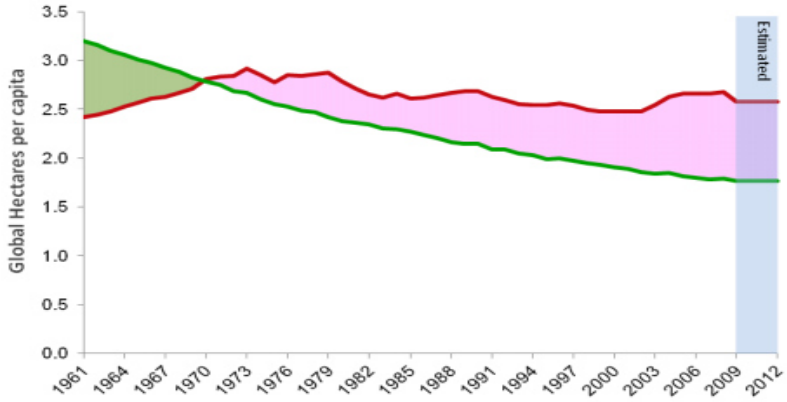


Figure 4 - **Green line** = Earth's Biocapacity, **Red line** = World's Ecological Footprint, source Global Footprint Network

we need and to absorb our waste and the situation will evolve in the future according to the population and consumption trends (figure 5).

As far as Europe is concerned slightly more than half of its total land area is bio-productive, with an average availability per person of 2.9 gha. However, the typical European resident has an ecological footprint of consumption of 4.7 gha! On the production side too, Europe is far beyond its limits since its ecological footprint for production is 1,038 million gha higher than its bio-capacity. To sum up, it could be said that the majority of countries in Europe produce and consume much more than their possibilities. And the agricultural sector occupies an important share of the overall consumption of resources.

Therefore, in the next sections, the (re)localization of the food system at the city level - via the adoption of urban agriculture - will be investigated.

In particular, the thesis is divided into 4 sections, developed as follows: Section 1 presents a theoretical framework which aims at reordering certain conceptual ideas concerning the relationship between the food system and the urban context, as they could be applied to the European cities today. Several cross-cutting disciplines related to food production and consumption have been taken into account, i.e. among others, landscape and territorial studies, urban planning and design, environment philosophy, food sociology and behavioral economics. Once demonstrated the suitability and the appeal for a (re)localization of the food system

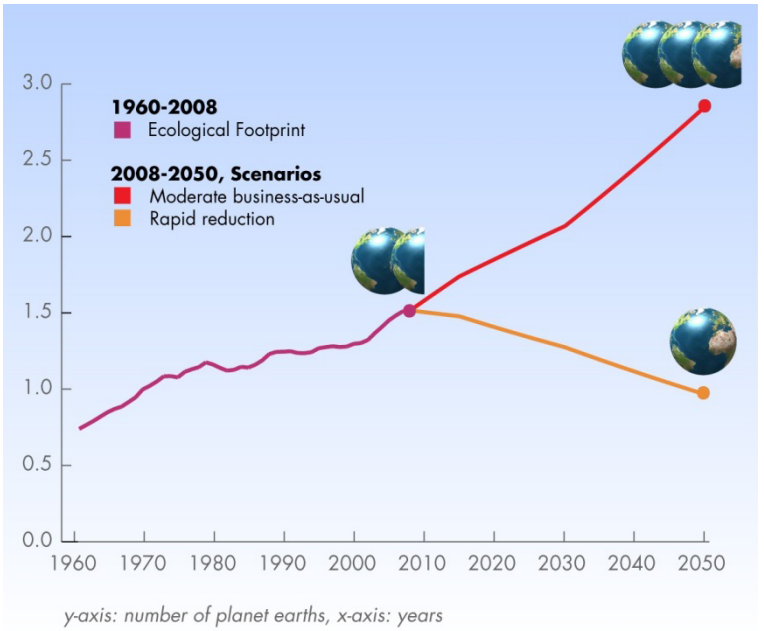


Figure5 - World's ecological footprint, future scenarios

at the city level, Section 2 and 3 focus on the feasibility of doing agriculture in the urban context.

Section 2 provides, first of all,a definition of urban agriculture as an industry devoted to the production of (not only) food within and for the city. Then, it analyzes the technical conditions necessary for UA to be implemented. A first cluster of necessary elements is labeled as 'specification of the ground' or 'location and environmental conditions'; they include the analysis of the soil, sunlight and water requirements as well as the contamination and pollution concerns related to food growing in the city. The land location, in particular, is addressed apart through the elaboration of a typology of potential plots, coupled with existing European projects. Finally, a second cluster of elements is investigated, and namely the access, security and legal frames to be taken into account for UA to be safeguarded, once the implementation phase is started.

Section 3 investigates the human requirement. First, it explains why UA is not only site-specific but also society-specific. In other words, it investigates the "why" and "who" questions. As far as the "why" dimension is concerned (why do people engage in UA?), it is explored by tracing the UA's history back from the origins up to its current re-emergence. As far as the "who" dimension is concerned (who does it the most?), it is investigated describing the profile of the main agents involved in the activity. They are grouped into the three categories: first, the urban farmer, representing the supply side of the phenomenon; second, the urban dweller as

direct beneficiary of those goods, composing the demand side; and third, the public sector (governments and local authorities).

Even if the territorial unit of analysis is the entire Europe, with its own food culture and identity, the phenomenon of urban agriculture appears to be manifold and great differences emerge between and within European countries and regions. Therefore, before drawing a conclusion on the state of play and future perspectives of urban agriculture in Europe, this thesis devotes a further section, the Section 4, to a specific case-study. The city of Rome has been selected since the author had the chance of entering in contact with the local reality through in-persons interviews with roman gardeners, on-site visits to a random sample of gardens and plots, and thanks to the support received by local authorities, in particular by the city's Department of Environmental Protection. First of all, Rome is framed within the broader Mediterranean context to which it belongs. Second, the influence exerted by the Italian planning system on agriculture and landscape is taken into account. And third, the peculiarity of the Roman land contexts, as well as the recent trends on food production and consumption within the capitol city are showcased, in order to outline its state of play on urban agriculture and the possible future developments.

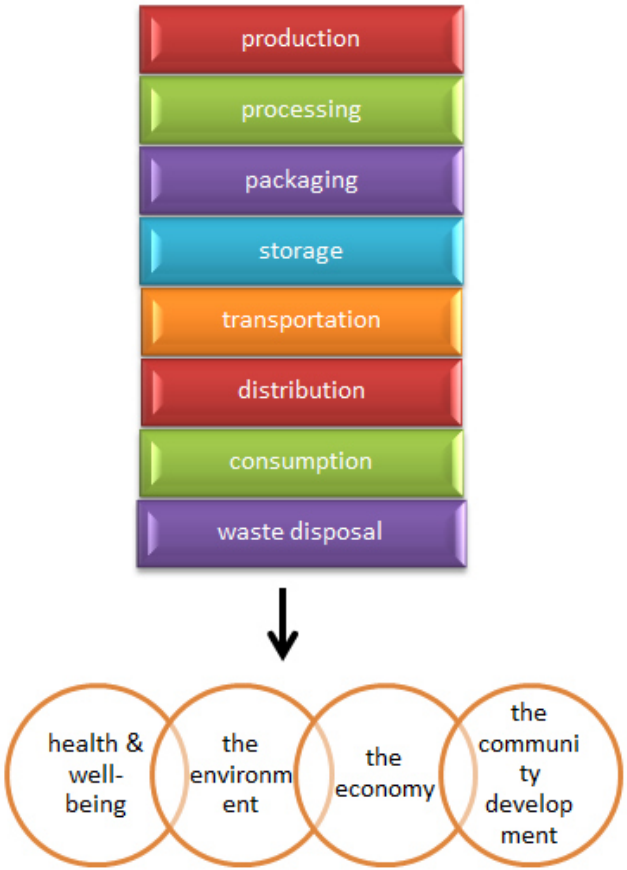
At the end, several concluding remarks complete the puzzle on the state of play and future perspectives of urban agriculture in today's Europe.

Section 1 – The city and the food system: a conceptual framework

This section analyzes the relationship occurring between the food system and the urban context. It aims at framing the issue that will be further developed in Section 2 and 3: the suitability of the (re)localization of the food production at the city level. In particular, this thesis investigates the role of*urban agriculture* in promoting resilient food systems in Europe. To do so, first, the complexity of our agro-food system is described according to a territorial approach. Three existing and overlapping *foodscapes*are studied - the global, the metropolitan and the local -, together with their interrelated dynamics. Second, the motivation behind a possible *shift* towards a *predominantly local* food geography is investigated, according to a philosophical approach, which endorses an active role of the city and its inhabitants in the protection of our planet. Third, the notions of *green infrastructure, ecological urbanism* and *urban resilience* are introduced in order to provide a conceptual framework of reference. And fourth, since urban agriculture is a society- and region-specific phenomenon, it is investigated with a territorial focus on Europe. Therefore, a final paragraph is devoted to a showcase for the European land context and food culture.

1.1 Complexity of the agro-food system: a territorial approach

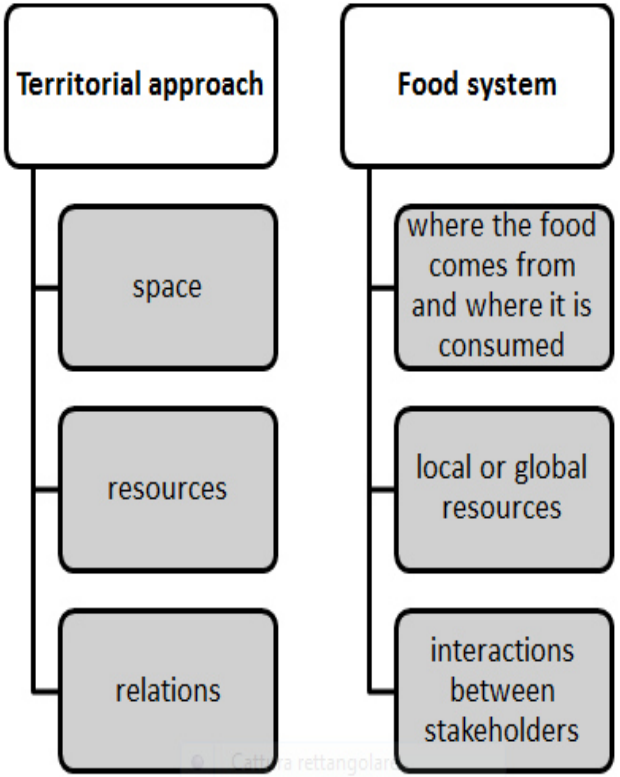
The agro-food system could be defined as the set of the interdependent elements that work together towards the end of satisfying food needs of a given population in a given space and time (Malassis, 1979). It has two main dimensions: one vertical, the other horizontal. The vertical one refers to the food chain made up of several consequential phases: production, processing, packaging, storage, transportation, wholesale or retail distribution, consumption and waste disposal. They could occur entirely at the local scale – *local agro-food systems* – or they could involve larger territorial dimensions – *regional, national or global*. All of them are related to consumption trends and societal food habits and impact on many other sectors, and namely health and well-being, the environment and the economy and community development. This cluster of food-related areas constitutes the horizontal dimension of the agro-food system, i.e. where food can impact the most **(Graph 1)**. The complexity of the entire process is related to the geographical location of its components, the flow of goods and the relationships between the actors involved. It is a dynamic process, which generates ever-changing food geographies.



Graph 1 - Vertical and horizontal dimensions of the food system

The adoption of a territorial approach to food could help framing the issue. According to Dansero *et al*. (2014), a territory can be defined as a complex of material and immaterial relations. These include the spatial dimension *per se* i.e.

the relation occurring between the territorial unit under consideration (e.g. local) and the other ones (e.g. regional, national, global); plus the connections existing between the humans and the resources therein located; plus, the relations that the various actorsestablish with one another. Therefore, three conceptual categories are identified (**Graph 2**).They are, respectively: the *space*, the *resources* and the *relations*. As far as the food system is concerned, its *space* refers to the way in which it transforms the environment (where the food comes from, where it is consumed and how the wastes are processed); its *resources* can be of two types: either truly local (highly specific, traditional, embedded in the local culture) therefore not available and reproducible elsewhere or vice versa, global, easily available and reproducible in different geographical contexts. Last, its *relations* include, firstly, the way in which consumers approach the system for reasons related to physical proximity and/or economic convenience or rather according to shared values and traditional food habits; and secondly, they include the way in which the different stakeholders interact with each other in a given area. Therefore, it is possible to identify at least three existing and overlapping agro-food systems: the global agro-food system (GAS), the metropolitan agro-food system (MAS) and the local agro-food system (LAS). Their features will be briefly described according to the scheme elaborated by Wascher*at al*. (2010).



Graph 2 – A territorial approach to the food system

Global Agro-food System (GAS)

A significant share of the current food consumption in Europe is made of imported products. They come from remote localities, as in the case of coffee, tea, exotic fruits, spices, or rather they are region-specific goods such as wine, cheese or olive oils. They can be imported for direct consumption as in the abovementioned examples or else they can constitute the feedstuff for livestock, like in the soya case for meat consumption. Imported products are part of our daily diet and they play a significant role in the overall food system. Main features of the GAS are summarized as follows:

- Food production includes diverse commodities as well as monocultures/bulk food
- The foodstuffs are processed goods distributed in wholesale markets and large urban retailers (e.g. supermarkets)
- Food chain components spread across several countries
- Food chain activities are characterized by long distance travels between the operating units, realized through the use of various storage equipment (e.g. cooling systems)
- System innovation is focused on resource efficiency to cut production and transportation costs (e.g. with special regard to transport volumes, energy, speed and cold-storage devices)

Metropolitan Agro-food System (MAS)

The metropolitan agro-food system is defined as a mid-way between the purely global and the local ones. It refers to the capability of the agricultural land surrounding a city or a cluster of cities (polycentric urban structure) to satisfy all or part of the food needs of the population. Main features of the MAS are summarized as follows:

- Food production includes diverse commodities as well as monocultures/bulk food
- The foodstuffs are processed goods distributed in wholesale markets and large urban retailers (e.g. supermarkets)
- Food chain components spread across all the metropolitan region
- Food chain activities are characterized by large degree of specialization (different operating units), with medium-to-long distance travelling and centralized transport logistics
- System innovation is focused on the increase of resource efficiency and the value chain in the food system, with special regard to higher productivity (quantity) and value creation (quality) maintainingconstant the input of resources (e.g. interest in industrial ecology)

Local Agro-food System (LAS)

Local food is associated with products grown, produced and processed in the locality in which they are marketed. Several authors have conceptualized slightly different local agro-food systems, defining them alternative food initiatives (ALLEN et al., 2003), alternative food systems (GOODMAN, 2003; WATTS et al., 2205), local food systems (HINRICHS, 2000), alternative agro-food networks (RENTING et al., 2003). Their common ground lays in the requisite of the spatial proximity between producers and consumers and in a general commitment to sustainability along all the phases of the production chain. Main features of the LAS can be summarized as follows:

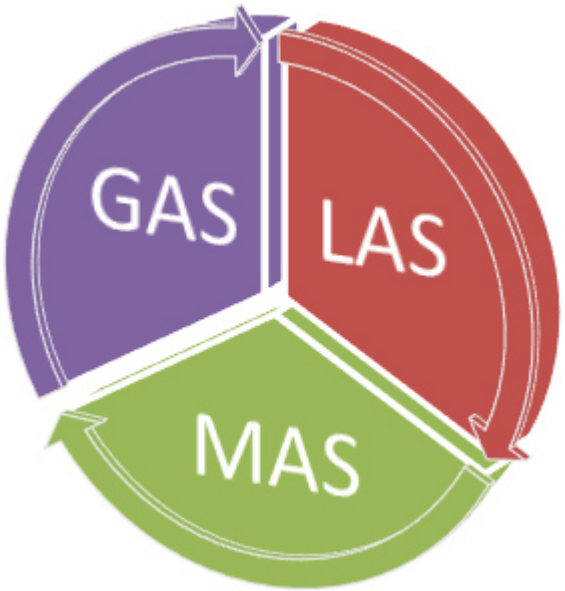
- Food production includes large amounts of region-specific goods
- The foodstuffs are both fresh and processed goods, distributed at farmers' markets, local cooperatives, direct sale points and recently they start to appear in supermarkets, which more often devote some special stores tomarketing campaigns on 'local food'
- Food chain components are located in spatially confined areas (e.g. single farms or cluster of farms)
- Food chain activities are handled by one or few operating units. Although high-tech systemsof production are not excluded in principle, more often the farmers rely upon traditional farming methods

- System innovation is focused on social and environmental issues, such as the involvement of the consumer in the production chain (e.g. through the establishment of Community Supported Agriculture) and/or the employment of organic farming techniques (e.g. with no chemical fertilizers, pesticide-free, etc.).

1.2 Investigating the right scale: from global to local

Investigating the "right scale" of the food system has an *analytical meaning* related to the understanding of the pros and cons of its different territorial dimensions and a *prescriptive meaning*, related to the different values attributed to them (DANSERO et al., 2014). The three agro-food systems here presented affect the (urban) landscape in different ways and at different percentages, and being their interrelation dynamic, their combinations produce changing food geographies (**Graph 3**). It is possible to attribute diverse prescriptive meanings to different "foodscapes". Aim of this section is to investigate the emergence of a new food geography, which is in favor of a predominance of the local dimension over the other two.

Nowadays there is a trend towards the *de-territorialization*of the production chain so that food is part of the network of the international commodities (MORGAN, 2009), that is to say that the global agro-food system (GAS) has the strongest influence over the other two. Consequently, the current food geography is characterized by a distancing between food production and consumption. There are still local food systems, yet they are no longer systems of mainly local food. This evolution of the food geography is evident in the urban context, since the city today seems to be mainly a place of consumption, without any traces of the other vertical stages. Evidence is given by the fact that most of the city dwellers ignore where



Graph3 - A given *foodscape* is made of the connection between its different territorial units

their food comes from, how it is produced and where and how their food waste will be processed (DANSERO et al.). De-territorialization and globalization are perceived as the main drivers of what has been conceptualized as the *New Food Equation*. That theory belongs to Morgan and Sonnino (2010) whom analyze a series of complex and alarming events putting them in relation to the GAS.The most important ones quoted by the authors are:

- *the food price surge of 2007/2008*, when global wheat prices nearly doubled and rice prices tripled, increasing food insecurity;
- consequently, *the insertion offood security in several national security agendas*especially since the food price surge triggered a series of food riots in several countries worldwide, pushing the G8 leaders to convene their first food summit in 2009;
- *the appearance of significant climate change effects*, in the form of water and heat stresses, damaged eco-systems and rising sea-levels; and
- *the rapid trends of urbanization,*which mean that the city will be the place affected the most by our food geography.

However, some *alternative* practices of food production still endured as the joint result of the *spontaneous* resistance of traditional local lifestyles and the creation of *intentional* strategies to support their survival, up to the point that some authors start to talk about a process of *re-localization* (FEAGAN 2007). The claim is for a

more sustainable food and farming system, for sustainability meaning that the food should be healthy, green, fair and affordable. *Healthy* is defined as the "food that is nutritious and readily available; food that over time won't lead to heart disease, diabetes or other chronic diet-related problems". *Green* is the "food produced in an environmentally sustainable manner, but not necessarily organic". *Fair* means that "all who are involved in the food system from production to the point of purchase receive fair wages and have safe working conditions. And *affordable* refers to the condition in which "people have the means to purchase it" (WINNE, 2010). In other words, the process of food production and distribution should care not purely for profit but also for social and environmental concerns. According to Seyfang (2011), there is an increasing demand for organic produce, the sales of organic products are increasingly growing as well as the share of land devoted to their cultivation. Primary rationale for this shift in consumers' demand lays in the claim for a production method in harmony with the environment in general, and with their local ecosystem in particular. A secondary new request is for the protection of personal health, especially in relation to the ingestion of chemical fertilizers. The opposition is, therefore, between industrial farming, global food transport and conventional food consumption channeled via supermarkets, on the one hand, and (re)localization or shortening of the supply chains, return to small-scale production, and distribution via direct marketing, regional marketing or similar initiatives (farm

Meaning of **sustainable food** according to Winne (2010)	
Healthy	Nutritious, ready available, that do not led to diseases
Green	Produced in an environmentally sustainable manner
Fair	Guarantying fair wages and safe working conditions
Affordable	Purchasable by the most

shops, box schemes), on the other hand. Several “benefits” of the local dimension could be observed, still they are considered as such if there is an accordance with a core of sustainability-related values. That is to say that not only the analytical meanings of the two systems are in sharp opposition (long vs. local distance, supermarkets vs. direct selling, industrial agriculture vs. organic farming) but also the underling prescriptive values (profit-oriented vs. sustainable food systems). Among the benefits of a shift in favor of a local dimension in our current “foodscape”, it is possible to mention health-related benefits (pesticide-free and fresher food whose origins are traceable and accountable), environmental-related issues, such as the avoidance of long transportation travels, the reduction of unnecessary food packaging and related GHG emissions, and social-related advantages. The latter include higher economic returns for the community due to the beneficial circulation of money locally. Indeed, a study conducted by Ward and Lewis (2002) states that 10£ spent with a local producer have a multiplier effect of 2.5, meaning that they create gains for 25£ in the territory, compared to the just 1.4 multiplier effect (14£ to the local economy) if the 10£ are spent at the supermarket. However, the most important social benefits related to a re-localization of the food system are labeled as ‘community-building initiatives’ (Seyfang, 2011: 98). The distancing between farmers and consumers is shortened thanks to the (re)emergence of personal connections, e.g. ‘face-to-face contact on the market stalls or with box-deliverers, and secondly through newsletters which share stories, recipes and news about the farms, and invite customers on educational farm visits’

(ibid). Therefore a sense of community could be created and the consumers could (re)gain a connection with the land, receive information on the sources of their food, accept the seasonality and restricted availability of certain products and (re)discover ancient food habits.

1.3 The city-system and the role of food production: a philosophical approach

Many UN agencies (UN Habitat, FAO, UNEP, IFAD), think tanks (RUAF Foundation) and associations of local authorities (ICLEI) have recently focused their attention on local adaptation strategies to the globalization of the food sector. An interesting point of departure/unit of analysis when attempting to promote a change is the city and its surroundings. New approaches to food security and sustainability in metropolitan areas start to emerge. Therefore, to deal with re-localization strategies means to investigate the suitability of the urban and peri-urban scale as central territorial unit for food policies. If a shift in scale is required, several challenges emerge. First, urban food systems do not necessarily comply with the administrative boundaries of a metropolitan area; second, the urban food is interwoven with an array of other policy issues (water, waste disposal, energy, health), thus it requires an inter-sectorial approach; and third, urban food systems should manage the problematic urban-rural relationship.

However, because of the complexity of the food-system, with special reference to its horizontal dimension, i.e. its impact on human health, environment and local economy, the conceptual framework that will be proposed here below is enlarged to encompass all of these dimensions, switching the focus on the city's well-being reachable through the destination of urban green areas to food production. These

areas are labeled as spaces devoted to “urban agriculture”. The phenomenon is defined as

> an industry located within, or in the fringe of a town, a city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area (MOUGEOT, 2005)

and it will be analyzed in Section 2 and 3. However, a previous philosophical approach is presented to frame the matterwithin an holistic perspective.

Given the actual trend on global urbanization, there is a general acknowledgement that the major sustainability challenges[1] will concern the urban setting. The previous paragraph demonstrated how the *shift* from a mainly global agro-food system to a mainly local one is stimulated by a previous *shift* in people’s values and behaviors. Therefore, it is worthy to further investigate the hidden reasons behind that *shift* and the main motivational factors that can kick it off. In this regard, it could be mentioned an environmental philosophy which endorses an active role of the city and its inhabitants in the protection of our planet, precisely through the adoption of widespread gardening activities within the city boundaries. According to Di Paola (2012), it is possible to protect the environment *while* increasing the human well-being through a participative human attitude towards the nature

[1] I.e. climate change, environmental degradation, loss of biodiversity, air soil and water pollution, resources depletion, etc. (More information are available at http://www.eea.europa.eu/themes).

defined as *active stewardship*. The point of departure is a conception of the relationship between the man and the nature as a positive-sum game. On the one hand, Di Paola criticizes the traditional value that certain environmentalists attribute to the nature, conceived as wild and self-sufficient, with the consequent ethical duty to keep it intact, and the widespread belief that the greatest benefit that such relationship can generate is the contemplation of natural landscapes as if the man was no more than a viewer in front of the beauty of our planet. By contrast, he proposes a theory of "reconciliation" between the man and the nature. The paradigm is one of a humanized nature, and it is exemplified in human activities occurring in urban green spaces. The latter are conceived as places where the two agents play together, in potential harmony and for mutual benefits. On the other hand, the institutional approach to environmental issues, which identifies political authorities as the main responsible for the care of our planet through the adoption of tailored policies based on negotiations, backed by regulations, and monitored through sanctions, is openly questioned. The public authorities should bear in mind two considerations: first, that a constitutive feature of the environmental phenomena is their being the sum of millions of daily individual behaviors (e.g. eating meat, driving cars or having long showers), which cannot be addressed through top-down regulations if acceptable levels of personal freedom are to be maintained; and second, that the abovementioned approach (negotiations-regulations-sanctions) seems to be inefficient and highly onerous. The notion of *active stewardship* can be defined, in contrast,as a participatory democratic model

of environmental protection. It implies a moral obligation of each individual towards the environment not imposed through institutional mechanisms, whereas based on the personal civic engagement of the inhabitants of a certain area, involved in the preservation of "their" urban green spaces. In this way, it is possible to reach a form of interpersonal coordination within a network of urban dwellers without external impositions, thus realizing spontaneous schemes of non-coercive collective action, which work at the same time in favor of the environment and the human well-being (Di Paola, 2012: 178). Within this framework, urban agriculture is recognized as the way to promote this attitude. Since each human being has an ecological footprint (he/she consumes natural resources during his/her lifetime) and has a consequent moral obligation of minimizing it, to adopt an attitude of active stewardship towards our environment stimulates sustainable urban lifestyles in a spontaneous manner, *therefore* enlarging the area of personal freedoms and not implying onerous mechanisms of monitoring and sanctions. And the local dimension, symbolized by the city's green spaces and cultivable lands, is the territorial unit that fits this approach the most. Several motivations justify this statement. First, to joint practices of active stewardship promoted at the neighborhood level implies having continuous human interactions with the people living there; second, to define oneself as an urban gardener entails having made a personal choice – a *resolute one* – meaning that there will be higher degree of awareness and willingness to pursue it; moreover, active and constant participation generates dynamics of *prudential positive feedback*, that is the stimulus to carry on

successful practices once positive results are obtained; and finally, a third factor justifying the involvement in systems of urban food production is the *endowment effect*, or rather the stimulating feeling of mastering an activity and being part of a change as well as the achievement of a set of virtues linked to the management of a garden.

Of course, there is a general understanding that this attitude requires the engagement of new actors, previously extraneous to the mechanics of food growing. Still, before addressing the human requirements necessary to transitioning towards more sustainable cities, it is worthy to investigate how the city's green spaces and cultivable lands can concretely benefit the contiguous built environment.

1.4 Urban Green Infrastructures (GI) in Europe

The (re)localization of the food system could be conceived as part of a more comprehensive strategy aiming at guaranteeing better living conditions in our future cities. This need starts to be recognized at the European level. And since the "spatial" dimension of this thesis covers specifically and intentionally the European urban context, it is worthy to reflect upon the latest strategies of the European institutions on that subject matter.

Ecological values, environmental quality and cultural assets are crucial to well-being and economic prospects. Overexploitation of these resources is recognized as a threat to territorial development. Working with nature and in harmony with the local landscape to deliveressential goods and services through Green Infrastructures, using a 'place-based' approach, is cost-effective and preserves the physical features and identity of the locality.

This extract belongs to a document titled *Territorial Agenda of the European Union 2020. Towards an inclusive, smart and sustainable Europe of diverse Regions* and delivered at an informal ministerial meeting of ministers responsible for spatial planning and territorial development (19 May 2011, Hungary). The direction pursued by the ministers seems to go towards the delivery of *essential goods and services,* and, as far as we are concerned, food and related stuffs fit this definition, *using a 'place-based' approach* and *working with nature and in harmony with the local landscape*. In particular, the policy tool therein mentioned is the Green

Infrastructure (GI). As defined by the European Commission, a Green Infrastructure is

> a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystems services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and *urban settings*. (EC COM (2013) 249 final, italics added)

This concept has a revolutionary potential. It prizes the intersection of natural and semi-natural areas with the explicit aim of safeguarding the delivering process of ecosystem services (also) in urban settings. In other words, it redirects the way the city landscape pattern is conceived, i.e. the spatial arrangement of the various natural and human areas and uses (UN Habitat, 2011), in favor of a merge between natural and semi-natural (i.e. human) spaces, that is to say in favor of a humanized natural geography. Food production in urban context appears to be as the prime example of this concept. Indeed, there is an explicit reference to such activities at page 4 of the Commission's communication, where it is stated that:

> Through *urban food production and community gardens,* which are efficient tools to educate school children and engage the interest of young people in particular, it addresses the disconnect between the production and consumption of food and helps increase its perceived value.

Furthermore, European commissioners addressed all the benefits related to the adoption of Green Infrastructures. The primary one is the delivery of ecosystem

services, which are defined as the 'benefits provided by the nature such as food, materials, clean water, clean air, climate regulation, flood prevention, pollination and recreation' (EC COM(2013)49 final). As far as the urban context is concerned, GI assumes a greater importance since:

> GI solutions are particularly important in urban environments in which more than 60% of the EU population lives. GI features in cities deliver health-related benefits such as clean air and better water quality. Healthy ecosystems also reduce the spread of vector-borne diseases.

And again:

> Implementing Green Infrastructure features in urban areas create a greater sense of community, strengthens the link with voluntary actions undertaken by civil society, and help combat social exclusion and isolation. They benefit the individual and the community physically, psychologically, emotionally and socio-economically. GI creates opportunities to connect urban and rural areas and provides appealing places to live and work in.

Moreover, there is a higher return on GI investments compared to the other restoration projects with 'cost-benefits ratios in the range of 3 to 75' (ibid). For instance, the report states that the absence of vegetation in urban areas creates lower humidity rates that together with the absorption of energy from the sun due to dark asphalted surfaces generate the 'urban heat island effect', i.e. the fact that inner city areas are often warmer than the hinterland. This phenomenon can cause serious problems, especially during heat waves and to the most vulnerable social groups (the chronically ill or the elderly). If we compare GI solutions to traditional

ones, the results are self-evident: nature provides moist air for free whereas air conditioning systems create it artificially (they use electricity to evaporate water) and this would cost around 500,000 EUR per hectare (SWD(2012) 101 final/2, p. 13). Furthermore, GI solutions can help reducing GHG emissions, therefore they are listed as mitigation strategies for the reduction of the city ecological footprint. Once more, among the examples quoted in the document, there are green roofs and walls in urban buildings, since they 'require less energy for heating and cooling and deliver many other benefits such as water retention, air purification and biodiversity enrichment'. An interesting best practice that could be mentioned in this regard is the case of the New York's Green Infrastructure Plan (2011). It aimed at rising investments in urban landscaping to absorb and slow the flow of stormwater as an alternative to new sewage infrastructure (COHEN, 2014). Indeed, the city system of sewage was perceived as problematic, especially in its maintenance: the city spent about $4.5million per year to solve sewer backup accidents. The adoption of the plan with an initial investment of $1million in urban agriculture projects developed at the rooftop level had the double consequence of mitigating the problem, lowering the pressure on the city sewage system and fostering alternative food production via urban rooftop farms. Indeed, several urban farms benefitted from the program, such as the well-known Brooklyn Grange, which received $592,730 (COHEN, 2014).

1.5Ecological urbanism: urban resilience applied to the food system

The increasing attention towards the development of Green Infrastructures in urban settings is related to a sense of urgency that cities and local authorities will be the first to deal with the negative effects of land uptake and fragmentation (EC COM(2013)49 final). Therefore, GI is part of a broader strategy intended to better integrate land use, ecosystem and biodiversity in urban areas. According to a report of the European Environment Agency, each year in Europe more than 1,000 km^2 of territory are subject to land uptake mainly for housing, industry, roads and recreation. As a consequence, in many regions soil is eroded or has low organic matter content, and soil contamination levels increase alarmingly (EEA, 2010).

Wherever they are settled, humans need supplies of food and clean water, and they need to dispose their waste. Today cities have been planned and designed in ways that do not always assure these services, which are satisfied recurring to external sources. These sources are increasingly threatened by climate change (temperatures increase, extreme weather patterns, change in rainfall supply and density, flooding, fires, sea level change), that is estimated to be the main cause of biodiversity loss by the end of the century (Millennium Ecosystem Assessment, 2005). A resilient city is one that strives to be accountable for its resources. However, the city's ability to cope with, and adapt to, natural disasters and

changing circumstances (that is the definition of *resilience* by the UN Habitat), seems weakened.

Urbanization directly impacts the city's capability of recovery to external shocks since it often results in rapid and unmanaged urban development (**Figure 1**). All of the city land uses (buildings, transport systems, parks) affect the ecological processes and the biological diversity, in a way that depends on the pattern of development that is followed. Forman (2008) conducted a study on several urban regions with the aim of classifying their spatial patterns of development and their relation with biodiversity maintenance and ecosystem functioning, for biodiversity meaning the 'diversity of life on earth, made up of many components, including genes, populations, species and ecosystems' (Millennium Ecosystem Assessment, 2005). Two patterns are identified as *common but unsuccessful* in protecting this natural diversity: they are the 'urban sprawl' and the 'development along transportation corridors'.

The urban sprawl pattern is characterized by low-density, with built constructions that occupy larger plot of lands and increase the travelling distances. It favors car owners and discriminates who cannot afford high transport costs, increases traffic congestion and leads to higher levels of pollution and emissions that contribute to climate change; finally, it results in lower air quality and greater health problems. This pattern is common in the western developed countries as well as in fast-growing cities of the developing ones.

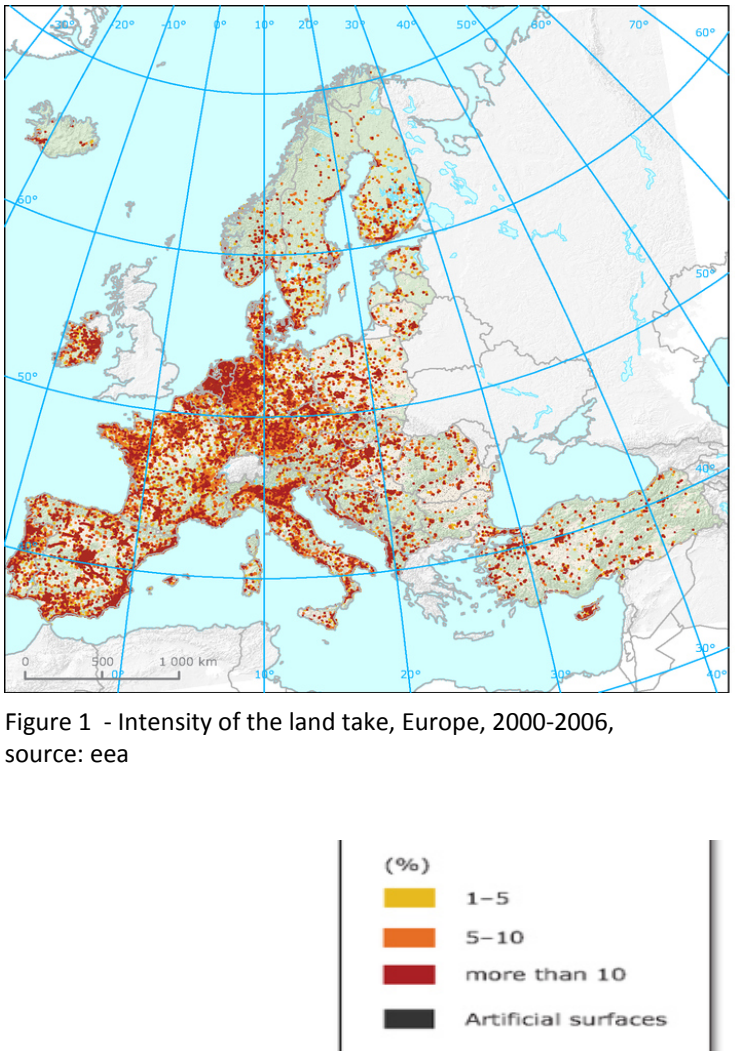


Figure 1 - Intensity of the land take, Europe, 2000-2006, source: eea

The second pattern identified by Forman is the development along transportation corridors. Its main negative consequence is the disruption of the natural systems often located along with regional transportation corridors, resulting in an excessively fragmented landscape. Land fragmentation impedes the movements and interactions of animals, plants and water, lowering genetic exchange, resource access and water flow.

Among the policy recommendation elaborated by Forman, two alternative patterns of urban development are suggested: the 'satellite city' and the 'compact concentric zones'. Both are successful in protecting the environment while satisfying the human needs for built spaces. They imply the organization of the city space in such a way that the maximum efficient, compact, urban forms are realized and connected via well-organized public transport systems at both metropolitan and regional levels. The rationale behind this urban compaction is the search for a spatial organization which maximizes the concentration of urban functions, avoiding land uptake and fragmentation.

Indeed, the city can turn out to be the solution of the problem, if conceived as part of a living and productive landscape. This new approach foresees as first step in governing urban development the mapping of the natural systems present within a city and its surroundings, as preliminary phase in order to plan and realize future urban expansions accordingly. Some authors define this new trend to urbanization theory as *ecological urbanism* (UN HABITAT, 2011), i.e. the recognition of the land

as a living system and the intentional identification of an ecological infrastructure as skeleton for every built development. Main idea is to dispose urban spaces by grouping larger areas of land and connecting them through corridors (e.g. green infrastructures) that allow built and natural networks to exchange information and coexist harmoniously, e.g. deserving specific areas for human constructions while preserving others as habitats.

The role of a local food system in making the urban landscape more productive while fostering its resilience has been largely investigated (VILJOEN, BOHN 2005). Scientific literature often links food planning and resilience through the notions of 'urban agriculture' and 're-territorialization' of the food system (DANSERO et al). According to the Associations of Local Authorities (ICLEI) a resilient food system should be: *diverse* in agricultural models, places of consumption, cultural food habits and variety of edible plants and animals; *distributed,* strengthening the rural-urban nexus and allowing food to grow in various well-interconnected locations in and around the city; *natural,* meaning that it should have a minimal ecological footprint and contribute to a better resource management; *innovative*, welcoming social and technological innovations, both in spatial planning and design (e.g. agriculture on rooftops, schools, walls, etc.) and in farming schemes (community supported agriculture, production via public procurement, etc.); and finally a resilient food system should be *social,* taking extremely care for the people's well-being and *inclusive*, pursuing the highest involvement of the multiple private and

public stakeholders engaged in the field. **Figure 2**represents a conceptualization of the notion of urban resilience into four main categories (metabolic flows, governance networks, social dynamics and built environment) associated with the related urban food practices.

Figure2– Food-related practices and urban resilience, CSIRO et al., 2007

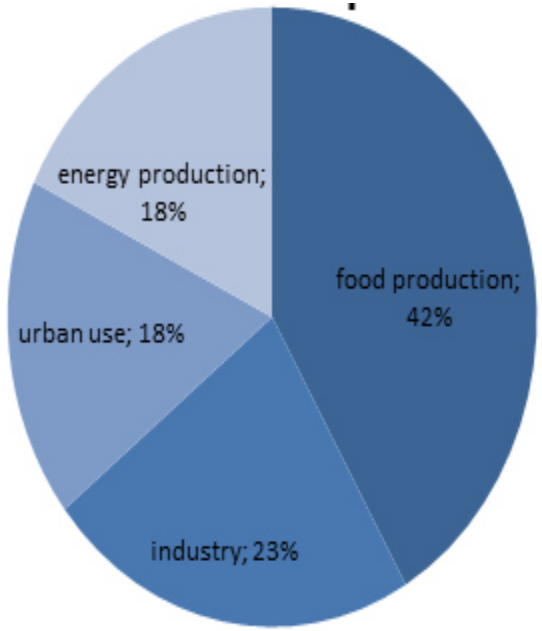
1.6The European context: territory, land and food culture

Before investigating the phenomenon of *urban agriculture* and its role in promoting the resilience of city's food systems (Section 2 and 3), it is important to center in on the European context, since the territorial coverage of this research thesis is intentionally limited to Europe.Since agriculture notably relies on the natural and human capital, which are society- and region-specific,each world region has particular challenges to address. For instance, the African region is affected the most by climate change, in both seasonal and inter-annual variability, and it presents a limited access to water and nutrients (SCAR, 2011). On the other hand, Morocco, South Africa and Jordan together have more than 50% of the world's phosphate ore reserves, that is one of the three macro-elements (together with nitrogen and potassium) vital for crops production (PASSENIER AND LAK, 2009). Therefore, this paragraph reports on the European context, revealing the general trend associated to the overall area as well as the specificities of the different European sub-regions (North, South, East and West).

As far as the European region is concerned, the area presents an array of diverse cultural backgrounds, traditions, histories and governance systems. Indeed, *United in diversity* is the official motto of the EU. There are geographical and climatic differences between the Northern and the Southern, as well as the Western and Eastern parts of the continent. Therefore, Europeappears complex and compound.

From an environmental point of view, the third report of the European Commission's Standing Committee on Agricultural Research (EC SCAR) states that water shortages and soil degradation represent the major challenges in the South, which is more sensitive to climate change; excess of nitrogen and phosphorus dominate in the livestock farming in the West and Centre; the East preserves much of the original biodiversity of the continent, still it remains far below his productive potential because of ongoing land governance disputes; finally, the North may profit from climate change, but its ecosystems are more vulnerable to eutrophication and acidification (SCAR, 2011 : 29).

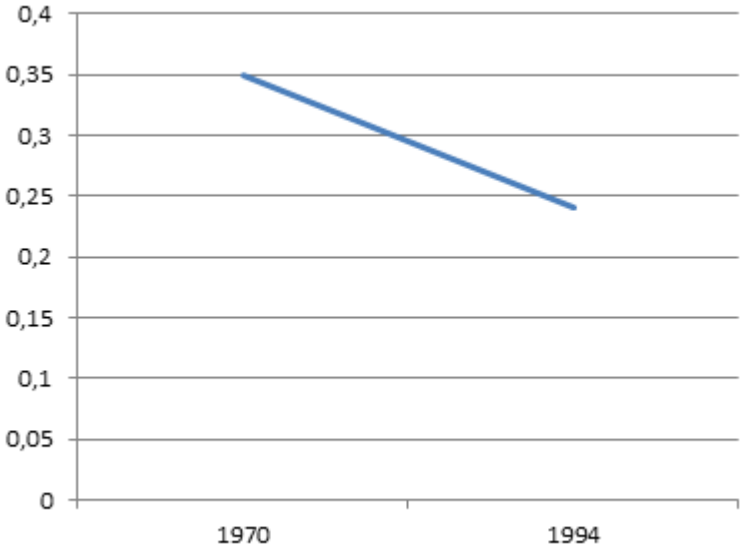
A similar miscellaneous scenario emerges if we analyze the rates of water consumption (**Graph 4**). The percentage of water used for food production in Europe is 42%, compared to 23% for industry, 18% for urban use and 18% for energy production. Yet again, these data are not uniform, they just represent the European average. For instance, in Southwestern and Eastern countries food production needs much higher water requirements (up to 50-70%). Natural conditions and economic and demographic structures differently affect the water consumption among the EU Member States. In France (64%), Germany (64%) and The Netherlands (55%) most of the water is used to produce energy, whereas in Greece (88%), Spain (79%) and Portugal (59%), it is mostly used for irrigation. The European countries with the lowest use of water in food production are Finland and Sweden. By and large, it could be said that in Southern Europe irrigation is an



Graph 4 - Rates of water consumption in Europe, source: SCAR, 2011

essential component of the overall water consumption scheme, whereas in Central and Northern Europe it is mainly used to improve production in dry seasons (SCAR, 2011: 39). Moreover, the Mediterranean area is expected to face a situation of decline in water per capita availability. Problems related to water scarcity, such as higher erosion risks, are projected to worsen due to climate change (Netherlands Environmental Assessment Agency and Stockholm Resilience Centre, 2009).

As far as the land is concerned, there is a general decline in the per capita availability of arable land (**Graph 5**). The global trends accounted for an accessibility of 0.35 ha/head in 1970, sharply reduced to 0.24 ha/head in 1994. Today global population in need for imported food is around 420 million. Current forecasts estimate that this number will rise over 1 billion by 2025 (SCAR, 2011: 34). Nowadays the European Union is the world's largest net importer of agricultural produce, meaning that it is the largest user of agricultural land belonging to others (von Witzke and Noleppa, 2010). Europe is currently using its land and seas as if they were double; its Ecological Footprint has been calculated by the Global Footprint Network which estimated an increase by 33% in the last 40 years (EEA, 2010). In particular Europe's system of food provision is strictly linked to Latin American one; the European livestock production, for instance, depends on the import of animal feed, mostly soy cake, 80% of which in 2007 came from Argentina and Brazil (Eurostat, 2008).



Graph 5 - Per capita availability of arable land

Biodiversity in agro-ecosystems is under considerable pressure due to intensified farming techniques and land abandonment. Most ecosystems in Europe are defined as 'degraded', meaning that they do not deliver the optimal quality and quantity of natural services previously supplied, in particular crop pollination, clean air and water and counteraction of soil erosion and floods (EEA, 2010).

To sum up, the European territory and land context is extremely variegated, and the region presents diverse challenges according to the latitude and longitude taken into account. Among the policy recommendations elaborated by the EC SCAR Report, one needs to be here reported: i.e. that the integration of agriculture in the urban setting is necessarily linked to the urban-rural nexus, therefore to the mainstream agricultural system. In particular, in our continent the following suggestion should be endorsed, for the continent overall well-being:

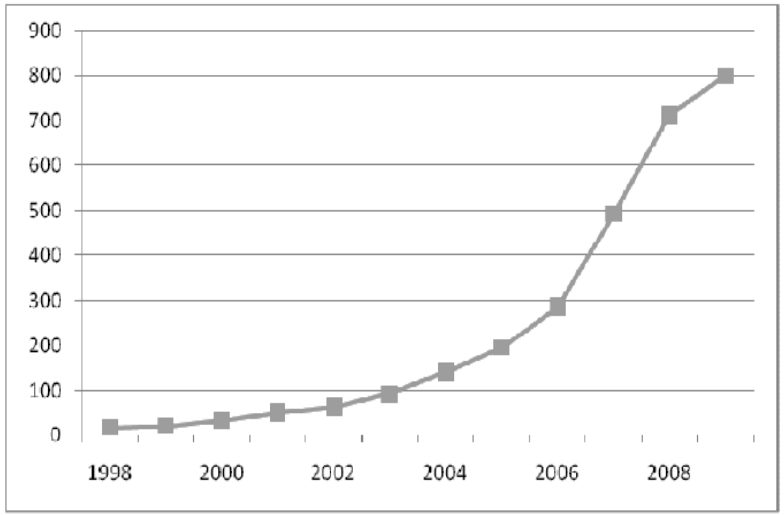
[Since] in Europe, the Atlantic biogeographical region has the highest pressure on agricultural land and includes some of the most intensively farmed areas on the continent (EEA, 2010), maintaining high-nature-value (HNV) farmland in the Mediterranean area and the Iberian Peninsula, central and eastern Europe, together with Scotland and Western Ireland, is clearly a priority (Cooper et al., 2009).

In the context of developing a 'sustainable-competitive' model of European agriculture that would provide Europe with a technical and marketing advantage, Purvis et al. (2011) stress the significance of local and regional food production as a critical element. They state that "in any system that is fundamentally reliant on natural processes, sustainability is strongly dependent on the local environment, and a strong emphasis on 'place and culture' is needed. Thus, in designing new

systems of food production, particular attention needs to be given to the central importance of, and the advantages provided by the local environment […]" (SCAR, 2011: 99).

As far as the food habits are concerned, the European Commission (2007) has identified three trends in the European patterns of food consumption: first, the *enlargement in the variety of food consumed* due to the development of the international food trade as well as of the social and technological innovations over the past two decades. Not only the kind of food ingested is wider, but also the way of purchasing and cooking it changed: regional differences in diets are decreasing and all over Europe people consume the same kind of food in similar way. Indeed, the second trend concerns the *change in food habits*: consumers spend less time at home and are confronted with an increasing availability of pre-cooked meals and/or new domestic appliances for storing and cooking. The driving forces behind this shift include new lifestyles, especially regarding the changing role of the housewife and family composition, an increase in disposable income and great innovations in food processing techniques. The third trend identified is about the *divergence in diet between the rich and the poor*. There is a general increase (in absolute terms) of food-related diseases (mainly obesity, type 2 diabetes, hypertension, osteoarthritis and cancer); however, only the richer consumers started to modify their diets according to healthier styles (vegetarian, organic, etc.). The poorest could not adapt and the rise in the price of fruits and vegetables affected them the most (SCAR, 2011: 75).

On the other side, there is some evidence of a *fourth* trend related to citizens' reaction towards this situation: some Europeans are *transitioning from a diet rich in animal proteins towards one closer to healthier environment-friendly standards coupled with an increasing awareness of the social concerns related to the current system of food provision.* For instance, the EC SCAR report estimates a rise in consumers' choice for fair trade produce, quoting the UK as illustrative example (**Graph 6**). There is a general understanding that 'diet is important for health' and that 'consumers need to be empowered to choose instead of being told what to or not to eat' and 'food should be safe'.



Graph 6 - UK fair trade sales in million £

As far as the European urban context is concerned, there is an ongoing project called *URBACT II – Sustainable Food in Urban Communities – Developing Low-carbon and Resource-efficient Urban Food Systems* (URBACT II, 2012-2015), which is part of a broader European learning and exchange program - the URBACT (http://urbact.eu/), devoted to the promotion of a sustainable urban development. It is jointly financed by the European Regional Development Fund and the Member States, within the framework of the Europe's cohesion policy to help fostering competitiveness, growth and employment in a socially inclusive manner. It was launched in 2002 and it is operationalized through the creation of various specific thematic networks, such as the one previously quoted concerning urban food production (http://www.sustainable-everyday-project.net/urbact-sustainable-food/). First findings from this 3-year thematic network show trends and best

practices currently developed in 10 selected European cities. They are Brussels/Belgium (participating as lead partner), Amersfoort/Netherlands, Athens/Greece, Bristol/UK, Gothenburg/Sweden, Lyon/France, Messina/Italy, Oslo/Norway, Ourense/Spain and Vaslui/Romania (**Figure 3**).The network offers a good coverage of the different urban realities, therefore constituting a representative sample of the European context (JEGOU, 2014). The partner cities are distributed from West to East and from North to South, reflecting all the European geographical nuances. They range from medium-size cities with a population between 70.000 and 250.000 inhabitants (Vaslui, Ourense, Amersfoort and Messina) to larger cities populated by 400.000 up to 1.100.000 dwellers (Bristol, Gothenburg, Oslo, Athens, Brussels and Lyon). A report conducted by the project coordinator Mr. François Jégou, project leader and expert in Strategic Design Scenarios, outlines the specificity of each urban setting: for instance, 'Athens and Lyon are very dense and mineral city, whose pattern of development are mainly urban sprawl, instead Oslo, Gothenburg and Brussels present more loose urban fabric resulting in more opportunity for food production in inner city'. Some partner metropolises (Messina, Oslo, Athens, Gothenburg) are important ports with a strong fishing tradition influencing the local diets, others were located totally in the inland (Brussels, Vaslui and Lyon) and the remaining ones (Bristol and Ourense) were in a mid-way between the coastal area and the hinterland.

Figure3- URBACT II project, partner cities

Interesting trends emerge in the comparison between the various food cultures. In particular, participating countries such as Italy, Spain, France and Greece, have gastronomies and culinary traditions well-know all over the world. So they present stronger food cultures, and this was recognized by the other participants as well. Meanwhile, countries like Norway, the United kingdom or The Netherlands, show weaker food cultures, characterized by low-quality food produced in agro-industries. It is interesting to note that *different but converging* challenges are faced by the two groups of partner-cities. On the one hand, the first group has populations strongly rooted and engaged with food, yet signs of erosion in traditional food habits start to appear, especially among the younger generations. Moreover, these cities tend to demonstrate a sort of 'blindness' towards the risk of a possible evolution of this negative trend. Therefore, in this case, sustainability applied to the food system could mean the transformation of an existing/resistingsolid culinary tradition into a sustainable one and the avoidance of the intermediate stage of a hyper-industrialized system of food production. On the other hand, the second group has a long-standing low-quality food tradition associated with junk food and industrial farming and, in that case, sustainability could be perceived as the way to (re)build the food culture, overturning the existing one. The latter cities show more dynamic communities of food activists compared to the former; still, these so-called 'foodies', which organize multiple urban gardening activities and food festivals are a minority hidden by a mainstream disengaged population. To conclude, the report states that the two challenges are

clearly different, still they converge towards the same scope: finding spaces for sustainable food production within the urban boundaries.

Conclusions

This section analyzed the relationship occurring between the food system and the urban context, in order to better frame the suitability of a (re)localization of the food production at the city level. To do so, first, it described the complexity of our agro-food system, adopting a territorial approach. Three existing and overlapping *foodscapes*were identified: the global, the metropolitan and the local, together with their interconnected dynamics. Second, it investigated the motivation behind a possible *shift* towards a *predominantly local* food geography, according to a philosophical approach, which endorses an active role of the city and its inhabitants in the protection of our planet. Third, the notions of *green infrastructure, ecological urbanism* and *urban resilience* were explained in order to provide a conceptual framework of reference. And fourth, since urban agriculture is a society- and region-specific phenomenon, it will be investigated with a specific territorial focus on Europe. Therefore, a final paragraph was devoted to a showcase for the European land context and food culture.

Now, it is possible to start the analysis of the way in which European cities are engaged in urban agriculture today.

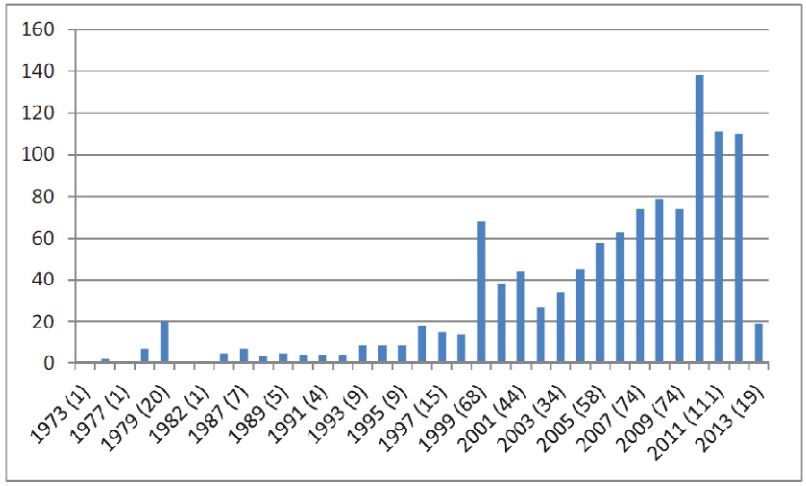
Section 2 –Technical requirements for urban agriculture

This section provides a definition of urban agriculture as an industry devoted to the production of (not only) food within and for the city. Then, it analyzes the technical conditions necessary for UA to be implemented. A first cluster of necessary elements is labeled as ‘specification of the ground’ or ‘location and environmental conditions’ and it includes the analysis of the soil, sunlight and water requirements as well as the contamination and pollution concerns related to food growing in the city. The land location, in particular,is addressed apart through the elaboration of a typology of potential plots, coupled with existing European projects. Finally, a second cluster of elements is investigated, and namely the access, security and legal frames, which are to be taken into account for UA to be safeguarded, once the implementation successfully starts.

2.1 Urban Agriculture (UA): a definition

*Urban agriculture is an industry located within, or in the fringe of a town, a city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area (*MOUGEOT, 2005).

This definition allows us to take into account the most important features of urban agriculture. First of all, such activity is defined as an industry meaning that the phenomenon is thought as a legitimate component of the overall system of food production. Indeed, its aim is to grow and raise, process and distribute a diversity of products. Since our current food industry is mainly associated with rural environments plus long transportation chains to supply urban populations, a first consideration here regards the possibility of conceiving the raising of crops within an urban area as a valid alternative to the mainstream one. As we will discuss later on in the chapter, this conceptualization of urban agriculture as an industry is applied to the reality of urban farmers at different levels. The importance attributed to the orientation-to-profit can be considered as a continuum line ranging from urban farmers systematically profit-oriented, and, on the other side, citizens conceiving it as a side event.



Graph 1 - Number of publications utilizing the expression "urban agriculture" (MULLER, 2014)

Nevertheless, the stress is always on its local dimension: human and material resources, products and services come from the territory and aim at feeding local population. Therefore, inputs and outputs of the process are supposed to be truly local. This is a second feature worthy to mention since it tells us that UA can be considered as a farming technique belonging to the Local Agro-food system (LAS), as described in the previous section and perfectly in line with the growing concerns on food security and sustainability raised by academics, politicians and environmental movements (see Section 1).

A third feature of urban agriculture as defined by Mougeot regards its multi-functionality. The reference here is to the possibility of producing food as well as non-food products. As far as the food is concerned, local producers tend to focus on products that require closeness to urban markets (vegetables, flowers, bees, poultry, eggs) prizing the freshness and seasonality of their goods. Moreover, such production is frequently coupled with educational and recreational activities, that is intentional production of non-foodstuffs. According to numerous researchers , the main functions attributed to urban agriculture behind food production are: 1) prevention or absorption of environmental risks, 2) contribution to cleaning up the city by recycling waste, 3) landscape and socio-educational functions, 4) contribution to urban employment and 5) reduction of inequalities(MOGLIA, 2014). These functions are commonly listed and they really describe the UA's benefits in a theoretical way. However, they should be ranked according to empirical data

demonstrating their effectiveness.Unfortunately, the collection of reliable data concerning the phenomenon is a recent ongoing process and no comprehensive databases exist yet. Nevertheless, these functions remain crucial in order to investigate the role of agriculture in urban contexts in so far as the inhabitants and policy-makers, recognizing and prizing the UA's multi-functionality, could be more prone to promote it even if in competition with other land-uses.

Urban agricultural projects are inserted within or nearby a city. This implies questioning urban space organization, i.e. the relationship between city market gardens and other land uses. It is a matter of urban planning and design. According to our definition, the activities analyzed occur within and/or in the fringe of a town or city or metropolis. Main concerns here regard the ratio between compacted, built spaces and uncompact, unbuilt ones . The reference is to alternative land-uses, and namely agricultural, residential, commercial and industrial urban land uses. Their balance and coexistence within a city and its surroundings depend on what the collectivity welcomes the most. Nowadays, unfortunately, modern schemes of food production tend to relegate agricultural activities mainly to the countryside.

2.2 Technical requirements for urban agriculture

Urban areas to grow food and not-food products can be planned and designed in different forms, according to the size and features of the selected site. Nevertheless, each project faces a set of specific challenges related to the following factors:availability of the land, soil (or equivalent) requirements, access to water, lighting or solar exposure, potential contamination, legal status and related commercial regulations, land access and security concerns (MOGLIA, 2014).

The first challenge is to find an urban place where the garden can be realized and safely maintained. Primary concern is about the availability of the "land", for land meaning an urban surface capable of satisfying certain technical requirements vital for agricultural activities, and namely: sufficient supply of soil (or soil equivalents) and water, and sufficient solar exposure. This cluster of "natural" elements can be labeled as 'specification of the ground' or 'location and environmental conditions'. They are conditions *sine qua non* that each urban gardener has to address. They are necessary but not sufficient factors to deal with. 'Access and security issues' as well as 'framework conditions', i.e. the period of availability of the land, its legal status and the consequent security and payment conditions (ownership, lease, squatting) constitute a second cluster of technical requirements to bear in mind (KEMPER, WELTRING, 2014).

2.3 Specification of the ground: analysis of the environmental conditions

2.3.1 Soil (and equivalent) requirements

Concerning the soil, the most commonly proposed solutions are: to cultivate directly on available urban lands; to set-up soil installations in not-arable urban spaces and to utilize innovative soilless techniques of vegetable production (hydroponics or aquaponics).

Direct cultivation on urban green spaces could take several forms. Commonly, the places devoted to agricultural activities in metropolitan settings are buildings' court- and back-yards, school and university playgrounds, urban gardens and city parks. They can be classified according to an array of different features (status, ownership, size, function), still they all are directly arable plots, meaning that they share the same soil concerns. In particular, urban soil in order to be suitable for crops production has to be safe, i.e. free from potential sources of contamination which pose at risk the human health and wellbeing (see further below).

Growing food in the city is not hampered by the absence of large surfaces of cultivable land. Rather, soil requirements could be easily adapted to different urban settings.

Today a variety of traditional and innovative elements and materials allows the cultivation in not-directly-arable urban spaces. They can be classified according to the spatial dimension in which the cultivation occurs: there are *vertical* farming systems, and *horizontal* ones. The latter in turn can occur at the *ground level* or on *rooftops*. The former addresses the issue of cultivating on vertically inclined surfaces and is often associated with innovative farming techniques, labeled as "soilless farming techniques" and described later on in this paragraph.

In the *horizontal* farming systems, primary concern is about the construction and maintenance of soil installations. One of the most common technique consists in the set-up of *raised planting beds* (**figure 1**). They are open-topped and open-bottomed boxes, higher than ground level, consisting of soil mounded and surrounded by a frame to keep it in place. The boxes are separated, allowing the gardeners to work from the path beside them. The crops therein cultivated could be protected mounting PVC pipes inside and rising bird netting or row covers around. Theemployed materials are usually all the items that hold dirt (lumber, plastic, metals, bricks, rocks). They frequently references the surrounding urban context and are reused and repurposed materials (**figure 2**). Since the soil is added manually, it is usually loose and fertile. And since gardeners work from the pathways, the arable land is never walked upon. Being the soil depth limited, it is necessary to consider the rooting requirements of different crops, as well as specific drainage requirements.

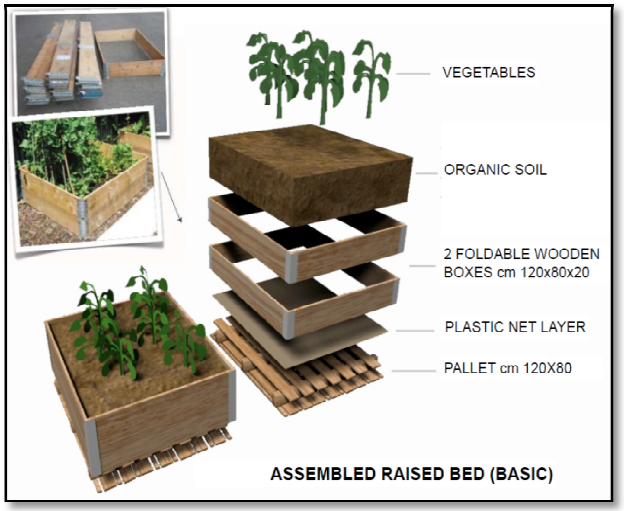


Figure 1- Functioning of assembled raised beds

Figure 2- Raised beds made of repurposed steel drums

A slightly different technique concerns the use of *geotextile bags* (figure 3). The geotextiles are permeable fabrics, used in association with soil because of their ability to filter and drain. So, the installation in such case is made up of open-topped but close-bottomed planting containers.

The relevant difference between ground-zero and sky farming systems is the additional weight requirements that the latter needs. On rooftop urban farms the basic requisite is the search for a flat roof capable of supporting further loads.

Modern scientists increasingly explore production technologies that do not use soil as a medium, known as 'soilless growing technologies' (KEEFFE et al). In particular, there are two increasingly recognized methods: hydroponics and aquaponics systems of food production. In both, crop roots are directly dunked into nutrient rich waters, and no soil at all is required. Their technical equipment is similar, since both systems use glass, plastic and mechanical pumps. However, the hydroponics systems imply recirculated water systems where nutrients are manually added, whereas aquaponic systems stimulate the ecosystem effect created by the interaction of fish and crops (figure 4). Such interaction is highly beneficial since it takes advantage of the natural nitrogen cycle occurring when the two natural elements are together. Fish respiration produces as by-product consistent amounts of waste ammonia (NH3), which is converted into nitrate (NO2) through the natural presence of bacteria in the water. This process has two functions: firstly, it 'recycles' ammonia, which is toxic for fishes living in closed recirculated water systems and,

Figure 3- Geotextile bags for urban agriculture

Figure 4 - Aquaponic system: basic functioning

secondly, it produces an available form of nitrogen (NO2), which is the nutrient requirement for crops growing. The rationale behind these techniques is perfectly in line with various concerns related to food production in urban contexts. First of all, the avoidance of soil is pursued since land availability in the cities is often insufficient. Urban soils could be contaminated due to previous industrial land uses and/or proximity with industrial plants and congested highroads. Therefore, soilless systems of vegetable production allow indoor growing of food, avoid pollution concerns and safeguard the quality of the crops produced. Secondly, when urban agriculture is integrated within and/or upon existing buildings, the amount of required soil generates concerns related to the capability of the existent structures of bearing the additional weight. Soil additional weight is a variable to deal with, and it can adversely affect the retrofitting of current urban infrastructures. The reduced weight of alternative-to-soil techniques let agriculture be successfully practiced without compromising the buildings' structural integrity. Lastly, from the environmental point of view, water use is reduced if compared to traditional agriculture since the growing channels utilize only few centimetres of water, and are part of closed, recirculated systems; the indoor production increases the resilience to external shocks such as storms, temperature shifts or prolonged rainy periods and the crops take up the nutrients across the surface of their roots, meaning that they could feed themselves with little efforts, using more of their energy for growth. An overall increase in their productivity is therefore obtained.

Figure 5 - Aquaponic system within a greenhouse

Figure 6 - Aquaponic system within a building

2.3.2 Lighting – Solar Exposure

Integrating agriculture in the urban context means being concerned about the exposure to sunlight, for the very basic need of solar energy that crops have during their photosynthesis process. Lighting is vital for vegetables' production. Therefore, the nature of urban lands arises concerns about the feasibility of cultivation in the city. It is well-known that the urban surface is devoted to an array of different activities, meaning that residential and commercial buildings as well as transportation infrastructures and facilities occupy most of the available land. So the productive capacity of cities requires an analysis of the lighting conditions of man-made surfaces. In particular, it is necessary to deal with orientation and overshadowing of existing building blocks. This implies the collection of height and shadow information. The roofs' height above ground level produces information on the overshadowing of surrounding spaces, providing the urban farmer with an at least empirical idea of the capability of such area on capturing the solar light. Moreover, a "shadow map" can be inferred through the analysis of the sun's position at different times of the day and months of the year (**see as example, figures 7, 8**). Longitude and latitude count as well. Since the intensity of light changes during the day, as a result of changing solar elevation, an area in shadow at midday has a higher decrease in the overall amount of daily light exposure than an area in shadow only during the sun rise or sunset (KEEFFE et al). If urban density can affect healthy plant growth in the city, on the other hand, knowledge about lighting

Figure 7 - Rooftop shadow map for March, city of Manchester

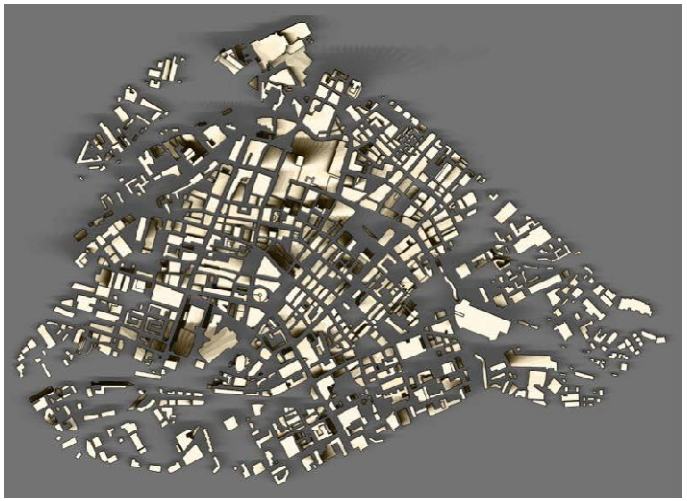


Figure 8 - Rooftop shadow map for June, city of Manchester

requirements of different plant species can help overcoming the problem. In conclusion, it could be stated that the capability of capturing solar light of the selected site is one of the biggest factors to bear in mind for the successful implementation of an urban agricultural project.

2.3.3 Water requirements

Crops production normally needs high water requirements. Also, the quality of water is critical, since water-borne pathogens on crops eaten uncooked cause diseases such as typhoid and cholera (FAO). In urban settings the demand for water satisfies multiple purposes: drinking use, personal care, domestic and economic activities. Therefore there is a competition for alternative water uses: domestic, industrial and agricultural. An increasing urban population means increasing overall water requirements, often coupled with inadequate wastewater management, which degrades the quality of urban rivers and aquifers (FAO).

Given the global concern on water scarcity, the greatest opportunity for urban agriculture is to access not-potable sources. Therefore, urban water requirements for crops production can be met through alternative channels, such as: *wastewater* from domestic sources, which can be re-used, if properly treated; *rain water*, harvested from roofs, which is low-cost, less polluted than other urban sources and, if constantly harvested, helps mitigating urban flooding and soil erosion. In addition, water utilization should be optimized adopting water efficiency practices and using

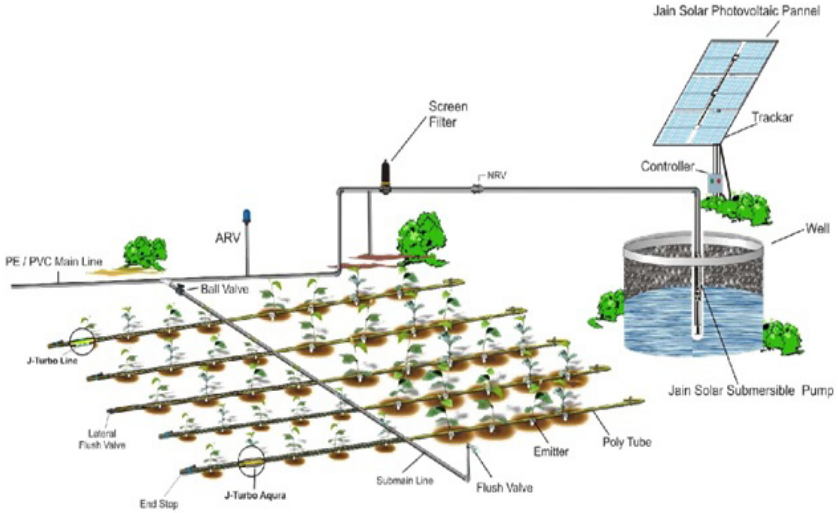


Figure9 - Drip irrigation system, functioning

Figure10- Drip irrigation system, detail

appropriate irrigation technologies (**figure 9, 10**).Examples of technologies designed to reduce water losses are low pressure drip irrigation systems, hydroponics, and mulching and conservation approaches to minimize soil evaporation.

2.3.4 Potential contaminations – awareness and remedies

Urban pollutants threaten the quality of food grown in metropolitan settings and rise concern about its usefulness and sustainability. They usually contaminate natural elements with which plants are in direct contact, i.e. soil, air and water, and pose at risk human health and wellbeing, since humans eating polluted plants directly absorb the harmful contaminants therein enclosed.

Concerning soil contamination, several studies and guidelines have been so far implemented (RUAF Foundation, *Guide on soil contamination*). They stress the importance of being aware of the matter and well informed about the existing remedies and their effectiveness.

There are different sources of soil contamination, basically related to past land uses, when toxic substances may have been utilized and entered in direct contact with the soil. The easiest form of evaluating soil is *soil testing*. This normally implies having a private firm performing several samples and lab analysis on the concerned land. The cost of testing can vary according to the range of contaminants being checked. Since certain types of land uses are associated with certain types of

contaminants, the process can be eased collecting information on previous land uses, contacting past land owners, or consulting city archives, courthouse records, etc. Once the level of contaminants has been detected, the urban farmer has several options in order to deal with the problem. One effective and costless option is to grow plants in containers or raised beds separated from the polluted land. The aim is to avoid any contact between plant roots and contaminants. However, such a remedy implies additional costs and expertise due to the purchase of soil and containing boxes. A second alternative is constituted by the so-called "physical soil remediation techniques" (Table 1). They imply the use of technologies for remediation purposes and include *excavation*, i.e. the physical removal of the polluted soil with heavy machineries at relatively high costs. This technology is often coupled with the use of *geotextiles*, i.e. impermeable synthetic blanket-like materials, put over the land in order to create an artificial protective barrier. Costs are not so high, however, the geotextiles could be subject to wear and tear in the longer period. Both remedies are quick and effective. Otherwise, it is possible to "wash" the soil through a *washing-soilprocess* which is a treatment of removal of contaminants from the soil, taken away and later put back on the ground. Last, it is possible to extract pollutants through *soil vapor systems*, made up of wells and pipes installed in the ground. All of these procedures are very effective, however highly expansive.

A third sound option to deal with soil contamination is the use of the so-called "biological soil remediation techniques" (Table 2). They are performed on site and

SUMMARY OF PHYSICAL REMEDIATION TECHNIQUES

	Excavation	*Geotextiles*	*Soil washing*	*Soil vapor extraction*
Access	yes	yes	yes	yes
Cost ($CAD)	$5000-$10 000	<$1000 +excavation costs	$1000-$5000	$10 000+
Timeframe	short <1 season	short <1 season	short <1 season	short <1 season
Effectiveness for UA	1	2	1	1
Environmental Effects	energy use air pollution disposal	energy use air pollution disposal	energy use air pollution disposal	energy use air pollution disposal

Table 1 - source: Guide on Soil Contamination, Ruaf Foundation

they imply the use of biological agents fighting pollutant agents. Among them we can quote *microbial remediation,* i.e. the use of microbes degrading contaminants in a less toxic form; *phytoremediation*, i.e. the process of using plants to extract pollutants from the soil; *fungal remediation*, i.e. the use of certain species of fungus to lower the level of contamination or *compost remediation*, i.e. the addition of compost to the soil, aiming not at the removal rather at the creation of a buffer zone to avoid the direct contact between plant roots and polluted agents. These remedies are more natural, less expensive, however less effective.

Concerning air pollution, a recent study conducted by the Parisian University of Agronomy AgroParisTech investigated the health risks associated with the deposits of atmospheric pollutants in high traffic areas. In particular they monitored the trace of metal concentrations in lettuce and cherry tomatoes cultivated for two growing seasons (2012/2013) on the rooftop of a Parisian building. First findings demonstrate that the level of contaminants were largely under the French and European standards for heavy metals (100 mg/kg), suggesting that, at least at the rooftop level, the urban agricultural production does not pose at risk the human health. Other urban farmers avoid the problem cultivating entirely indoors (e.g. in greenhouses or within the buildings).

SUMMARY OF BIOREMEDIATION TECHNIQUES

	Microbial remediation	*Phyto-remediation*	*Fungal remediation*	*Compost remediation*
Access	yes	yes	no	yes
Cost ($CAD)	<$1000	<$1000	n/a	<$1000
Timeframe	short <1 year	2-5+ years	n/a	short <1 season
Effectiveness for UA	2	2	3	2-3
Environmental Effects	potential metal toxicity	disposal of toxic plants	potential metal toxicity	none

Table 2 - source: Guide on Soil Contamination, Ruaf Foundation

2.4 Land location: typology of potential plots

There is an array of potential plots where urban farms can satisfied the abovementioned technical requirements in several ways, so coming into existence. The classification provided here below is based on European case studies. It is not exhaustive, and the evidence provided refer to both ongoing and implemented projects.

The selection of a suitable site for urban agriculture is often in line with farmers/gardeners' motivations behind the activity. A clear distinction can be made between *professional urban agriculture*, *urban gardening* and *innovative concepts* applied to them.

Professional urban agriculture seeks for food production opportunities, meaning that profitability is pursued through market-oriented activities, the establishment of a link with direct and regional marketing and the supply of services combined with agricultural production (such as gastronomy, horse keeping, etc.). On the other hand, urban gardening runs for more socially-oriented activities, where profitability is only partially pursued; instead, recreational and educational services are often provided. Both can be realized in traditional ways; however, innovative concepts are increasingly welcomed by European communities of urban farmers and gardeners, for innovation meaning original spatial and design installations as well as new competitive agri-business models.

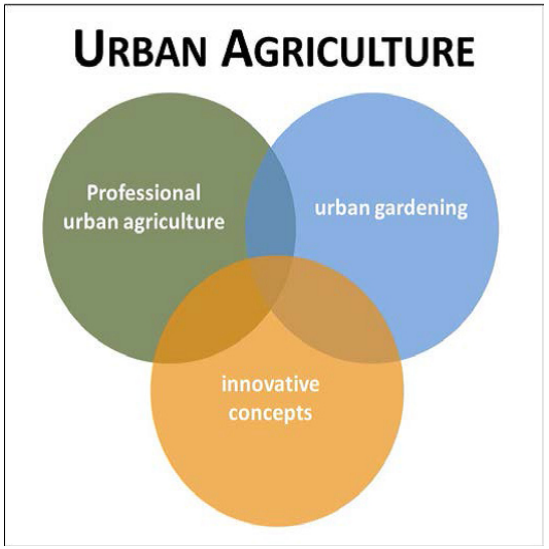


Figure 11 - Dimensions of Urban Agriculture, source : *EU-COST Action Urban Agriculture Europe*

The three domains are not strictly separated, rather they can overlap as shown in the Euler diagram (**Figure 11**).

Accordingly, it is possible to enlist an array of commonly used spatial arrangements for UA. And namely, the most suitable plots find their place in *open green spaces* (gardens, parks, backyards, playgrounds) and *man-made constructions* (rooftops, buildings, living walls, balconies). Here is the list of the most commonly proposed architectural solutions for urban agriculture. Each of them is briefly described, then coupled with existing and/or experimental European project.

Figure 12 - Abandoned athletics field, before OrtiDipinti

2.4.1 Open green spaces

Demolished sport fields: OrtiDipinti Community Garden, Florence, Italy

One possibility is to farm on demolished sport fields, ex-football areas and playgrounds. This has been the case for the first educational garden established in Florence, Italy: the *OrtiDipinti*project.

It is a sound case of urban gardening in which the pursue of socially-oriented activities is more emphasized than the profitability of food production. Initiated in September 2013, and launched by the city mayor during an official visit later on in mid-October, the project represents a successful example of the integration of agriculture in urban contexts. The project coordinator, the architect Mr. Giacomo

Figure 13- Orti Dipinti Community Garden

Salizzoni[2], worked on its design and implementation for two years, either verifying the technical requirements of the field and testing the local support from both public authorities and neighboring inhabitants. Main goal of the activity is the establishment of a "community" beautifying the neighborhood, strengthening social bonds, providing recreational opportunities and promoting environmental awareness (SALIZZONI, 2014). The chosen location, an abandoned public athletic field, was regenerated, with impressive results (**figures 12, 13**).Traditional gardening activities, such as growing of seasonal vegetables, fruit trees, edible flowers and aromatic herbs, are coupled with innovative gardening solutions, such as the construction of a warm farm, a bamboo geo-dome, an energy tree and a Zen garden. Moreover, the area provides farmers and visitors with a kids playground, a workshop/event space, a biking park and an entry/info point (**figure 14**).

Figure 14 -OrtiDipinti, design project

University campuses : The Thessaloniki Project - Red and Green, Aristotle University, Thessaloniki, Greece and the LUISS Community Gardening, LUISS University, Rome, Italy

Other types of available plots are school playgrounds and university campuses. It is encouraging that concerns about urban ecology and sustainability arise in educational contexts, where reflection, criticism and innovation are supposed to

2 Interviewed on-site the 15th of February, 2014.

start. These activities occur within the campus gardens. In Thessaloniki, the School of Architecture at the Aristotle University, offered a course on Urban Agriculture for master students with the aim of launching an internal competition for the design of an agricultural site into a fallow urban area. Participant students came up with several proposals, judged by an international jury during the academic year 2013/2014. The project was financed by the university and the participation of international professors was guaranteed through an Erasmus Lifelong Learning Program Staff Training (FÁCZÁNYI, 2014). Moreover, the university offers its own available plots for rent to citizens interested in growing their own food (MYLONAKI et al.) (**figure 15**). In Rome, the LUISS University inaugurated, in November 2014, the first Italian community garden born and established at the university level. It is an area of around 500m^2, where students, professors and staff employees can collaborate together to get to know horticultural activities and food production-related issues (**figure 16**).

The significance of such 'urban farming training programs' lays in the possibility of challenging current ideologies over urban land space and traditional agricultural practices. The trend has been analyzed in Montreal, where most of the campuses of universities have become 'training fields' for multiple agricultural activities. First evidence emerge from the studies conducted by RONDEAU (Centre Urbanization Culture Société, INRS, Montreal) on the potentials of and opportunities for this new growing generation. They will be addressed in the following chapter concerning the profile of the urban farmer.

Figure15 - Rented plots at the Aristotle University, Greece

Figure16 - LUISS Community Gardening, Rome

Urban farms : CooperatiefEigenwijzer, The Hague, The Netherlands

Nowadays European cities are increasingly hosting entrepreneurial activities labelled as urban farms. Their business models often conceive the profit as a new variable internalizingthe negative externalities of the production process as well as pricing goods not-directly according to mainstream economic notions. For instance, the Dutch Cooperative Eigenwijzer, established in 2008, lists among its main objectives, and along with the production of 'healthy food for urban citizens', awareness creation, social education and greening of the urban space (ANASTASIOU et al.). In particular, their project aims at training, coaching and financially supporting long-term unemployed dwellers, which wish to produce food in The Hague. So far, they established three urban farms in the neighbourhood of Molenweide: a backyard garden and a roof garden in the cooperative's premises and a roof garden on the top of a restaurant (**figure 17**). The commercial status foresees the onsite sale of grown vegetables, herbs and seedlings, as well as the possibility of subscribing to a Community Supported Agriculture, whose membership implies the reception of personalized baskets of locally produced food. Besides, part of the products are sold directly to local restaurants. Moreover, they compost their waste in a peculiar way. The organic wastes of 150 families living in the area are collected to realize self-made organic fertilizer, part of which is used in the own activity, and the remaining part is given back to the contributing families.

Figure 17 - Rooftop garden, CooperatiefEigenwijzer

2.4.2 Building-integrated agriculture

Recent urban agriculture initiatives tend to integrate agriculture in and on buildings. Literature on the matter developed several concepts (SANYE-MENGUAL, 2014), such as *Vertical Farming* (Despommier 2009), *Building-Integrated Agriculture* (Caplow 2009), *Zero-Acreage farming* (Specht et al. 2014) and *Skyfarming* (Germer et al. 2011).

Rooftop gardens : Potage-Toit project, Brussels, Belgium

One possibility is to farm on available flat rooftops, establishing there a rooftop garden. The European selected example is the *Potage-Toit* project (**figure 18**), developed by the Belgian no-profit organization *Le Début des Haricots*. It is an ongoing case of urban rooftop farming. The project started in January 2012, with the aim of creating an experimental urban farm on the rooftop of the Belgian Royal Library, located in Brussels, city center. The local administration provides financial support with an annual grant of 15,000 euros/year for the first 2 years.[3] All

Figure 18 - Potage-Toit Project, Le Début des Haricots, Brussels

3 Mr. Filippo Dattola, *Potage-Toit* project manager, *Le Début des Harricots* ASBL, interviewed on September, 5th 2014.

technical requirements are satisfied: the rooftop measures 350m^2 ,and it is resistant in supporting additional loads (up to 450 kg/m^2), well-equipped for water evacuation (pouring floor tiles), with a good solar exposure and an easy access (via the library's elevators). Intensive food production is the main activity, indeed the organizers established an on-site mini-market three times a week (mon, wed, frid, from 10am to 3 pm). The production system is coupled with the use of renewable energy technologies (a small photovoltaic panel supplies all the energy needs for the irrigation system and the greenhouse ventilation system). Rainwater for crops irrigation is collected into 3 tanks (1000 l each) and distributed through a drip irrigation system. Finally, the food waste of the library cafeteria (same floor) is collected and composted in order to produce organic compost.

During an onsite interview, the project manager, Mr Filippo Dattola, explained that for the first time since its launch, the association refused the public funding for the coming year, with the aim of demonstrating the complete economic sustainability and independence of the activity.

Rooftop Greenhouses: the Rooftop Greenhouse Lab, Barcelona, Spain and WATER-ROOF FARM, Berlin, Germany

A further option suggests the establishment of greenhouses along all the top of urban buildings. The idea widely spreads in North America, where well-known examples can be quoted, such as the Gotham Greens (http://gothamgreens.com/ -

Brooklyn, NYC, USA), the Vinegar Factory (Manhattan, NYC, USA), the Lufa Farms (http://lufa.com/en/ - Montreal Canada) and the Fairmont Royal Hotel (Toronto, Canada). On the other hand, in Europe, building-integrated forms of agriculture are currently receiving more attention from researchers and local authorities. In particular, it is worthy to mention the *Rooftop Greenhouse Lab (RTG-Lab)*, an experimental pilot project led by the Autonomous University of Barcelona (ICTA-ICP Building, UAB, Bellaterra, Spain), as well as the *ROOF-WATER FARM*, a German research center funded for a period of four years (2013-2016) by the German Federal Ministry of Education and Research. Both the projects are ongoing and presented their first findings at the 6th AESOP Conference *Finding Space for Productive Cities* (Leeuwarden, November 5-72014). Their main focus is on the development of *integrated* rooftop greenhouses, suitable for urban food production in the cities of Barcelona and Berlin. What emerged is that main factors to tackle when initiating such a project are, first of all, the diversity of existing building typologies and their different water requirements, and second, their usage potential (MILLION et al.). The latter is estimated in available m^2 (acceptable threshold > 50 m^2) and capability of supporting additional loads. Instead, the former includes an analysis of urban buildings based on their main function, and namely residential or commercial. This is an important feature since the aim of these projects is to develop an *integrated* rooftop greenhouse, meaning that all the water requirements are satisfied via the recycle and reuse of building wastewaters (i.e. greywaters and rainwaters). Indeed, a positive correlation has been

demonstrated between the edifice function (residential/commercial) and the most available wastewater source (greywaters/rainwaters). In particular, residential buildings are the only ones producing sufficient amounts of greywaters so as to supply food production (MILLION et al.).

Multi-level eco-buildings: Skyland project, ENEA

Researchers are currently investigating the possibility to enlarge the "arable" indoor space going beyond the limited roof surface and conceiving an entire building as a suitable space for urban food production. The idea is to realize multi-level eco-buildings applying innovative architectural and engineering solutions. They theorize the use of the most advanced cultivation systems, in order to optimize the production and to grow vegetables in sustainable soilless environments, with controlled micro-climate and atmospheric conditions. So far, such buildings exist only in experimental projects. An interesting prototype has been realized by the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), with the project name of *Skyland*(**Figure 19**). Its main features can be summarized as follows:

Figure 19 - Skyland Project, illustration, ENEA

- It welcomes technological innovation through the application of greenhouse systems fueled via atmospheric controlled engines aiming at maximizing crop

production and safeguarding food quality, while ensuring the minimum energy and water requirements.

- It prizes ‘zero distance’ between production and consumption places, since the planned building provides direct points of sale or retail stores as well as restaurants and shops for on-site consumption.
- Finally, ‘zero emissions’ and ‘zero energy’ are pursued via the use of renewable energy technologies (photovoltaic panels, geothermic pumps, and energy savings through the re-use and recycle of biomass waste).

House balconies: Edible Balconies project, GezondeGronden foundation, The Hague, The Netherlands

Urban agriculture is also promoted in private environments, such as house balconies and windowsills. The idea is to integrate the activity in existing and common urban spaces, accessible to everyone. GezondeGronden is a Dutch foundation, established in The Hague in 2006, which is running a project on ‘edible balconies’ in private houses. The project is structured into several steps, during which experts provide participants with basic knowledge on how to grow edible plants in their balconies. They help them through all the growing phases, from the seeding up to the harvest. Each course ends with a cooking lecture and a social dinner (ANASTASIOU et al.). The courses are funded by the municipality and

participants are often low income immigrant living in the area. Food production is a collateral activity, the primary concern being the knowledge transfer and consumers empowerment on food-related issues.

Summarizing table of the potential plots for urban agriculture

Location	Selected case study	Open Space / Building-integrated	Ground level/ Rooftop	Property rights	Implementation	Orientation
Demolished sport fields	OrtiDipinti, Florence	Open space	Ground level	Public area	Since Sep. 2013	Socially-oriented
University campuses	LUISS University, Rome	Open space	Ground level	Private area	Since Nov. 2014	Educational
Urban farms	CooperatiefEigenwijzer, The Hague	Both	Both	Private area	Since 2008	Profit-oriented
Rooftop gardens	Potage-Toit, Bruxelles	Building-integrated	Rooftop	Public area	Since 2012	Profit-oriented
Rooftop greenhouses	Rooftop Greenhouse Lab, Barcelona	Building-integrated	Rooftop	Private area	Ongoing	Experimental
Multi-level eco-buildings	Skyland project	Building-integrated	--	--	Not implemented	Profit-oriented
House balconies	GezondeGronden The Hague	Building-integrated	--	Private areas	Since 2006	Socially-oriented

2.5 Further technical requirements

Once the natural requisites are satisfied, a second cluster of technical requirements needs to be addressed. It includes 1) access and security issues, 2) framework conditions (i.e. the legal status and period of availability of the plot) and 3) the relationship with the neighborhood (that is distances to public transit and local infrastructures, interactions with local stakeholders).

Access and security issues can be addressed together since both imply a reflection upon the degree of openness of the site towards the public. In other words, they ask for a decision on which kind of public is welcomed to join the activity.

The first distinction is between public and private spaces devoted to UA. By definition, a project developed on urban public places seeks for the maximum degree of openness and social inclusion. This is the goal intentionally pursued by public authorities as well as private citizens attracted by the idea of requalifying a particular urban area through urban agriculture. Nevertheless, even if the access is free and visitors are welcomed, security concerns influence the way the entrance is supervised. The community of gardeners has, first of all, to protect their gardens, in order to avoid vandalism and thefts. In the abovementioned case studies, the optimal solution was reached when the land was embedded within a larger public space. This has been the case for the *OrtiDipinti*project, where the ex-athletic field was part of a larger public garden with a guardian paid by the municipality to look

after the area. The same stands for the *Potage-Toit* project, which is established at the 5th floor of the Belgian Royal Library, thus respecting its opening times and not needing further personnel to monitor the area.

On the other hand, private spaces devoted to urban agriculture can be more selective, targeting specific publics. This is the case of universities and schools, where the main actors to be involved are students and professors. Here the degree of openness towards external visitors can vary according to the 'good relationships' with the neighborhood. At the University of Thessaloniki, the rental of internal plots to urban dwellers was meant to enlarge the potential public, facilitating a collaboration between students and urban residents. Still, being the infrastructures private, security concerns are inserted into the overall security policy of the building. The same is true for private balconies and rooftops.

Figure20 - The physical disposition of the natural and human elements of a garden can stimulate broader participation

Commercial UA projects often restrict the access to the public. The main reason is not security, but the avoidance of interferences with rentable activities. Visitors are conceived as clients; if not, their presence is channeled into established tours and side activities aimed at promoting the project, coaching new personnel and/or advertising the edible products.

Concerning the relationship with the neighborhood, itisa determinant element for the success of the project. In particular, certain technical features help in creating a good interaction between the gardeners and the local community. The presence of

a direct foot (or bike) access via public paths is considered as a priority criterion in the selection of the location, as well as the proximity to local public transport (bus and subway's stations) or the proximity to residential areas. Instead, access by car has a minor importance. The involvement of the stakeholders present in the territory (industry, social institutions, schools, associations/religious groups, hospitals, private sector such as retailers, hotels, etc.) in the garden's activities helps at rooting the project within the local culture. On the other hand, the visibility of the site by local pedestrians helps in protecting it, lowering the risks of theft and vandalism, which in turn strengthens the personal engagement of the voluntary gardeners. The physical disposition of the natural and human elements and the organization of social events within the selected area could stimulate the local participation (**figures 20, 21**).

Concerning the framework conditions, i.e. the legal status the plot, UA projects can occur in both privately and publicly owned lands. If established on lands owned by the municipality, the urban farmoffers the added value of maintaining a green public space reducing the total maintenance costs for the collectivity. In any case, the two legal issues to be tackled concern the check of the period of availability of the land and the amount to be paid in case of lease. Other economic options are the direct purchase of the plot or the squatting, the first being not so easy due to the high investment it requires and the second being not so secure due to the uncertainty it implies for the future of the community.

Figure21 - Social events organized by community gardens can stimulate broader participation

Conclusion

This section provided a definition of urban agriculture as an industry devoted to the production of (not only) food within and for the city. Then, it analyzed the technical conditions necessary forUA to beimplemented. A first cluster of necessary elements was labeled as ‘specification of the ground’ or ‘location and environmental conditions’; they includedthe analysis of the soil, sunlight and water requirements as well as the contamination and pollution concerns related to food growing in the city. The land location, in particular,was addressed apart through the elaboration of a typology of potential plots, coupled with existing European projects. Finally, a second cluster of elements was investigated, and namely the access, security and legal frames to be taken into account for UA to be safeguarded, once the implementation successfully starts.

Section 3 –Human requirements for urban agriculture

Section 3 investigates the human requirement needed for urban agriculture to thrive. First, it explains why it is not only a site-specific but also a society-specific phenomenon.In other words, it investigates the why and who questions of urban agriculture (Why do people engage in UA? Who does it the most?). As far as the "why" dimension is concerned, it is explored by tracing its history backfrom the origins up toits current re-emergence. Special attention is devoted to two social movements present today at the European level: the urban food planning movement and the local food movement. As far as the "who" dimension is concerned, it is investigateddescribing the profile ofthe main agents involved in UA. They are grouped into the three categories:first, the urban farmer, representing thesupplier of local foodstuff; second, the urban dweller as direct beneficiary of the goods, composing the demand side of the phenomenon; and third, the public sector (governments and local authorities) whose role is investigated through the analysis of the local food policies of9selected European cities.

3.1 Urban agriculture: a society-specific phenomenon

The fulfillment of the technical requirements (shown in Section 2) is only one side of the coin. For urban agriculture to thrive, it is important to address the human component as well, i.e. its main stakeholders and actors. Indeed, the phenomenon is not only site-specific but also society-specific, meaning that it consists of spatial as well as socio-economic and societal components (PIEPGRAS, 2014).

It is by now demonstrated that cultivation techniques allowing urban food production are currently deployed in our cities and there is an ongoing impetus to further research on that field. Whether outdoors or indoors, low or high tech, feasible cultivation techniques fit the urban context. Therefore, each potential urban farmer could be familiar with them. However, this technical knowledge is a necessary but not sufficient determinant of UA. The existence of stakeholders with different sets of values and ambitions counts far beyond the availability of land, its environmental conditions and cultivation techniques. Consequently, our framework of analysis will be enlarged to include the human capital.

If the following determinants for UA are considered, and namely:

- the spatial dimension (the where and how);

- the stakeholders and actors involved (the who and why),

then, it is possible to better understand the sorts of each UA project (the 'what') and deduce a general European trend for the future (PIEPGRAS).

Once this two determinants are identified, the challenge is to address both individually and in conjunction. Section 2 has already developed the 'where and how'. Thus, the aim of this section is to investigate the 'who and why' of urban agriculture.

It could be useful to anticipate here the main questions deriving from the joint analysis of both the dimensions. In particular, three challenges arise (KEMPER, WELTRING, 2014). Type 1 – *Demand for land*, is the case in which the human component is present and active but it struggles with finding a suitable space. Instead, Type 2 – *Land seeks user*, describes the opposite situation in which suitable plots are available but there is not a sufficient critical mass of stakeholders to start a project. And finally, Type 3 – *Gap of demands and needs*, identifies the case in which both the determinants are present in a territory, still they are not matched yet. Furthermore, a Type 4 can be added under the label of *Long-term maintenance,* meaning that, once the project has been launched, its long-term maintenance implies a certain steady amount of human resources as well as a sufficient level of social acceptance and integration in the surrounding area.

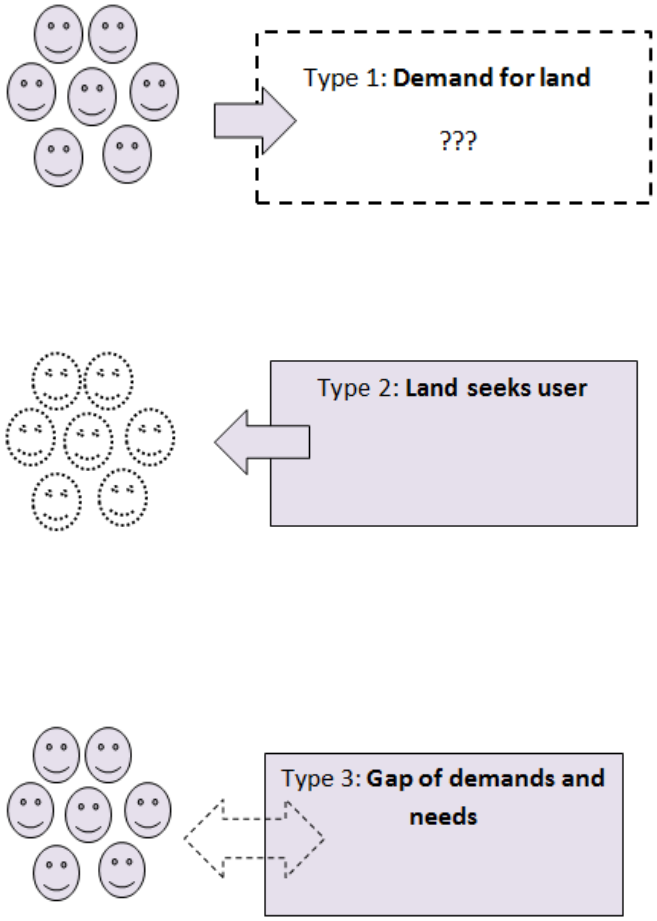


Figure1 - *source: Kemper and Weltring, 6th AESOP Conference*

3.2 The emergence of urban agriculture: history and recent developments

In order to understand the reason why urban agriculture is (re)emerging in our cities, it is vital to briefly describe its ancient and recent history. The role of green spaces for growing food has been analyzed by sociologists and geographers, and several authors investigated the origins of food growing in the cities. Between 3,500 and 3,000 BC, some Neolithic villages in Mesopotamia, Egypt and India were populated by settled communities, which cared for the production and storage of food in their living environment. There is archeological evidence of granaries, specialist shops, houses with courtyards and the presence of animal husbandry in these primitive urban areas (PARHAM, 2014). Ancient populations prized and pursued the location of perishable foodstuff in the proximity of their consumption places, therefore, Classical cities were accustomed to productive urban land uses. Such reality persisted in the Middle Ages, when cities hosted markets and commercial activities of a predominant agrarian society. Towns were not only catalysts of economic and cultural events, but also places for fruit and vegetable gardens and cattle grazing. Food production occurred in specific spatial forms, such as kitchen gardens, and individuals cultivated crops in the residual town fields and grazed animals along riversides. A food surplus was available for urban settlements, where the percentage of the population not devoted to agricultural professions was increasingly growing (PARHAM quoting MORRIS, 2013). With the advent of colonialism, even urban agriculture reflected the broader movement of people and

goods, and the consequent economic changes and immigration flows. Examples are the Chinese market gardening settled in America and Australia, as well as the Dutch 'truck farmers' in Chicago, immigrant urban edge farmers which lived selling their products to local markets. The historical reason behind them is related to the social-economic conditions of the first generations of immigrants, which very often undertook urban agriculture as a survival strategy allowing them to fight poverty and improving their quality of life.

During the 20th century, food production in urban green spaces has been deployed in times of crisis. For instance, it provided 40% of the US vegetable consumption during the second world war, and almost the half of the British one. It softened the economic meltdown in Rosario, Argentina both in 1989 and in 2001 and it delivered over 40% of vegetable and livestock during the blockades in Sarajevo in the early 1990s (ZEUNERT, 2014).

However, with the exception of periods of national emergencies, during the last century, food growing and green spaces in cities have become increasingly less productive and more symbolic in nature. There has been a general decline in the practice of urban agriculture in Western Europe due to the erosion of the perception of the importance of locating productive spaces within or closed to the city and due to the emergence of a new vision of the metropolis as a living place disconnected from the nature. Consequently, today urban open spaces mirror the

transformation of the countryside affected by the introduction of industrialized agriculture techniques. Moreover, the steady growth in urban population, occurring since the industrial revolutions, generated an increasing sprawl of residential areas, with the consequent loss of agricultural land on the urban fringe and the distancing between production and consumption places. In design terms, modern city open spaces appear sterile food-free environments, such as turfed parks, paved streets, vacant lands, industrial zones and waste disposal areas (PARHAM, 2014).

However, recent data demonstrate that urban agriculture has still an impact on the total share of the urban food. Several metropolis worldwide such as Nairobi, Kampala and Shanghai are known for their edible self-sufficiency due to a strong tradition of locally produced food. Urban farmers in Singapore and Hong Kong produce between 30 and 50% of their fresh products, and in Shanghai and Beijing respectively 76% and 81% of vegetables consumed come from the city itself (ZEUNERT, 2014). In France, for instance, in the late 1990s, family plots produced over 20% of the consumed fruits and vegetables and more than half of the households owned a *potager.* In Moscow, the percentage of population involved in agriculture within the city was nearly 80% by the late 1990s. And in Australia, in the early 2000s, between every second and third suburban families grew part of its own food (PARHAM, 2014).

The disconnection between cities and food production has been challenged over the last fifty years both theoretically and practically. Worthy to mention is the countercultural urban farming movement of the 1960s and 1970s, born in the US and spread all over the world. Later on in the 1990s and 2000s, environmentalists adopted an holistic approach, criticizing the overall system of food production and consumption, therefore focusing their attention on new concepts such as urban food resilience, food scarcity, urban ecology and circular economy, which in turn led to the theorization of new planning and design strategies such as the so-called edible productive landscapes and edible cities (VILJOEN, 2005).

3.3 Urban food planning movement and local food movement

The 'who and why' research questions are intrinsically related. In particular, this paragraph investigates ongoing grassroots initiatives whose general aim is the promotion of UA at the European level. The goal is to analyze the way in which potential stakeholders gather together to claim attention and promote their values. One clarification is necessary before proceeding: the category of "stakeholder" related to urban agriculture here considered implies both the direct promoters and the beneficiaries. They are conceived as UA agents at the same level: the former being an actor straight involved in the creation of urban farms, the latter being the direct consumer or a collateral contributor. Both these human participants are necessary for urban agriculture to thrive and both can express their values on the

current system of food production, constituting the critical mass of citizens claiming for change.

According to Morgan (2013), the 'urban food planning movement'is one of the 'fastest growing social movement of our time'. It has a highly diverse social composition, gathering together urban planners, as main core group, with civil society organizations and municipal government departments. Being among the promoters, professor Kevin Morgan recognizes that the use of the term 'movement' is a debatable point, yet he sustains the existence of a 'food planning community' at the European level, for food planner meaning "anyone who is working in, or engaged with, the food system with the aim of rendering it more sustainable with respect to its social, economic and ecological effects" (MORGAN, 2009). Main aim of the movement is to promote an explicit insertion into the urban planning agendas of the issue of food production. Awareness about this systematic 'puzzling omission' started to rise in the early 2000s, and was channeled into this high professional and exclusive movement. Even if they claim to be open and to group civil society organizations, the 'urban planners' acted through high level conferences and highly specialized meetings, and their aim is to present concrete technical alternatives to our current urban planning schemes, in order to integrate them with urban agriculture in a systematic manner. They target municipalities and local authorities and they are not interested in larger audiences. News and information are spread via selected media, such as the scientific journal *International Planning Studies*.

They perceive themselves as an avant-garde, with the main aim of initiating an urban planning dialogue with local authorities to promote fast and efficient changes. This is the truly local dimension of the movement. However, they recognize the importance of global interconnections today, therefore they aim at strengthening the cooperation between planning institutions and civil society within countries as well as at transnational level, that is among different European planning organizations.

On the other hand, urban agriculture's promoters and activists can be identified as part of a broader social movement focused on the protection, maintenance and promotion of local habits of food production and consumption. The general aim of the movement is the promotion of a more value-based approach to food, farming and community (WINNE, 2010). Food should be heathy, green, fair and affordable. *Healthy* is defined as "food that is nutritious and readily available; food that over time won't lead to heart disease, diabetes or other chronic diet-related problems". *Green* as "produce in an environmentally sustainable manner, but not necessarily organic". *Fair* means that "all who are involved in the food system from production to the point of purchase receive fair wages and have safe working conditions. And *affordable* refers to the condition in which "people have the means to purchase it" (WINNE, 2010).

One example worthy to mention is the *Slow Food movement*(**figure 2**). It is a not-profit organization established in Italy by Carlo Petrini in the late 1980s, that counts nowadays a network of more than 100,000 members across 160 countries. Its history and philosophy head for an inclusive approach to food, defending regional traditions and encouraging healthy and fair food productions that do not harm the environment (www.slowfood.com). It counters the rise of fast food and fast life and the disappearance of local food traditions, promoting several initiatives at different levels to awake people's interest in the food they eat, where it comes from and how it tastes. An overview of its main activities is out of the scope of this research, being *Slow Food* focused on an array of different food-related topics at various levels: local, European, and global. They range from biodiversity protection, food waste disposal, family farming, animal welfare up to food and taste education, GMOs, land grabbing, with specific focuses on certain types of food (wine, cheese, meat and fish).

Figure2 - Slow Food movement, official logo

In particular, as far as this thesis is concerned, it can be useful to briefly describe the European dimension that the organization has recently gained. Together with other environmental NGOs, such as the *European Milk Board*, the E*uropean Coordination Via Campesina* and the *Friends of the Earth Europe*, *Slow Food* witnesses the growing interest of the European civil society on food issues and policies.

These not-profit organizations and interest groups constitute the core of the European local food movement. The *Agricultural and Rural Convention (ARC2020)* could be quoted as an instance of their joint collaboration (**figure 3**); it is a European platform set up in 2011 with the aim of gathering together several organizations 'working for good food, good farming and better rural policies in the EU' (www.arc2020.eu). In that context, a *Good Food Good Farming campaign* was launched in 2012, and culminated in the organization of a *Good Food March* (September, 19th) to grouped together European farmers, consumers and young people asking them to travel across the continent to reach the European Parliament in Brussels and manifest before it their ideas on the food policy they want.

Figure 3 - Agricultural and Rural Convention (ARC2020), logo

Before the 2009 economic crisis and related great recession, the local food movement was perceived as 'addressing the cultural preferences of the few and not the many' (MORGAN, 2012). Therefore, it is worthy to mention how the civil society across Europe is organizing bottom-up activities to change the food production paradigm and soften the negative impacts of the economic crisis. One excellent example comes from the Greece, one of most affected European countries. It has been labeled by newspapers and media as 'potato movement', and it consists of the direct selling of potatoes first, other agricultural produce later on, to consumers by their producers (**figure 4**). The system was envisaged by Mr. Christos Kamenides, professor of agricultural marketing at the University of Thessaloniki, and works as follows: the municipality announces a sale on the website and local citizens sign up

for what they want to buy. Then, the authority tells Kamenides the required quantity and he and his students call local farmers to supply it. They show up with the requisite amount of produce at the appointed place and time, meet their consumers, and the selling is done. The involvement of the municipality was intended to provide a certain degree of organization and legitimization and to encourage locals to trust the mechanism. The project achieved immediate success, with online offers of 24 tons of potatoes sold within four days, and pre-ordered by 534 families. Both producers and consumers were delighted. The former because they get the money immediately, even if the selling prices were slightly above the production costs. They stated that especially at time of crisis wholesale buyers sometimes take a year to pay them; so the immediate availability of cash was prized as a great benefit. On the other side, the consumers were satisfied because they could buy potatoes at 25-30 cent/kilo (against the 60-70cents at the supermarket), helping local producers to recover from the crisis and being sure of the quality and freshness of their products.

Figure 4 - Greek customers buy potatoes direct from the farmers in Thessaloniki. Source: The Guardian

Encouraged by the success of the movement, Kamenides said he was working on a broader scheme for unified co-operatives involving both producers and consumers (*source: The Guardian)*.

3.4 Main stakeholders involved in urban agriculture: a classification

The human determinant of urban agriculture is made up of the ensemble of stakeholders directly or indirectly involved in the activity. They can be grouped into three main categories: the urban farmers, the consumers and the public sector. The firstprovide the city with food,so thatthey constitute the supply side of the phenomenon. On the other side, city dwellers act as direct beneficiaries or consumers of the produced goods, composing the demand side. Sometimes they offer local support either participating at the individual level or establishing certain forms of joint collaborations (with hospitals, schools, restaurants, etc.). In such cases, they can be labeled as active contributors. Finally, the public sector (governments and local authorities) plays an important role since it could promote (or hinder) urban food production through the (non) adoption of specific public policies. These categories will be analyzed further in detail here below.

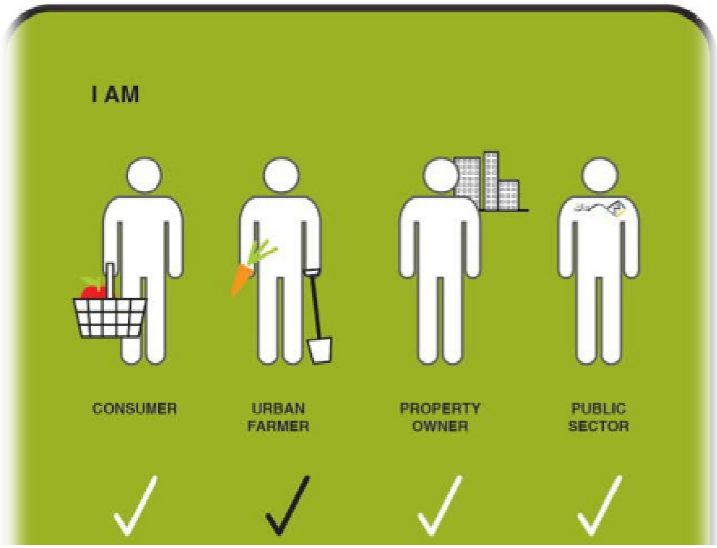


Figure 5 - Main stakeholders in urban agriculture

3.4.1 Profile of the urban farmer

There is not one single profile of the urban farmer at the European level. The history of urban agriculture and the reasons behind its current re-emergence can help identifying certain motivational values largely shared by different typologies of European urban farmers. According to the data collected, at least three profiles emerge. And namely, the young educated urban farmer; the expert, and the guerrilla gardener.

The young educated urban farmer

The fast-growing interest in urban agriculture in the Global North has led to the multiplication and diversification of agricultural sites within the city. In particular, it is worthy to investigate one emerging urban space devoted to UA practices: the university. For at least three reasons: first, universities are places where scientific and technical knowledge is created; second, they take care for the formation of new actors in the food system, covering at different levels the issues of the healthcare and proper nutrition, the sustainability of the production processes and food chains; and third, they constitute at the same time aggregation and food consumption places. Therefore they can be thought as suitable laboratories to start urban agricultural experiments, in which a new category of future urban farmers can grow: the young educated generation of students.

The university can offer the opportunity to test and verify innovative not-institutionalized solutions, among which urban agriculture. This is happening worldwide, Europe included. Students start to challenge the hegemonic ideology over urban space and agricultural practices and they develop models of alternative agrarian spaces. It is possible to theorize the emergence of an education infrastructure system out of the institutional one, and parallel to it (RONDEAU, 2014). The leverage power of the educational environment lays in the intrinsic network of knowledge it constitutes, having, therefore, a powerful multiplier effect.

In order to back this view it is necessary to define an 'agricultural training program' and to investigate how its development in university can promote the emergence of new urban farmers, therefore contributing to the establishment of alternative food geographies within the city.

For 'agricultural training program' is meant whether the implementation of a well-defined course on food production inserted within an educational infrastructure, with a certain amount of registered participants, established lectures and timetables, or the establishment of urban gardens as open laboratories within the university campus, whose care and maintenance is led by students, often coordinated by a professional profile. These definitions are often complementary.

Examples of such activities at the European level are the experimental rooftop garden established on the rooftop of the *AgroParisTech*, a French university specialized in agronomy, settled in Paris. The project initiator, Mr. Nicolas Bel, in collaboration with the students, aimed at analyzing the impact of urban pollution on produce grown on rooftops as well as at texting a new type of soil obtained with the re-use of city organic wastes. As mentioned in Part 2, other examples of university edible gardens are the *LUISS Community Gardening* project, in Rome, the *Rooftop Greenhouse Lab (RTG-Lab)*, an experimental pilot project led by the Autonomous University of Barcelona and the master course on Urban Agriculture led by the School of Architecture at the Aristotle University, in Thessaloniki.

Figure6 - Rooftop gardern, AgroParisTech

The existence of agricultural training programs within the universities witnesses the increasing interest of young generations in developing skills in agricultural practices of new kinds. This cultivated areas do not have the legal recognition as a farm and are inserted within privately-owned institutional grounds. Their added value is therefore other than the economic benefit or the direct urban renewal. Young generations of students can establish a direct contact with sustainable farming techniques, therefore challenging in the longer term the hegemonic view on agrarian practices (RONDEAU, 2014). In particular, the expression of 'counterhegemonic ideological choices' is manifested through the adoption of specific cultivation techniques and the consequent new socio-spatial relationship created between the student-farmer and the natural element. For instance, the use of no-mechanized tools and the preference for smaller scale plots and more manual labor is indicative of a different relationship between the man and the nature.

This learning process and the challenging attitude it originates are useful since they can spread seeds of change in different directions: the graduated student can devote its future career to the reproduction of similar experiences making then rentable, or it can promote sustainable practices of food production in its future working and private environments.

An ongoing research project conducted by the French National Institute of Agronomic Research (INRA) investigates the background of urban agriculture

project leaders in the Great Region of Paris (Ile de France). According to the data collected, "*the majority of innovative intra-urban UA entrepreneurs have no agricultural or agronomical background: only 27% have made agriculture or agronomy related studies*". They are mainly town planners or architects, or businessmen with background in economics and marketing studies or environmental studies, or social workers with a high level education (Master level minimum). These findings are in support of our profile of the new urban farmer, still they indicate that this young generation of highly educated entrepreneurs should be supported by professional profiles in the agrarian field in order to realize their projects.

The expert: traditional urban farmer or professional intermediary

A second cluster of actors promoting urban agriculture is composed by experts in the field, for expert meaning people that aims at integrating food growing activities in the city in a systematic manner. They live through the direct selling of their products, their activity is rentable and they can be considered as full-time employees in the sector. These urban farmers are essentially of two types, according to the kind of product they supply: first, the traditional urban farmers, which produce and process their foodstuff in farms located in the city and its surroundings and sell it to local farmers' markets; and, second, the professional

intermediaries that develop innovative business models for the promotion of urban agriculture, behind remuneration.

These two expert profiles pursue the same goal, i.e. the transformation of the current industrialized production system towards a more local and sustainable one, still they act through very different approaches: the maintenance of traditional local farming systems on the one hand, and the diffusion of highly technological innovations and new business models, on the other hand.

The traditional urban farmer

The traditional urban farmers are local farmers whose agricultural knowledge is often linked to the family expertise and which are normally engaged in such activity by generations. They respect and promote local food habits and they are generally not interested in high tech farming systems such as hydroponics or rooftop solutions, still they use greenhouses or little mechanized tools for on ground cultivations. However, even if they constitute the supply side of the local agro-food system of a city, safeguarding its food tradition, their certification for organic produce is not always transparent and their environmental concern is expressed with simple thoughts, that reveal little or none awareness of the global debate on climate change and similar. Their main channel of distributions are on site farm shops and local food markets (**figure 7**).

Figure7 - Food Market, Campo de Fiori, Rome

The professional intermediary

A European example of a professional intermediary entirely focused on urban agriculture is the Swedish company *Plantagon*(**figure 8**). It is a modern corporation, whose mission is the production of "functional and ecological food directly to western consumers or starving citizens of the third world" (www.plantagon.com). It claims the right to change the usual way corporations do business, i.e. integrating the search for profit with a "deep sense of responsibility for the common good". For that reason the company refers to itself as a "companization", the word symbolizing that two driving forces coexist within the organization: profit and values. Indeed, the business model is based on the collaboration between two different legal entities working for the same cause: one profit-driven commercial organization (Plantagon International AB) and one no-profit organization (Plantagon non-profit Association). They are legally bound to support each other in order to express even at the formal level that the search for profit and the promotion of sustainable ways of living could go hand in hand towards the same direction. According to Mr. Hans Hassle[4], Plantagon International CEO, the mission of the company is to find innovative solutions to feed urban population, especially the one settled in megacities. Therefore, the focus is on large-scale urban food production via vertical systems of farming. The preference for the vertical dimension is strictly related to

Figure 8 - Plantagon, company brand

[4] Interview available at https://www.youtube.com/watch?v=0ur-FRb6Gis#t=215.

the growing concerns on demographic density and edible land scarcity in those cities. The idea is to construct a building without horizontal stories, instead provided with an internally open construction helically shaped which let much more sunlight entering in the core of the building, and equipped with a patented logistics system for how to move the crops as the same time as they grow inside this vertical building. The project is called "PLANTAGON greenhouse"(**figure 9**) and Mr. Hansle defines it as a 'high tech futuristic building producing food inside the city'. They are currently waiting for public authorization to realize the first of it. It will be in Sweden, in the city of Linkoping and its functioning is foreseen by 2030. The productive capacity will range from 300 to 500 tons of food per year on a surface of 400 m^2. Notwithstanding the initial high investment costs, the company is confident that the successful implementation of the project will have a cascade effect and the benefits will be higher on the long term.

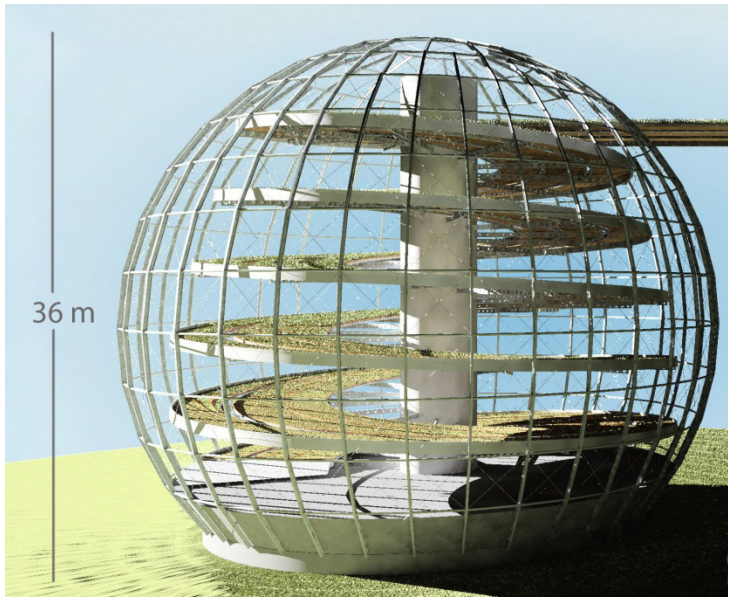


Figure 9 - "PLANTAGON greenhouse", model

The guerrilla gardener

A third group of actors promoting urban agriculture could be labeled as *guerrilla gardeners*. It is linked to a not-necessarily productive agriculture emerging in vacant public spaces and it can be considered as a form of spontaneous bottom-up movement of protest – guerrilla – of the civil society against the state of abandonment of certain city's districts.

The reference is to a specific phenomenon known as urban gardening, i.e. crop cultivation in small urban plats for the auto-consumption and/or social recreation of city dwellers. The activity finds its origins in Northern Europe, in particular United Kingdom and Germany, at the end of the 19th century, when philanthropists assigned small urban allotments to the poorest in order to satisfy their social needs (MONICA et al., 2014). In wartime, these pieces of productive lands were intensified and re-purposed with the main aim of feeding the city and, indeed, they remarkably contributed to that scope. In Italy, Rome included, they were known as *orti di guerra*. Later on, during the period of economic development and industrialization that followed the second world war, allotment gardens were used to counteract the social alienation of urban workers, especially of those coming from the countryside. Urban gardeners, "working" on the urban fields, "had the illusion of being landowners, created a link with their rural provenance and were able to cultivate and compensate low incomes" (EDELBLUTTE, 2009). In Italy the first municipal regulation concerning social urban gardens appeared in the city of Modena in 1980 (TAMBURRANO, 2013). The phenomenon has witnessed a strong revival in Europe in the last five years. Nowadays the establishment of an urban garden could be conceived as a bottom-up social reaction to various urban phenomena, such as the intensification of the built spaces versus the progressive reduction of urban green areas; the state of abandonment and decay of the latter, especially in the suburbia; and a general claim for collective shared spaces as the expression of an innovative

sustainable and participative form of urban citizenship. It is, therefore, an expression of opposition to certain mainstream modern lifestyles.

3.4.2 Profile of the consumer

"Consumers" of urban agriculture are important stakeholders. They constitute the demand side of the phenomenon. Since our definition of UA is that of an *industry producing food and not food stuffs,* it follows that the social acceptance of and the demand for such goods by the urban communities are essential indicators of the success of this industry.

For consumer is meant the direct beneficiary of urban agriculture. Its involvement can range from sporadic/constant participation in gardening activities expressly organized for him and/or the purchase of the urban agricultural produce (mere consumer) up to higher forms of more structured collaboration, known as Community Supported Agriculture, CSA in short (the engaged consumer).

Consequently, the profile of the consumer can be declined in two categories: the mere consumer and the engaged one.

The mereconsumer

The general trend concerning urban agriculture in Europe could be esteemed as positively growing as far as the number of new initiatives is concerned. Most of the

projects here analyzed has been launched from 3 to 5 years ago, and many others are still under implementation/at experimental phases.

Consequently, the involvement of urban citizens is difficult to calculate and appears relatively low, especially if compared with experiences similar in nature but well-established, occurring nowadays in North America. Therefore, there are not direct data at European level concerning the degree of participation of city dwellers in urban farming activities. Indeed, most of the project leaders affirm to monitor the following indicators when evaluating the state of play of their business:

- number of visitors,
- media coverage and echo,
- legal recognition by local authorities,
- sales account (in case of for-profit business) and
- rate of locals' participation at on-site educational activities.

They do it individually, often with no scientific knowledge on data collection techniques and with rough approximation.

However, it is worthy to quote a recent study conducted in New York and concerning the relevance of social food practices in transitioning towards more

sustainable food systems (COHEN, ILIEVA, 2014). The authors investigated the phenomenon from a sociological standpoint, stressing the social dimension of our food habits and the role of the city as milieu of change.

Generally speaking, the social practices are defined as “the everyday routines people perform to achieve goals”. They are composed of *meaning* related to background beliefs, cultural norms and social conventions, plus *materials* i.e. tools, technologies or resources deployed, plus *competences* that is the necessary skills and know-how to perform the practice. According to the authors, “practices, rather than the discrete decisions of atomized individuals, determine the outcomes of a socio-technical regime”. In particular, as far as the food system is concerned, everyday routines count in several ways and there are clusters of routines related to that specific theme. Food consumption, for instance, includes a single practice such as buying food, which is related to and has an influence on cooking, eating and food waste disposal. Everyday food practices are shaped by broader clusters of other practices. For instance, cooking depends on travelling attitudes as well as purchasing and food storage habits. Therefore, they can be transitioned not only influencing their elements (meaning, materials and competences) but also changing interdependent practices. The core of a practice-based approach to food system transformation is the substitution and normalization of sustainable practices over the current ones.

The study aimed at demonstrating that the city is a stimulating environment for food practices to change. Within the city there is room for alternative “deviant” practices to emerge, and an opportunity for “sustainability minded planners and researchers” to stimulate the process of transformation towards more resilient cities. The challenge is to understand how to question dominant understandings of food practices, such as “how food is grown and who grows it, why home cooking is important, or why closing material loops and treating food waste differently make sense”. Urban agriculture is quoted as a successful example of deviant food practice.

The engaged consumer

The role of the consumer in urban food production can be pro-active. In particular, there exists a mechanism of collaboration between farmers and dwellers known as Community Supported Agriculture (CSA). This alternative model of food production and distribution is inserted in this section, since it represents an instance of the direct commitment of the citizens into the productive process.

The paragraph will describe its functioning, the profile of the consumer normally participating in such scheme and the network of CSAs developed in Europe.

The Community Supported Agriculture is a model of farming in which both growers and consumers share the risks and benefits of the production. CSA members or

subscribers pay at the beginning of the growing season a share of the future harvest. Once harvested, the farmers distribute their produce to them through vegetable boxing schemes. These include seasonal fruits and vegetables often coupled with dairy products, eggs, honey or meat. The fees paid by the consumers are considered in economic terms as the initial investment. This explicit commitment of the locals and the consequent risk sharing are the main features of the system.

The model seems to have been originated in Japan and Europe, however, the largest network of existing CSAs is currently in the USA (SJOBLOM, 2014).

There are many benefits associated with this farming model: first, there is a financial benefit for the farmers due to the direct economic transaction; indeed, there is no need for intermediaries and the distancing between consumers and producers is shortened. Second, consumers know where their foodstuff comes from and, since their commitment is for the entire season, they tend to structure their diet on the vegetable boxes they receive. Therefore, they tend to eat more fruits and vegetables and they increase the frequency of home cooking (SJOBLOM, 2014).

However, the average consumer involved in a CSA scheme seems to be a “woman, Caucasian, with an age ranging from 30 to 40 years, employed, with a high education and often without children” (SJOBLOM). Therefore, several hindrances emerge, such as that people with no cooking skills, unfamiliar with vegetables and

the way they can be prepared, or lacking the time to do it are (almost) excluded from the system. This obstacle reflects the core of the consumers' attitude towards alternative food mechanisms: they are valued-based mechanisms and their adoption often depends on personal choices.

It is possible to map the existing networks of CSA in Europe[5].

In France they are named *Association pour le maintien de l'agriculturepaysanne*, shortened as AMAP. They started to appear in very recent times, as early as 2001, and since then, they flourished in number and participants, counting 300 member-farms by 2006 and several thousands today (Urgenci, HENDERSON).

In Germany the number is of about 1000 crate-subscription systems developed in urban areas, particularly in the North of the country, with city like Hamburg populated by 1,8 million inhabitants and offering 30 different CSA systems (Urgenci, STRANZ). Their diffusion increased immediately after the Chernobyl nuclear disaster in the 1990s.

In 2005, the British Soil Association identified one hundred consumer-farmer partnerships in England (Urgenci, HENDERSON).

5 Source: Urgenci, The International Network of Community Supported Agriculture. Website http://www.urgenci.net/en-gb

In Italy there are *Gruppi di AcquistoSolidale* (GAS) that according to their official webpage are about 900 all over the country (www.retegas.org). They do not share the initial costs, still they guarantee the creation of a preferential ethical purchasing channel among local producers and consumers.

In Spain, there is not a uniform association gathering all the CSA initiatives together. Instead, each region has an association of reference. Among others, the *Andalusian Federation of Ecological Consumers and Producers* (FACPE), which consists of a network of 11 associations promoting the collaboration between organic producers and local consumers; the *Nekasarea network,* active in the Basque region, made up of 25 consumers groups (about 500 families) and 80 farmers; in the central region of the country, close to Madrid there are *Bajo el Asfaltoesta la Huerta!* a cooperative of consumers and producers started in 2000 by a group of agro-ecological activists and split today into 5 independent CSA groups; and *La Rehuerta*, a social platform launched in 2009 by ISAM (Madrid Initiative for Food Sovereignty) acting as a bridge between local producers and Madrid's citizens. Similarly, in Catalonia, an informal network named *La Repera*has the same linking function together with *Ecoconsum*a federation of eco-consumers coordinating 20 purchasing groups for a total of 1000 families (Urgenci, Cordoba Symposium).

Other European examples of Community Supported Agriculture recently emerged and are mainly located in Eastern Europe.

In the Czech Republic the elder group was established in 2007, and many neo-CSAs were born in 2014. Their total number is of 19, with an overall involvement of 500 families (roughly 1,400 people) and 17 farmers (Urgenci, VALESKA).

In Romania there is the *Association to support peasant* (ASAT), which acts as main promoter of CSA schemes all over the country. It has a 5-year history, with an experimental earlystage (until mid-2011), followed by a more consolidated action. At May 2012, the country registered 12 partnership grouping 12 producers and 242 consumers (Urgenci, PAROT).

In Hungary, the elder CSA scheme was introduced in 2010, and many other follow in the next years. Nowadays a total of 10 activities is present in the territory, mainly in the surroundings of urban areas (4 are closed to Budapest, 3 to Szeged, 2 to Miskolc and 1 to Mosonmagyaròvàr).

3.4.3 The involvement of the public sector

The public sector plays an important role in promoting resilient urban food systems. Urban agriculture starts to be mentioned in policy recommendations and agendas. The most relevant initiatives in the field concern the constitution of City Food Councils and/or City Food Strategies and Charters.

The added value of an institutional top-down approach to urban agriculture is the possibility that public authorities have of *framing* the issue, i.e. identifying all the

diverse policy instruments to deal with it, *brokering* relationships between stakeholders and across governance structures and *leveraging* existing resources (MORGAN, 2013).

There are several instances of cities engaged in food-related issues worldwide. The city of Toronto, in Canada, is recognized as a 'municipal food policy leader' since it developed its City Food Council in 1991 and established its Food Strategy in 2010, dealing with a great variety of municipal policies, among which an Urban Agriculture Action Plan (RUAF Foundation). As far as Europe is concerned, these political instruments start to emerge with a slight delay compared to other regions of the world.

In particular, this thesis presents an overview of the municipal policies related to urban agriculture in a sample of 9 European cities. They are Bristol and London in the UK, Amsterdam, Utrecht and The Hague in The Netherlands, Paris, Barcelona, Berlin and Turin.

Bristol

Bristol is the first city in the UK to have a Food Policy Council. It was established in March, 2011, at the Bristol Food Conference, in order to bring together stakeholders belonging to diverse food-related sectors. The aim is to examine how the city food system is operating and to develop consequent policy

recommendations on how to improve it (www.bristolfoodpolicycouncil.org). All the elements of the food chain are taken into account, and namely production, processing, distribution, retail, catering, consumption and waste disposal with the general objective of achieving a healthier, more sustainable and resilient food system. Consequently, the stakeholders represented in the Council come from the following areas: production, wholesale, business development, local government, catering, green capital, non-governmental food organization, retail, health, education and training. The Council meets at least four times a year and defines and follows the implementation and review of a Bristol Good Food Plan for the city.

The latter was launched in November, 2013, together with a Bristol Good Food Charter. It is a 'call to action', setting out a vision, the changes needed and some targets to reach them.

A first peer review on the general functioning of the Council has been conducted in March 2014, with the aim of investigating the 'results on the ground', i.e. the concrete action of coordination among spontaneous bottom-up initiatives and they coherence with the vision and principles elaborated in the official documents. When it was published (May 2014), the review analysis stated that most of the food projects in and around Bristol have been mapped and are nowadays well-known to public authorities. Still, they are not always in accordance with the Good Food approach set by the Council. Furthermore, part of them comes and goes, meaning

that they survive just one or two years. However, the common feeling was that it is still too early to develop a cost/benefit or co-benefit analysis and identify best practices. One activity worthy to mention is the participation of the Council at the *URBACT Project*, that is a European Exchange and learning program promoting sustainable urban development (mentioned in Section 1). In particular, Bristol is teamed up with nine other European cities as part of a food exchange and learning set.

London

The London Food Strategy was published in 2006. Since then, a London Food Board was established and yearly review documents – the *Good Food for London reports*, monitor the implementation of the plan's vision and objectives across the city boroughs. The Board is an advisory group composed of representatives of independent food policy organizations and experts, and chaired by the Mayor of London's Food Advisor, at present Mrs. Rosie Boycott, appointed in 2010. It meets twice a year, and has three Implementation Groups, one for each of the priority areas identified by the Strategy, and namely Communities and Citizens, Business and Commerce and Borough, which meet quarterly. Main aim of the team is to coordinate the work and lead the debate on sustainable food issues (www.london.gov.uk). A Food Strategy and two Implementation Plans have been so far realized. It is important to underline the challenging nature of the London food

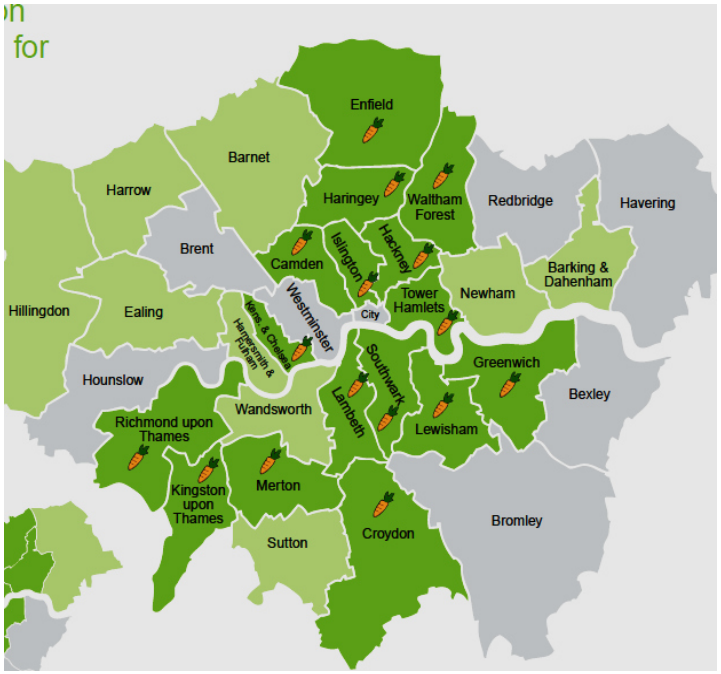


Figure10 - London Community Gardens

system, compared to the other British urban settings. Indeed, it is a given that London's food supply is variegated and responds to the different cultural food habits of its huge international population (more than 8 million inhabitants in 2013).

The core of the strategy is centered on five key objectives: first, to improve Londoners' health and to decrease health inequalities related to the food they eat; second, to reduce the negative environmental impacts of the current food system; third, to support a local vibrant food economy; fourth, to celebrate the London's food culture; and fifth, to develop London's food security.

They are pursued from the point of view of the consumers, the local producers and the municipalities, the London's boroughs as mirrored in the correspondent Implementation Groups. This structure led to a well-organized, clear and efficient food policy team, ultimately coordinated by the city mayor.

The Netherlands: Amsterdam, Utrecht, The Hague

The Netherlands are mostly an industrialized country, whose food provision is highly dependent on imports. In 2009 the total share of imported food accounted for more than 7 million tons, mainly coming from Latin America (ZWART, 2012). The issue of food is dealt with at different political levels (European, national and local). In the last years, several Dutch cities adopted specific food strategies in order to promote a transition towards more resilient and sustainable urban food systems.

There will be here presented the case studies referred to Amsterdam, Utrecht and The Hague.

The Amsterdam Food Strategy known as *Proeftuin Amsterdam* started in 2006, in the wake of the London's one. The municipality wanted to approach a series of food-related issues in a more holistic and comprehensive manner. Main concerns were the lack of municipal authority over the agricultural landscapes surrounding Amsterdam, the high percentage of imported food (40% of the overall food provision of the city came from abroad) and related environmental concerns, plus, the high number of health disease, 70% of which were food related, and the alarming data concerning obesity, showing that 45% of the Amsterdam's inhabitants were overweight (ZWART, 2012). Consequently, in 2007 four public authorities signed a joint action program. They were the municipalities of the cities of Amsterdam and Zaanstad (distanced by 30km), the province of North Holland and the Ministry of Agriculture, Nature and Food. This common effort was operationalized into a two-year working plan for 2008-2011, which can be considered as the core of the Amsterdam Food Strategy. First feature is, therefore, the multi-level governance approach adopted since the very beginning. Moreover, the project was implemented through the creation of a working team, whose main actors were both local authorities and civil society. Therefore, a second feature is the choice of a joint top-down and bottom-up approach. The general aim stated in the document was to let this working group lead the discussion on sustainability

food-related issues and promote partnerships between the private and public sectors. An agenda was set and based on three main objectives: to provide more organic and locally grown food; to promote healthier consumption habits, especially among young generations; and to meet the urban demand side with the potential peri-urban and countryside supply of fresh produce. Several projects flourished accordingly. However, the review literature (Brand, Schendelen, Vermeulen, Zwart) pointed out several criticisms, among which the short-term implementation (2008-2011) and the scarce financial support offered by the public authorities as well as the few confidence that urban dwellers manifested in the strategy. Many emerging initiatives fitted the sustainability targets fixed by the action program, still they did not use the brand of the municipal campaign, such as the label "*Proeftuin Amsterdam".* On the other side, great impetus arose from the civil society and there is optimism on the future development of the city.

The Utrecht (tentative) Food Strategy, or *LekkerUtregs* is a private ongoing initiative launched in 2005 by two civil society organizations, the *StichtingAarde* (Foundation Earth) and the *Milieucentrum Utrecht* (Environmental Centre Utrecht). Main goal of the project was to define a city food strategy to be shared among citizens, whose adoption as the official one would have been proposed before the local authorities. It was centered on the transitioning towards a more resilient regional food system, mainly focused on the valorization of regional products. However, the founders and activists did not obtain any public support. Between 2006 and 2008 they circulated

and signed a letter of intent in order to gather consensus and claim for a public engagement. They proposed the creation of a working plan to upscale the project. Yet, a slow bureaucratic answer hindered the development towards the institutional direction, so the activists opted for the establishment of a green participatory society, the *GroeneparticipatieMaatschappij* (GPM). They won a European competition, receiving financial supports for a 3-year period to stimulate the sales of regional produce in the city of Utrecht. The plans for the future are to become an autonomous and for-profit local agent, marketing regional products for the city and making them available more easily.

The *Voedselstrategie Den Haag*, or The Hague Food Strategy, was implemented by the municipality in 2013. It promotes the achievement of three strategic goals: first, health improvement, revising nature- and environmental-education programs in schools and sport clubs; second, greening the city by introducing rooftop gardens, community gardens and courtyard gardens; and third, fostering the local economy allowing temporary use of vacant urban spaces for urban agriculture, stimulating the sale of local produces , promoting the safeguard of the rural function of the city surrounding landscapes and incrementing the share of green local purchase by the municipality (VAN DER VALK, 2012). A short action plan was integrated in the document. This is a successful example of Urban Food Strategy in which there is an explicit reference to urban agriculture and, moreover, a person has been appointed as responsible for urban agriculture, Mr. Ed de Jager. The implementation activities

are carried out with the support of five platforms: Haags Milieu Centrum, GezondenGronden, Eetbaar Den Haag, Duurzaam Den Haag and City Spices. They act as catalysts of the citizens' involvement and are the main reference for the public institutions, bridging the gap between the two sides. No review literature exists yet, since the strategy was implemented one year ago.

Paris

In Paris there is not an official food policy yet. However, in recent municipal elections, the three main candidates quoted urban agriculture as part of their electoral programs promising to institutionalize it (AUBRY et al., 2014). The episode means that there is an increasing public attention and involvement in the subject and that local authorities are aware of that. Indeed, many initiatives occurred in the last few years. At the regional level, the official documents for land management (known as SDRIF, *SchémaDirecteur de la Region Ile-de-France*) mentioned the importance of agricultural land use for the regional landscape, which is mainly devoted to agriculture (50%), forests (25%) and urban areas (20%). Regional authorities have commissioned studies and reports on new forms of intra-urban agriculture as well as on renewed forms of no-professional agriculture (Aubry&Kebir, 2013). The Planning Institute of the Parisian Region (IAU) devoted anexplicit research team to the subject, the *Agricultures urbaines* team, specifically involved in investigating the role of food growing practices in public open spaces.

They mapped collective gardens across the region as well as short-circuit market gardening activities; they collaborated with school canteens and have been involved in experimental programs such as the development of a rooftop garden on the top of the AgroParisTech Institute. As far as the city of Paris is concerned, several projects related to urban greening and renewal have been launched or backed by the municipality. In 2013 the city celebrated the 10th anniversary of the *Programme Main Verte*, a program inspired by the experience of community gardens in New York and Montreal. Itassists citizens in the creation of shared gardens (*jardanspartagés*) in the inner Paris (**figure 11**). According to the provided guidelines, all gardens are required to open at least two days a week. Everyone is welcomed to visit whenever there is a member of the association in the garden, and no specific spatial constraints are required, meaning that the only obligation for the responsible people/association is thecreation and maintenance of the garden.At present,there are 70 shared gardens in Paris (they were five in 2003) andmany other French cities have established similar programs, such as Lyon, Lille and Nantes(www.paris.fr). Another initiative to mention is *Végétalisationsinnovantes*, a call for projects launched in 2013 by the Paris Region Lab, that is a municipal research team, in partnership with the Paris Urban Ecology Agency (AEU).They called for private projects related to urban agriculture and/or the protection of biodiversity in the city. The proponents chose 15 out of 39 proposals received and assisted them with financial and logistical support for their implementation on public urban areas. 7 out of the 15 selected projects has been successfully realized,

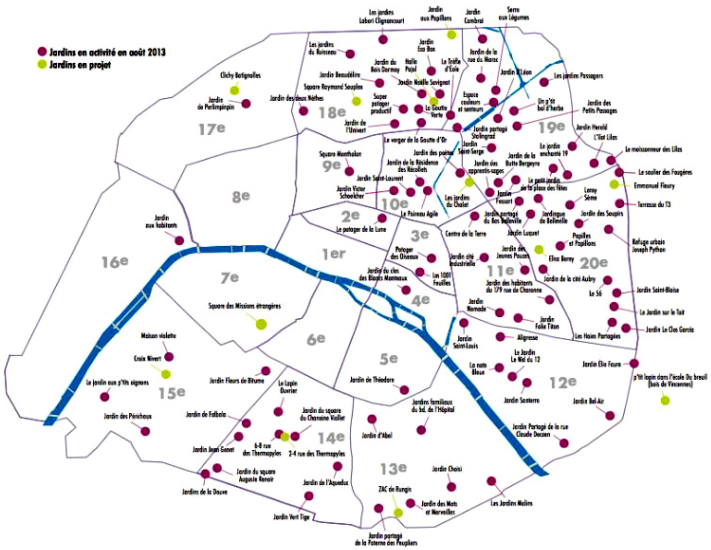


Figure 11 - Map of the Shared Gardens in Paris in 2013

and a showroom was organized by the end of 2013 in order to let the Parisians know about them. The remaining 8 projects could not be implemented due to difficulties in accessing the selected public land/building. Moreover, at the beginning of July 2014, NatureParif, the regional service for biodiversity protection, organized the first *Summer Workshop on Urban Agriculture,* inviting researchers, public institutions and the project leaders of the*VégétalisationsInnovantes* project. Therefore, it is possible to affirm that the local authorities and their technical services are increasingly investigating UA as a new policy for greening the city and its surroundings. Still, they have not elaborated yet an official comprehensive strategy to frame and lead the process.

Barcelona

According to recent literature (MENGUAL, 2014), Barcelona lacks a strong unified vision on urban agriculture. In particular, city dwellers and public authoritiesdisagree on what urban agriculture means and expressdivergent opinions on the kind of benefits it could produce. The regional government defined urban agriculture as a potentially productive activity whereas the city council and related green departments prefer to restrict its sphere of action, attributing to it mainly social and environmental functions. Therefore, there is not any city food strategy and an overview of the main urban gardens reflect this status of “anarchy”. In Barcelona, three types of urban gardens coexist: municipally-supported UA,

squatting community gardens and vacant lands revitalized through gardening activities (MENGUAL et al.). The squatting community is tolerated by the public authority, which sometimes has publicly recognized its existence. As far as the municipality-supported UA is concerned, it is possible to mention three examples. First, the long-standing program *Barcelona Urban Gardens Network*, launched in 1997 by the city Environment Department. It is tailored to address a specific social category: the elderly. People aged at least 65, resident in a city district, in good physical conditions to maintain a garden, can apply for a 5-year plot of 25 to 40 m^2. The beneficiaries cannot use chemicals in growing plants, indeed they are committed to organic systems of production, and they cannot sell their produce since the activity has a purely social dimension. Second, the municipality is involved in the establishment of school gardens in order to promote the environmental education among the youngest generations. The total area devoted to community and educational gardens is of 2.5 ha, and counts 13 projects (**figure 12**). And third,in 2012, they launched a short-term plan for the revitalization of vacant lands, grown in number and size after the economic recession. 9 out of the 14 unused spaces identified by local authoritieshave been devoted to urban gardening, and they account for an extra 0.7 ha of food production in the city.The total area of cultivated land rises up to 3.2 ha. Nevertheless, behind this expansion there is not a linear strategic vision nor it is foreseen for the immediate future.

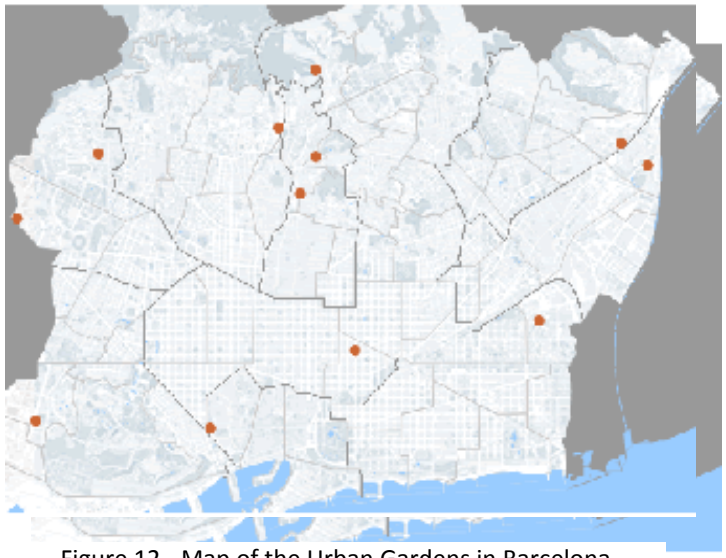


Figure 12 - Map of the Urban Gardens in Barcelona

Figure 11 - Map of the Urban Gardens in Barcelona

Berlin

An interesting case study is the BerlinerPrinzessinnengarten. It is a “social and ecological urban farm[6]” located atMoritzplatz, in one of the most dense and socially vulnerable neighborhood of the city of Berlin. The area is public and, before the establishment of this community garden, it was vacant and abandoned (**figure 13, 14**). The project does not receive any public support, indeed, the garden has a restaurant and a bar whose profits constitute its main source of sufficiency. A rental agreement was established between the two parties.

However, certain tensions emerged in 2012, when the project leaders, Mr. Shaw and Mr. Clausen,found out that the City Property Fund has been commissioned by the Berlin Senate to sell the plot and that negotiations with private investors interested in the purchase of the area were already started, without any previous involvement of the gardening community. Their immediate reaction was the writing of an open letter and the launch of an online petition to stop this policy of privatization of the area, signed by some 30,000 people in the first week. Main claim was for stopping the precarious situation of urban agriculture developed in Berlin’s public spaces and for demanding a stronger commitment for a long term sustainable city planning. The inhabitants of the neighborhood requested to their politicians to be more aware ofthe importance of such “alternative” land uses and, above all, to involve them directly and on time, in cases like that.

Figure13 - Moritzplatz, Berlin, 2009

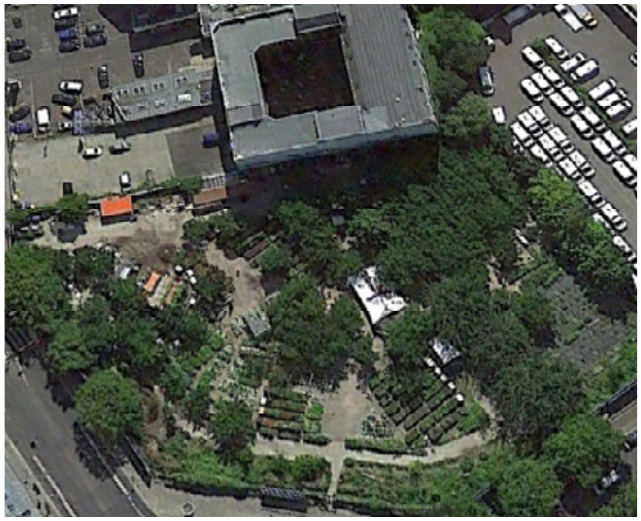


Figure14 - Moritzplatz, Berlin, 2012

[6] Mr. Marco Clausen, project leader, interviewed by email in February 2015.

On the other side, the local authorities affirmed that, since the beginning, their idea was to sell the plot to “creative industries” under the strict condition of an integration of the garden within their building blocks.

At the end, a temporary agreement was reached and nowadays the lease has been renewed until 2018.

The case has been selected and reported in this section, because it reveals the contradiction that may rise in the political arena. Prinzessinnengarten was considered by the city mayor, Mr. Wowereit, as part of that “beautiful and wild Berlin” to be protected and promoted. Still, few years later he agreed to privatize the area and dismantle the garden. So, this caseis a good negative instance, demonstrating how the lack of regulation about the use of public areas for UA could threaten the existence of even the most well-established projects.

Turin

Turin does not have a food strategy nor a city council devoted to it. However, it is worthy to mention the growing interest shown by local authorities on food-related issues. For at least two reasons: first, there is an ongoing process of institutionalization of the “metropolitan area” of Turin, which will substitute the previous “province” (an administrative district of intermediate level between the city and the region). And this will bring about an increase in urban population from

the current 900,000 inhabitants to the foreseen 2,3 million (DANSERO et al.). Second, the spatial proximity with Milan, which will host the 2015 Universal Exposition on food and food-related issues (*Feeding the planet, energy for life)* motivated local authorities in acting on time to maximize the benefits linked to such event. Moreover, the food environment in Turin is stimulated by some very active stakeholders such as Slow Food and Eataly, which contribute to a regional development based on high-quality food production and food and wine tourism. Such trend starts to be acknowledged by local politicians: the last city plan lists among its relevant objectives the recognition of Turin as "Italian food capital". This strategic planning initiative aims atscaling up the food sector, considered as a pillar for further metropolitan economic growth, and it means concerting a "common metropolitan food agenda that consists of integrated governance and policy coordination" (Torino Strategica, 2013). In particular, it is worthy to mention the participation of municipal and regional authorities at the *Urbanfamingmetropolitano* project, launched by Slow Food and consisting in the organization of a series of events to rouse citizens' awareness on urban agriculture. Recent data witness the presence on the metropolitan area of Turin of approximately 108.000 ha of cultivable land, 119.000 ha of grassland and pasture, 1.300 ha devoted to viticulture and 280 ha of urban gardens.

Conclusion

This section investigated the human requirement ofthe urban agriculture. First, it explained why it is not only site-specific but also society-specific. In other words, the "why and who" questions have been addressed. The "why" was explored tracing the history of the phenomenon from the origins up to its current re-emergence. Special attention was devoted to two social movements present today at the European level: the urban food planning movement and the local food movement. Then, a classification of the main agents involved in urban food production - the "who" dimension - was provided. They have been be grouped into the following categories: urban farmers, acting as city suppliers; urban dwellers, acting as direct beneficiaries of the produced goods, therefore composing the demand side of the phenomenon; and, the public sector (governments and local authorities) whose role could promote or hinder urban food production, as shown through the analysis of the local food policies of a sample of selected European metropolises.

Section 4 – Case study: Urban agriculture in the city of Rome

The aim of this research thesis is to investigate the state of play and future perspectives of the phenomenon labeled as “urban agriculture” (in short “UA”) in Europe. The previous sections have framed the issue from various standpoints: Section 1 got a glimpse of the theoretical context existing behind the concepts of “agriculture” and “urban development”, as could be jointly applied to the European cities today. Several cross-cutting disciplines related to food production and consumption have been taken into account, i.e. among others, landscape and territorial studies, urban planning and design, environment philosophy, sociology of agriculture and food and behavioral economics. Once demonstrated the suitability and the appeal for a (re)localization of the food system at the city level, Section 2 and 3 focused on the feasibility of doing agriculture in urban settings, analyzing, respectively, the technical and human requirements requested to successfully implement a UA project. Even if the territorial coverage/unit of analysis was limited to Europe, which has its own (food) culture and identity, nevertheless the phenomenon appears manifold and great differences emerge between and within European countries and regions. Therefore, before drawing a conclusion on the state of play and future perspectives of urban agriculture in Europe, it is worthy to center in on a specific case-study. The city of Rome has been selected since the author had the chance of entering in contact with the local reality through in-

persons interviews with roman gardeners, on-site visits to a random sample of gardens and plots, and thanks to the support received by local authorities, in particular by Mrs. Marzi, head of unit at the Department of Environmental Protection, Urban gardens office, Rome.

Therefore, this section will deal with the agro-food system of the city of Rome, investigating whether it makes room for urban agriculture. First, Rome will be framed within the broader Mediterranean context to which it belongs. Second, the influence exerted by the Italian planning system on agriculture and landscape will be taken into account. And third, the peculiarity of the Roman land contexts, as well as the recent trends on food production and consumption within the capitol city will be showcased, in order to outline the state of play of urban agriculture and its possible future developments.

4.1 Rome and the Mediterranean context

The Mediterranean area has been studied in order to investigate the existence of common patterns of urban development. According to Matvejevitch (1995), the Mediterranean itself invented the city; indeed, the urban settlements here established were historical nodes of an exchange system that pre-existed the modern nation-states. Likewise, Braudel (1987) defined the Mediterranean as a succession of cities and seas. However, recent authors (Pace, 2002) criticize the notion of “Mediterranean city” and/or the existence of a common Mediterranean

pattern of urban development. Still, according to Cavallo et al. (2014), it is possible to identify at least five features that differentiate this urban context from the others of the continental Europe. These characteristics will be briefly described since Rome belongs to this geographical area.

The first feature of the Mediterranean cities is the informal expansion of their built environment. In particular, from the 20th century onwards, their dynamic development led to the emergence of large- and medium-sized cities, basically compact in form. That growth was stimulated by an overall increase in the population, distributed firstly in the inner central zones, then towards the urban fringes, which experienced a period of intense and uncontrolled spread. Indeed, the city planners chased rather than direct the phenomenon. This has been the case for Lisbon, Barcelona, Marseille, Naples, Athens, Thessaloniki, Istanbul and Rome (CAVALLO et al., 2014).

The second feature is the weak role of the public authority, unable to govern the land transformation. Certainly, a feeble planning process is both cause and consequence of the urban “sprawl”.

A third distinctive element is the compact form of the Mediterranean cities, especially evident if they are compared to the scattered structure of the North European ones. This feature has a direct consequence, i.e. the establishment of a

very clear distinction between the city and its countryside, whose landscapes interact with each other.

The countryside, on the one hand, is shaped by the settlement model of its city (BRAUDEL, 1987). With reference to the Mediterranean geography, the original relationship between the two elements was mainly conflictual, i.e. characterized by a sharp opposition between a productive centre and an agrarian surrounding area. However, on the other hand, this traditional vision of the countryside as external to the inner city and whose functions are mainly complementary to it has been increasingly challenged: the rural-urban nexus is nowadays more blurred and agriculture in the peri-urban areas, when resisted to urban sprawl, invented new forms and functions, which are interesting to analyze and which are related to the fifth feature.

It concerns the central role of food in the cultural habits of the Mediterranean peoples. In these places, food significantly shapes the areas where the exchanges take place, which are often public open spaces, such as farmers' markets. Food consumption too frequently takes place in streets, being these traditions backed by generally mild weather. Therefore, it is possible to state that in the Mediterranean cities the social dimension of food consumption is deeply felt.

4.2 The Italian planning system: regulations concerning urban agriculture

In Italy, recent regulations have questioned the structure of the metropolitan area, (Law no. 56/14), now conceived as a new territorial entity – the Cittàmetropolitana –with a broader land coverage (it embeds a previous administrative unit known as provincia), whose general function is to lead the development of such area, working for the realization of an efficient network of services and facilities, integrated all over the territory, through the adoption and annual revision of a 3-year strategic plan. The law is partially inspired by the administrative models of other European cities (indeed, in the official text there is a reference to the European metropolitan areas), in particular London, Amsterdam and Barcelona (CAVALLO et al., 2014). Among the specific functions attributed to the Cittàmetropolitana there are: the metropolitan land planning, the management of the public transports, the traffic regulation, and the promotion of social and economic development. These administrative changes are currently under implementation and they represent both a challenge and an opportunity for ameliorating the urban planning and design, including a better management of the local food system.

Yet, before analyzing the specific regulation concerning the status of urban agriculture in Rome, it is worthy to briefly recall the history of the Italian planning system as far as urban landscape and agriculture are concerned. Indeed, many

criticalities emerge in the way the two policies have been handled up until now. The Italian planning system shows a traditional separation between urban and agricultural policies, which can be explained through a brief excursus of the past attempts of defining the agricultural areas through the territorial planning tools (CINA, DI IACOVO, 2014). The main planning instrument is the so-called piano regolatore (municipal plan, MP), which, since the beginnings (Law 1150/1942, Law 765/1967 and Law 1444/1968), has been focused on the regulation of the right to build in the urban contexts. According to these laws, the urban agricultural areas were defined in relation to the maximum "building capacity" agreed for certain zones, with no further investigation on the nature of the farming activities to be therein developed. Therefore, during the second half of the 20th century, in Italy, the only rules concerning the way in which agriculture could be practiced were the ones established according to the European Common Agricultural Policy (CAP). During the 1980s and 1990s, the local authorities at various levels (regional, provincial, municipal) started to take the leadership back on the subject, and new official documents established different regulations on the agricultural sector, especially anticipating one important dimension of the relationship between agriculture and the built environment, that is nowadays represented in the newly reformed CAP (2014-onwards): i.e. its capability of protecting the landscape. At that time, however, such innovative municipal plans, as the ones of Giussano, Luzzi and Verona, were not sufficiently implemented (CINA, DI IACOVO, 2014).

If agricultural practices in urban areas were defined exclusively in terms of “building capacities”, with no further specification on the value of the faming activity in itself, on the other hand, the protection of the urban landscape did not include agriculture at all. It is a very recent conceptualization the one that identifies the agricultural landscape as one to be protected, both for its natural-environmental value and as artificial man-made territory (the European Landscape Convention and related Italian Landscape Act, D.L. 42/2004, sec. 131). However, this potential is still not unveiled. Indeed, the existing regulations concerning the environment in Italy are very conservative strategies that aim at protecting the natural and cultural heritage without merging these aspects with productive concerns, whereas agriculture mainly is an economic activity. Therefore, even if the two levels are nowadays much more closer, they still remain parallel.

To conclude, it is important to state that this uncertain approach to land and agriculture at the top-down level did not hinder the (re)emergence of urban agriculture in Italy. Instead, several researchers (CINA, DI IACOVO, DANSERO, BONAVERO, PETTENATI, TOLDO) investigate the peculiarity of the Italian way to food, i.e. the spontaneous, rather bottom-up interest towards local production and consumption, that it is not even stuck by chaotic and not coherent national and local policies. In particular, this view is backed by data witnessing the high participation of Italians in local networks of food distribution that elsewhere are

defined as “alternative” and in Italy seem to be still “mainstream”. Globalization and de-territorialization seem to affect the peninsula lesser than elsewhere.

If a short supply chain model is defined as “a production and consumption model based upon the relation between territoriality, proximity of products and consumer markets, socialization practices, safeguard of work and correct remuneration for whose working in the farm and food sector, and a relationship of trust between producer and consumer” (Laboratorio di StudiRurali Sismondi, 2012), than recent data demonstrate how such short supply chains are increasingly growing in Italy. The current number of solidarity purchasing groups is 980. 21% of the Italian farms adopted a direct selling scheme in 2005, the percentage touched 22.1% in 2007 and is today 26%. The farmers’ markets have increased by 44% over the last two years, reaching the number of 1,367 (ISTAT, 2012). Moreover, the entire national territory is composed of a network of agricultural organizations which work in support of local food production, such as the Coldiretti, the Italian Association for Organic Farming and the Slow Food movement. The next section will describe how Rome is part of this positive trend.

4.3 Rome’s territory, land and food context

As far as the land context is concerned, it should be stated, first of all, that Rome’s recent pattern of development is in line with the “Mediterranean style” previously described. In particular, the traditional relationships between the city and its

countryside, known as the Agro Romano, started to be eroded by broader economic dynamics, which transformed the productive landscape from a mainly industrial to a mainly tertiary one (CAVALLO et al., 2014). The urbanization and the consequent sprawl towards the suburbia is documented by recent studies (BLASI et al., 2008; FRONDONI et al., 2011), according to which between 1993 and 2008 the built areas increased by 12% (plus 4,800 ha) whereas the population grew by only 1.1%. If Fiumicino is included, Rome's territory is made by built areas at 43%, agricultural land at 39% and woods and riparian vegetation at the remaining 18%. It is interesting to underline that 67% of the overall unbuilt land is protected by specific environmental policies and the ratio between protected wild land and protected productive land is the following: 40% are parks and natural reserves, 49% are edible landscapes. Moreover, another interesting datum concerns the percentage of cultivated areas within the city boundaries, here established at the great circular highway turning around the city, known as Rome's Great Ring Road: 28% of the agricultural areas lay within these boundaries.

As far as the urban population is concerned, it slightly increased by 1.1%, still its distribution was not uniform. Between 2002 and 2008 the inner urban population grew by 7%, whereas the peri-urban one grew by 23%. These data include the migration from the city center towards the suburbia of an increasingly number of romans: in 2008 they were 14% more than in 2005 (ibid).

As far as the agricultural land is concerned, if the cittàmetropolitana is considered, i.e. Rome and its previous province, the following landscape mosaic appears (figure 1): most of the areas are arable crops, followed by legumes, fodder plants, trees and vegetable crops. Moving away from the center, the landscape is enriched by vineyards and olive groves, together with complex cultures, i.e. parcels of mixed areas composed of annual crops, pasture, perennial crops, etc.. According to the national census (ISTAT, 2012), the city of Rome presents opposite trends if compared to other Italian realities. And namely, the cultivated area within the city has increased in the decade 2000-2010 by 17% as far as the utilized agricultural area (UAA) is concerned and by 12% as far as the total agricultural area (TAA) is concerned. For UAA is meant the land specifically used for growing agricultural produce within a farm (e.g. crops, vegetable gardens, perennial fields, meadows); instead TAA includes also not directly agricultural fields such as parks, canals, gardens, ponds, etc. In absolute terms, compared to the previous census UAA increase by 6,236 ha, and TAA by 6,289 ha. So, in relative terms the cultivated land had a higher increase (17% compared to 12%), still, in absolute terms, the total agricultural area is bigger. It is worthy to underline that the report presented this trend as outstanding compared to other Italian metropolises. Indeed, 2,656 farms in Rome (as cittàmetropolitana) have been surveyed, of which 763 within the Great Ring Road (inner Rome).

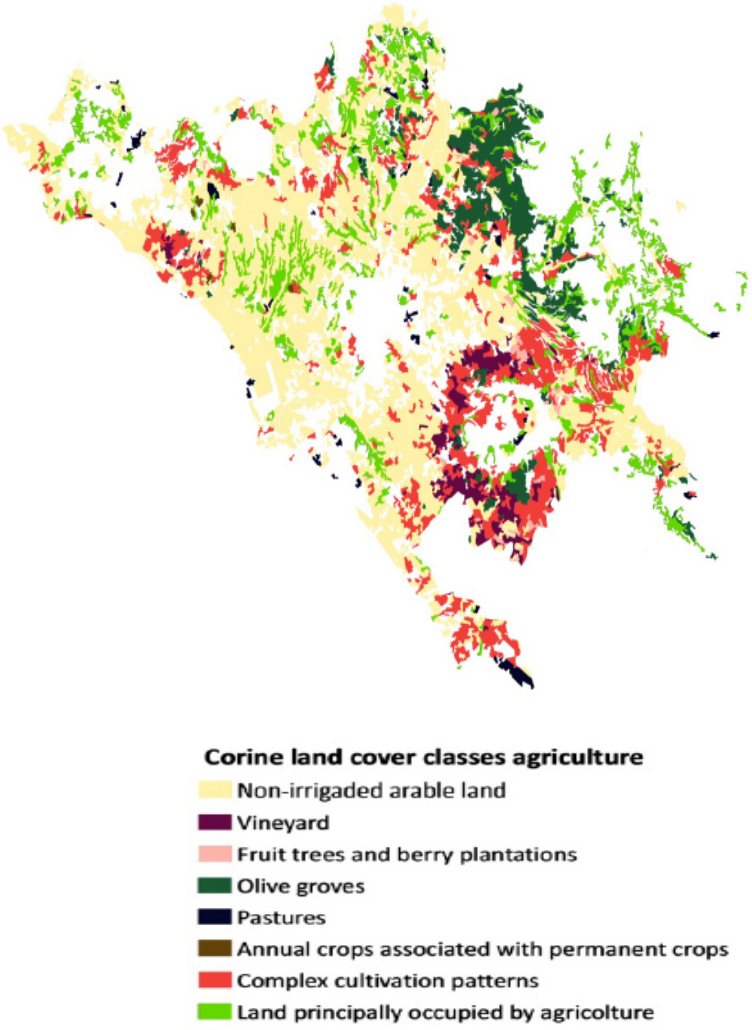


Figure 1 source: Cavallo et al.

As far as inner Rome's farms are concerned, their size and distribution have been accurately investigated by Cavallo et al. (2014). A classification based on the farms' size revealed that about 30% of them is small (less than 1 hectare), 34% are between 1 and 5 hectares, less than 10% are between 5 and 10 ha, 10% is the medium-sized (between 10 and 50 hectares), and barely 4% of them is medium-large/large (i.e. from 50 to 100 ha, and over). These data mean that the roman landscape is highly fragmented. Their spatial distribution is as follows: the large farms own 40% of the total UAA, medium-large farms occupy 10%, medium-sized 24%, and all the other smaller categories together constitute 18% of the agricultural land. Despite the net predominance of large to medium sized farms, once more, it is important to underline the recent trend: i.e. in the decade under examination (2000-2010) the smaller sized farms increased in relative terms.

These information are clearly linked with the type of crop cultivated (and the farming system adopted). The geography of the food produced in Rome (figure 2) has seen an increase of crop production from woody plant (plus 78% in 2000-2010), of tree plantations for wood production (plus 45.5% in the selected period) and of arable crops (plus 15% than before). However, in absolute terms, the arable crops represent alone 38% of the cultivated area in the inner Rome. The most relevant crops are potatoes, beets and fodder. Cultivated trees occupy 10% of the metropolitan areas, and are mainly olive trees and vines. In Rome, the livestock sector is important as well, especially in peri-urban and semi-rural areas, where

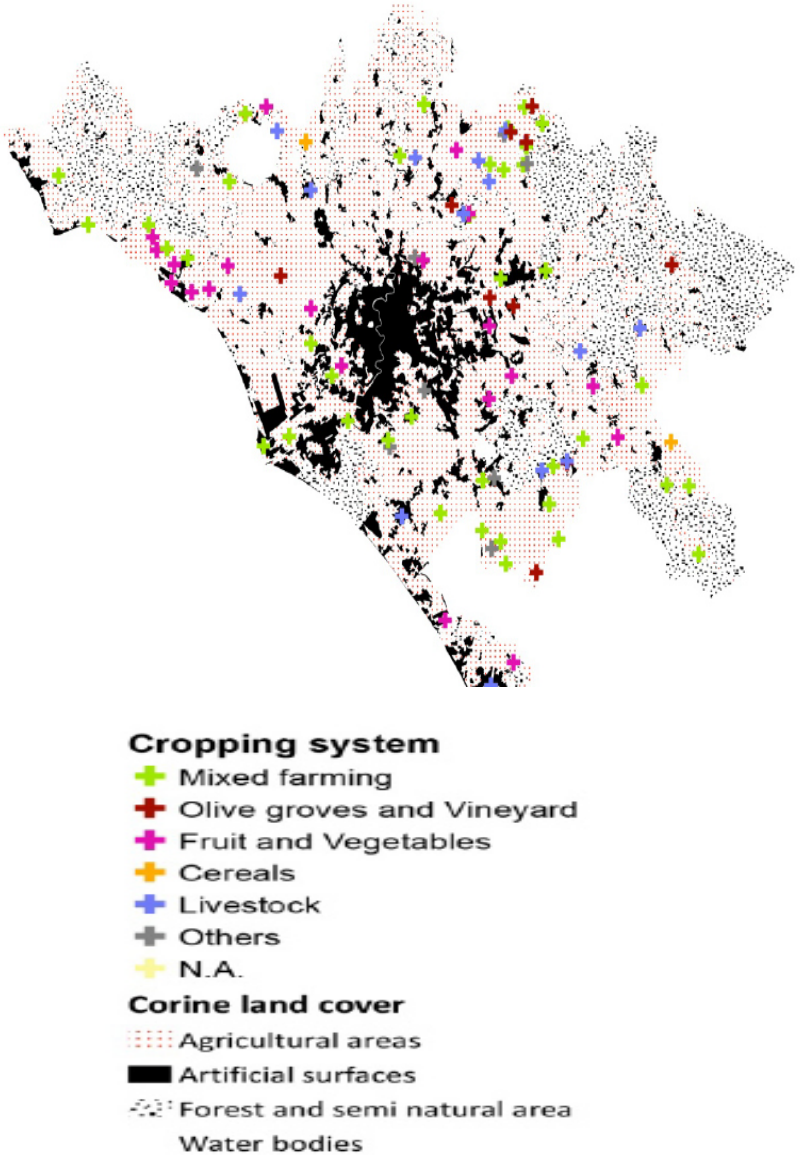


Figure 2 source: Cavallo et al.

dairy farms play a central role, with cattle breeding activities at 20%, buffalo at 27% and sheep at 20%.

4.4 Urban agriculture in Rome: state of play

According to the Italian Census for Agriculture (INSTAT, 2012), the demand for local produce in Rome is a remarkable datum: 60% of municipality farms sell onsite and the city's farmers' markets increased by 57% at the inner city level and by 64% if the overall metropolitan area is considered over the past decade (2000-2010). Therefore, there is positive trend towards the purchase of locally grown and produced foodstuff. Aim of this paragraph is to investigate the strengths and weaknesses of such system of provision, in order to provide the state of play of the urban agriculture in Rome.

The local food system in Rome is composed of a variegated network of actors, ranging from agricultural cooperatives to associations, CSA schemes, and single volunteers initiatives. It is important to understand the nature of this chain of short supply, i.e. where it starts and ends, and for whose benefit. It is for sure an "urban phenomenon" (CAVALLO et al., 2014) since the city is the ultimate place where the exchanges occur. The interaction between consumers and producers mainly happens within the city's boundaries via three channels: farms, markets or purchasing groups (figure 3). As previously said, one out of two Roman farm provides an on-site sales outlet, the Roman markets can be considered as the public

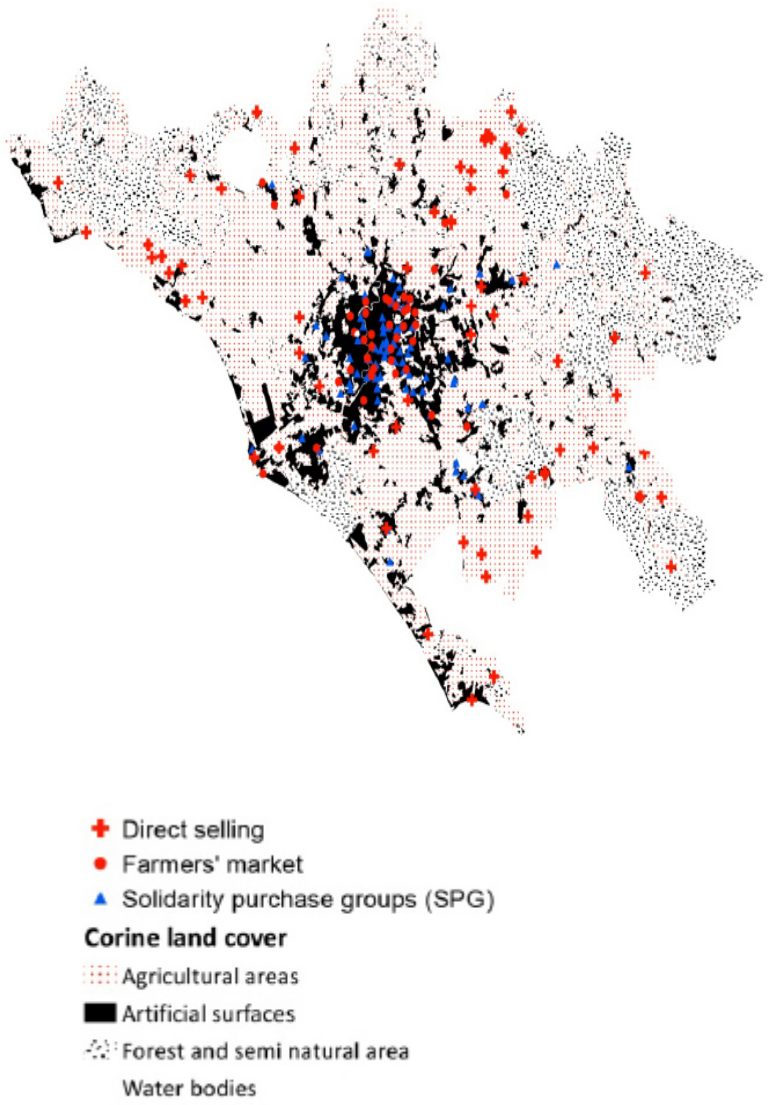


Figure 3 source: Cavallo et al.

spaces devoted to food selling par excellence and the purchasing groups are remarkable insofar as they are often organized by city districts, therefore, they describe a food community that shares certain values and promotes different food habits and purchasing behaviors.

In particular, a deeper analysis of the Roman farms reveal their strengths and weaknesses in terms of social, economic and environmental sustainability (**Table 1 and 2**). As far as the economic profitability is concerned, urban agriculture boosts the local economy. 20% of the farms' profits derive from on-site sales, and most of the farms do not need to access the market in other ways. As far as the employment is concerned, the majority of the business is family-owned (66%), whereof 44% employs only family workforce and 33% hires external workers, positively contributing to the local work market. Moreover, only 17% of the surveyed farms cultivates between one and five hectares, the majority having the ownership over much more extended areas (26% of the total farms has more than 50 ha): these data highlight a peculiarity of the Roman landscape compared to the Italian reality: even at the city level, the scale of the agricultural activity remain quite large in size (CAVALLO et al., 2014). As far as the environmental functions are concerned the study reveal a weakness connection between productive activities and landscape sustainability. For at least two reasons: first, the entire green policy in Rome is based on the care and maintenance of a selected number of protected areas, mostly vast wild parks. Yet, as shown in **Figure 4**, only a tiny number of

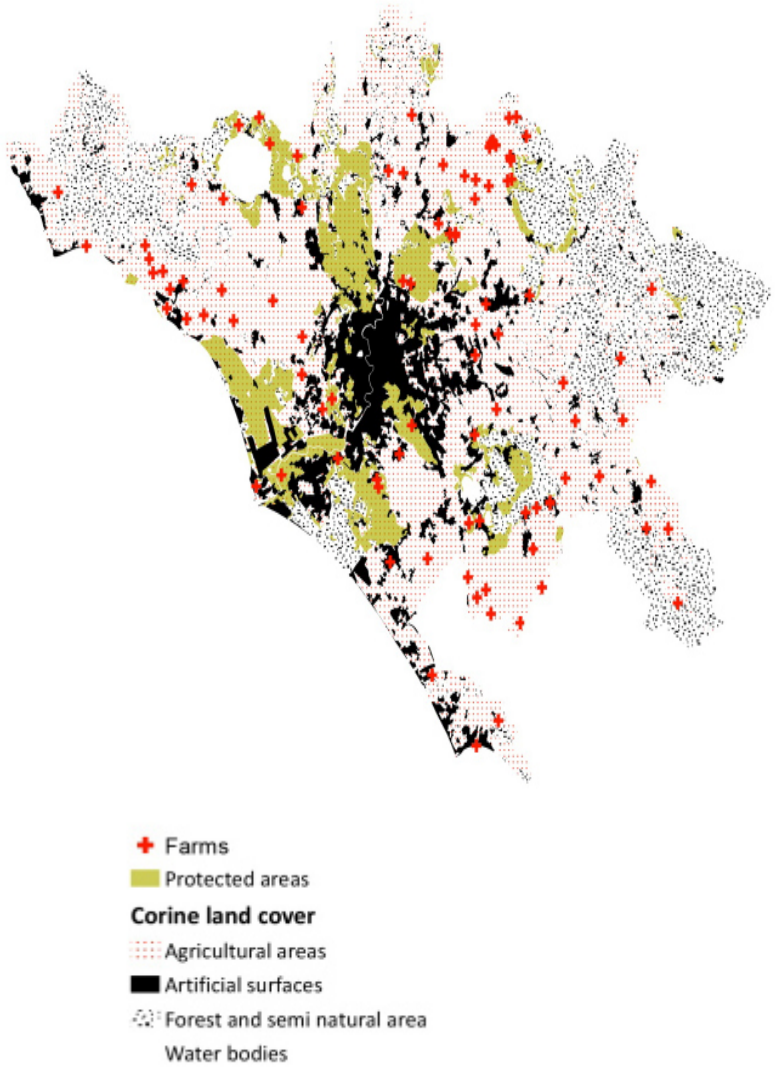


Figure 4 source: Cavallo et al.

surveyed farms are established within such areas. And second, Cavallo et al. matched the data on farms' locality with a classification of the metropolitan area according to the "urban", "suburban" and "rural" categories as defined by the Italian Ministry for Territorial Development. The result is shown in **Figure 5** and, on the one hand, it reveals the high productivity of the urban context, competing with the rural one for the city provisioning. Yet, on the other hand, it reveals the weakness of the suburban zones, hybrid forms of city/country life, which would deserve further consideration, especially for their closeness to the center.

To sum up, productive urban agriculture exists in Rome. In the past decade (2000-2010) the demand for locally grown produce more than doubled and the exchanges occurred via three main "alternative" channels: onsite farms' outlets, farmers' markets and solidarity purchasing groups. As far as the impact on the local economy is concerned, the phenomenon positively contribute to the local employment (33% of external workforce hired) and general welfare (20% of the farms' profit derive from onsite selling). As far as the environment is concerned, there is a weak connection between the agricultural activity and Rome's ecological footprint and, furthermore, the peri-urban areas appear to be underutilized. Being at the city level, the scale of the agricultural activity is quite large (26% of the total farms owns more than 50 ha) and local producers are assisted by agricultural cooperatives, such as Coldiretti, through, for instance, its famous campaign CampagnaAmica.

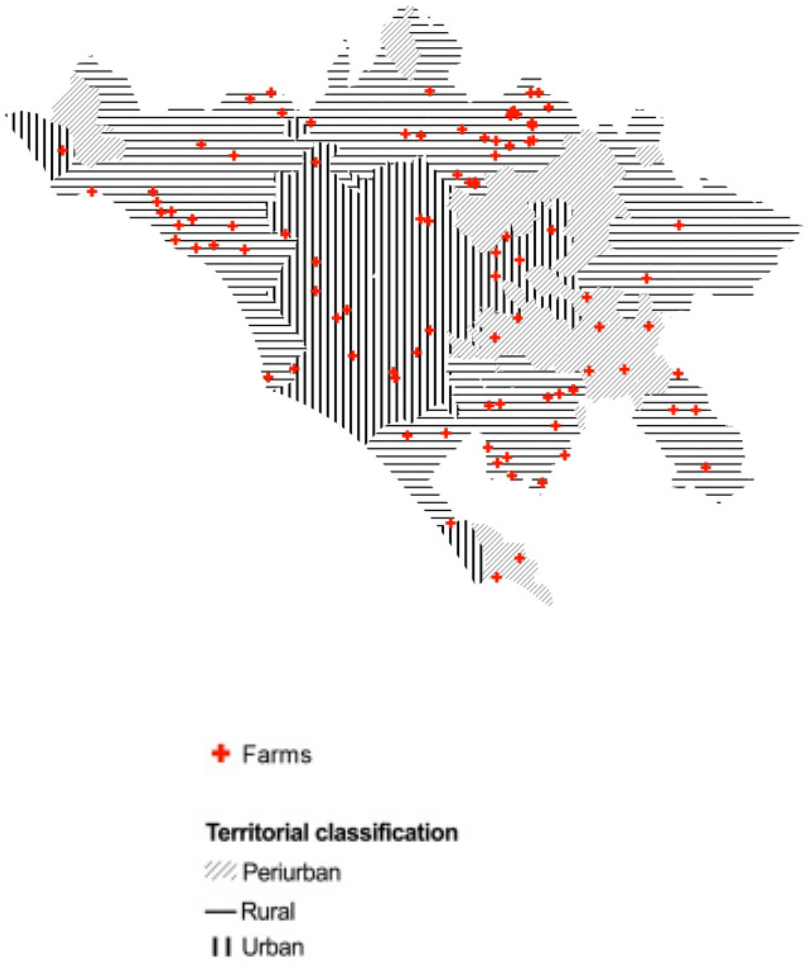


Figure 5 source: Cavallo et al.

Therefore, with reference to the categorization of the urban farmers developed in Section 3, it is possible to say that urban agriculture in Rome is led by experts of the first type: i.e. traditional urban farmers, whose agricultural knowledge is often linked to family expertise, engaged in such activity by generations. They are generally not interested in high tech farming systems such as hydroponics or rooftop solutions, still they use greenhouses or little mechanized tools for on ground cultivations. However, even if they constitute the supply side of the local agro-food system, making it possible, their certification for organic produce is not always transparent and their environmental concern is expressed with simple thoughts, that reveal little or none awareness of the global debate on climate change and similar. On the other hand, in Rome the role of the local authority in promoting public awareness on environmental issues is very disappointing.

4.5Urban agriculture in Rome: recent developments

The weak role of the public sector paved the way to the activity of civic organizations, which increasingly fight the city decay through urban gardening. Therefore, the profile of the Roman farmer is not complete yet. A second category has to be introduced. This is linked to a not-primarily-productive agriculture that re-emerged in vacant public spaces and can be considered as a form of spontaneous bottom-up reaction – often labeled as guerrilla - of the civil society against the state of abandonment of certain city's districts (see the profile of the *guerrilla gardener*).

Table1 - Workforce employed in Roman urban farms

Workforce	Farms	%
Employs labor from outside the family	32	33
Only family labor	42	44
N.A.	22	23
Total	96	100

Table2 - Juridical forms of Roman urban farms

Juridical Forms	Farms	%
Cooperative companies	5	5
Individual farms	63	66
Companies	2	2
Others	12	12
N.A.	14	15
Total	96	100

With regard to Rome, *ZappataRomana*, a local no-profit association, spontaneously surveyed this reality, mapping more than 100 urban gardens developed in the city since 2009 (**Figure 6**). At the same time, several social organizations started a dialogue with the municipality of Rome, in order to promote the adoption of a legal text on what they considered as *social and shared gardens*. In particular, they wrote a shared document to describe the most relevant features for which they were claiming for. This text circulated as a petition, launched in March 2013, and finally, a year and a half later (the 17th of October 2014), the city government adopted an official guideline for the establishment and maintenance of urban gardens in the territory of Rome. According to the legal text, an urban garden is defined as *a plot of urban land intentionally devoted to the production of edible and not-edible plants, in order to satisfy the following aim: self-production and consumption inserted within a context of urban requalification of a certain area* (Art. 1). The social educational and recreational dimension of the gardening activity is strongly emphasized. Indeed, the selling activity is forbidden, the production being exclusively for self-consumption. The responsible entity can make money only for covering the starting and maintenance costs via self-financing activities, and no public supporting investments are foreseen. The farming activity has to be organic, so no chemical fertilizers nor pesticides are allowed. The assignment of the land can occur in two ways: following a request presented by the civil society (organized in a collective juridical form – e.g. associations, cooperatives, etc.) or via the realization of an entirely public project. The selected territory has to satisfy certain

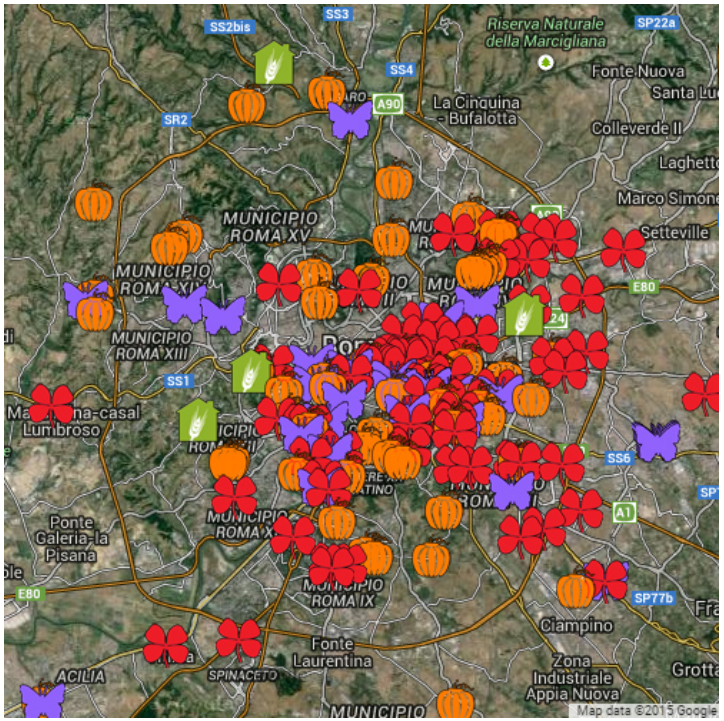


Figure6 -Urban Gardens in Rome, interactive map
Source: Zappata Romana

environmental conditions necessary for food production (soil, water, sunlight and relative pollution concerns). The public land is rented for free to an entity having juridical personality according to the Italian law, for a period of 6 year, renewable once, and such entity will be responsible for the allotments' distribution among the inhabitants of the area. Their involvement should be transparent and it consists in the assignment of maximum $60m^2$ allotments per person/family. The Urban Gardens office, established in 2002 under the Department of Environmental Protection of the Rome's Civil Protection, is in charge of the implementation and follow-up phases of each project .

A specific Roman case has been selected by the author. The example is the urban garden located nearby the Aguzzano's urban park, situated at the North-Est periphery of Rome, within the Great Ring Road (**figure 7**). This project is significant for at least two reason: first, it is a successful ongoing garden, which published online all the requested documents, therefore offering a complete transparent picture of the procedure undertaken; and second, it is interesting since, on the one hand, the garden is maintained by a local association, named *CasalePodere Roma*, which is active and well-rooted in the territory, and collaborates with the *Centre ofEcological Culture*, that, on the other hand, is the municipal authority in charge of the overall area of the urban park of Aguzzano, which hosts one municipal farmers' market (the third Saturday of every month), the public library *FabrizioGiovenale*, well-known for its environmental archive and the park itself. What is currently

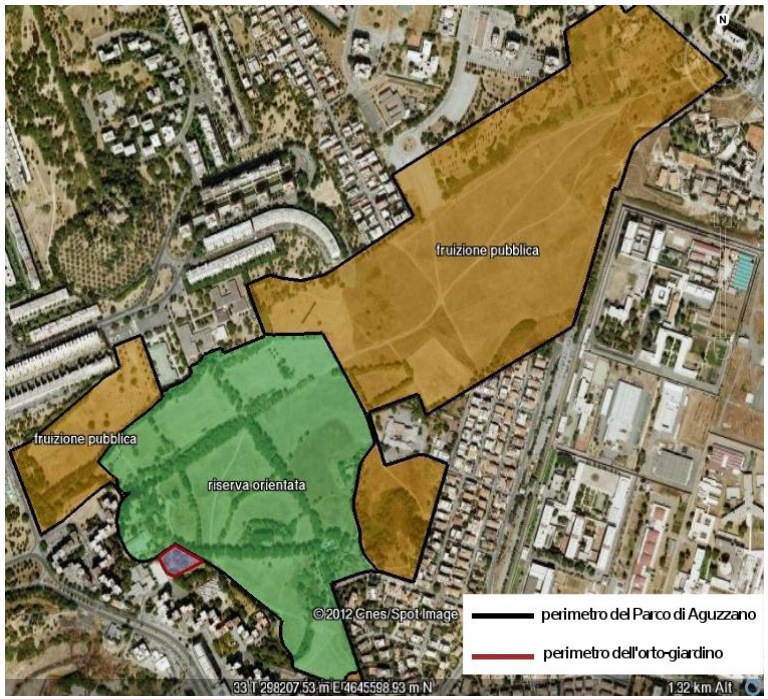


Figure 7 - Urban garden *"Orto di Aguzzano"*, localization

happening there is explicative of the Roman contradictions as far as the environmental policies are concerned. Indeed, the public institutions involved in the project are poorly supported by the municipality: the library stopped receiving the public funding, so that its existence is at risk (an interviewed employee said they could probably close by march 2015); the market is made up of few producers not always coming from the roman territory and the park was in an evident state of abandonment at the time of the author's visit (January 17th, 2015). Nevertheless, the urban garden, which is mainly managed by the members of the association and the locals involved, prospers. It is developed over a total area of 2.660 m2, slightly sloping, sided by the park, one road and the Centre of Ecological Culture (figure 8). 60% of this area is devoted to individual allotments for vegetable production attributed to citizens subscribing an annual quota of 60 euro to the association ranked first in a ranking realized on the basis of the first-come, first-served principle. Since the high number of subscriptions, it was not possible to accept all the applicants, therefore there is a waiting list. 35% of the garden is devoted to public paths in between the plots, so that the access is always guaranteed and open to everyone. The remaining 5% is devoted to the building of supporting structures. The projected started at the end of 2012 and today is a well-established reality, working for the promotion of Rome's sustainability in one sub-urban area.

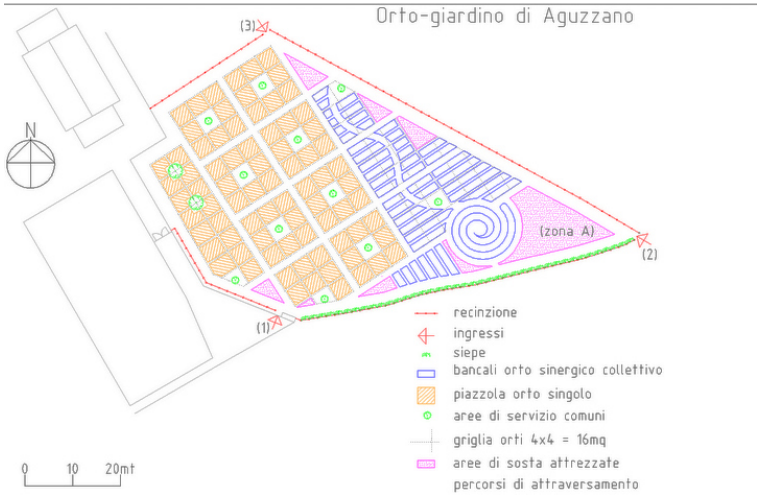


Figure 8 – *"Orto di Aguzzano"*, projectdraft

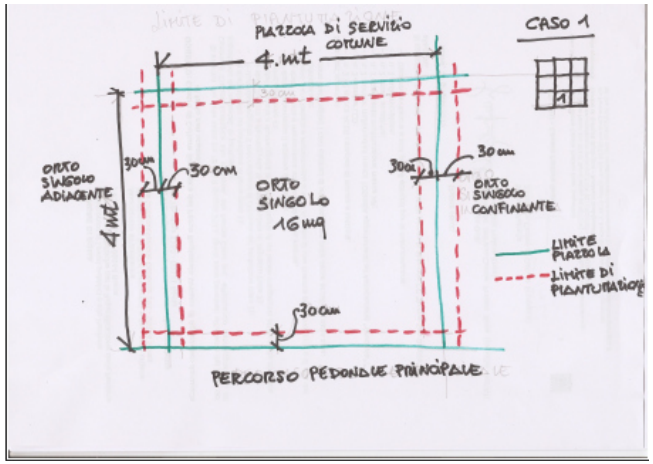


Figure 9 - "*Orto di Aguzzano*", single allotment, sketch

Figure 10 - Selected area *before* the project “Orto di Aguzzano”, Rome

Figure 11 - Selected area *after* the project "Orto di Aguzzano", Rome

Conclusion

The state of urban agriculture in Rome is far from efficient. The city has a strong agricultural tradition, rooted in its ancient relationship with the countryside. Therefore, there is an important number of urban farms led by families and cooperatives, which are established both within the city and in its surroundings, and which constitute the backbone of the local food supply chain. However, considered the city's extension (1.825 km^2) and the relatively high number of protected green areas (**figure 12**)which remain wild and unproductive, due to a voluntary political choice, it could be stated that there is still an untapped potential to be explored.

Moreover, the weak role of the public institutions and authorities in managing the urban green spaces led to the development of a young bottom-up movement of urban gardeners. They promote the growing of edible and not-edible plant within the city with the explicit aim of requalifying decayed areas and promoting sustainable urban habits among their inhabitants. Yet, this movement is not always coordinated and it has been legitimized solely in very recent time (November 2014). Therefore, its growthisuncertain and it is too early to forecast possible future scenarios.

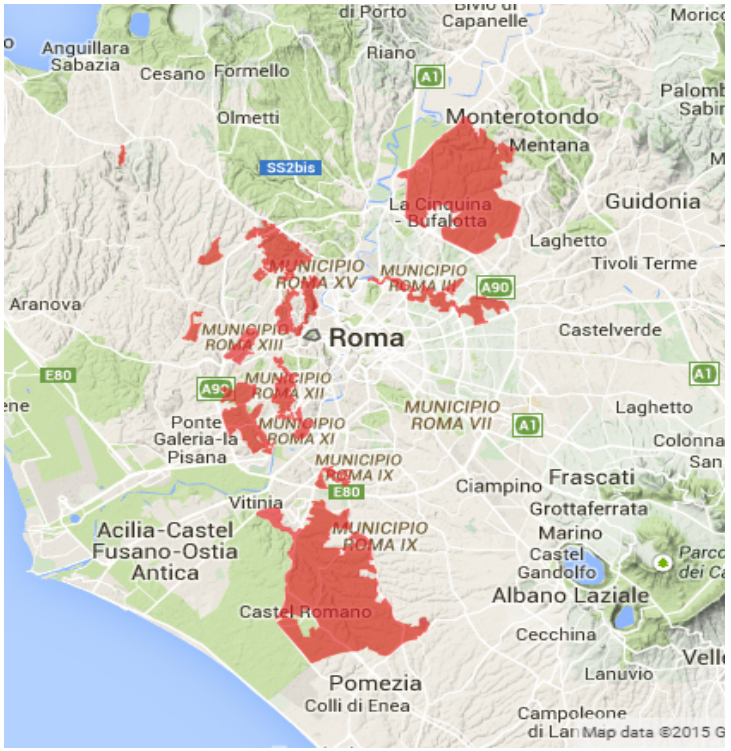


Figure 12 - Rome's officially protected green areas

Section 5 –Concluding remarks

This section draws some conclusions on our research. The common theme so far investigated answered to the following question: is the (re)localization of the food production at the city level a suitable and desirable solution for the promotion of resilient and sustainable food systems? And, in turn, could a city engaged with food production be considered more sustainable and resilient to change?The aim of this dissertation was to investigate an engagement with food production at more localized levels. In particular, the specific focus was on the role of *urban agriculture as adaptation strategy in Europe's cities*.

As first general conclusion, it could be affirmed that the local is a suitable and desirable spatial unit for food production, for the sake of both the overall agro-food system and the city's context. Still, certain limits to the agricultural productive capacity of today's cities emerge. They concerns the volume of produce that the urban environment is able to supply, which appears to be insufficient to feed the urban population. It follows that the other spatial dimensions (regional, national, global) should be properly included in any re-localizing strategy. Consequently, a desirable future scenario for the sustainable development of our planet and our metropolises, as far as the food system is concerned, could be the one favoring, on the one hand, the predominance of the local scale, while including, on the other hand, an in-depth examination/reshuffle of the current trade system.

The predominance of the local scale can be pursued via urban agriculture. Practically, today's cities in Europe can truly integrate UA into their food policies. Concerning the fundamental conditions to do it, the findings of this research prove what follows: first, at present, there is a satisfying level of scientific knowledge about the design, installation and maintenance of an urban garden/farm in Europe; or, alternatively, it is possible to easily access to several information about it (scientific literature, best practices, etc.) thanks to the spread of ICTs among the European people. Second, concerning the human involvement on the field, it still appears weak, in terms of active and constant participation, but increasing. And lastly, concerning the role of political authorities, it varies according to the country, with a general difference emerging between North and South of Europe. Official food policies adopted and implemented across the continent are still few in number and too young to be reviewed. When it happened (e.g. in Bristol), these reviews were not so encouraging. By and large, it emerged that the most remarkable contribution given by local politicians is the financial support to baby projects. Instead, when they are openly against them, their existence and further development are at risks (see the Berlin case).

Accordingly, the today's re-emergence of urban agriculture in Europe seems to be *a relatively young trend*. It has just received a certain attention by citizens and public authorities, it appears to be led by a bottom-up heterogeneous group of actors (hard to define as a movement), and it lacks of a comprehensive conceptualization.

Hence, its ambiguous role as adaptation strategy at the city level: there is not a uniform understanding of the way in which UA should be integrated with the other urban policies. A main cleavage emerged between profit-oriented urban agriculture (economic impact prized first) and social recreational and educational urban gardening activities (social-environmental benefits prized first).

In conclusion, it is possible to identify several perspectives:

- Given that the majority of the European projects today are experimental or in early stages, their future development should be monitored
- Given the lack of reliable and comprehensive data about UA in Europe, further research should aim at devising a specific method of analysis in order to systematically determine the city's potential for UA. For that approach to be comprehensive, it should integrate the various disciplines related to the study of the urban area
- Joint efforts by public authorities (municipalities, governments) and research organizations could capitalize past experiences and exchange best practices
- The spread of innovation technologies on urban food production could ease the integration of agriculture in the city – facilitating, for instance, the retrofitting of existing buildings or the re-purpose of old infrastructures

- The spread of information and communication technologies could facilitate the exchange of information and generate greater involvement of the citizens in UA activities.

5.1 A general conclusion

It is possible to draw a general conclusion concerning the re-localization of the food system at the city level, and namely that the local is a suitable and desirable spatial unit for food production, for the sake of both the overall agro-food system and the city's context. It is suitable because it is an economically and ecologically sound option and, therefore, desirable because it increases the urban resilience and sustainability, as demonstrated in Section 1.

Still, certain limits to the agricultural productive capacity of today's cities emerge. They concerns the volume of produce that the urban environment is able to supply, which, at present, appears to be insufficient to feed the urban population (KEEFFE, 2014). Given the current dynamics of food production and consumption and their impact on the ecological footprint of a country and its cities (see Introduction), it is possible to state that the food system is complex and hard to change. Urban agriculture is a valid option, economically and ecologically, since it could produce a certain amount of healthy affordable green and just food. Still, it cannot solve the food issue alone. It should be included as part of a broader intervention aiming at reducing the human impact on natural resources through the adoption of a broad

range of complementary strategies such as the reduction of meat consumption, the promotion of renewable energies, the reduction of waste flows, to name but a few (KEEFFE, 2014).

It follows that the other spatial dimensions of our foodscape (the regional, national and global ones) should receive appropriate consideration too. The general concentration of resources and power into a limited number of multi-national corporations that stand for an agro-industrial model of food production can be counteracted promoting more sustainable and inclusive strategies at all levels, such as, for instance, the corporate social responsibility model or multi-stakeholders policy platforms (SCAR, 2011). Consequently, a possible future scenario for the sustainable development of our planet and our metropolises, as far as the food system is concerned, is the one favoring, on the one hand, the predominance of the local scale, while including, on the other hand, a better governance and regulation of the trade system. Indeed, recent studies demonstrate that despite the realization of the maximum regional food self-sufficiency, given the globalizing trend of production and consumption, the future food geographies will unavoidably deal with global trade and businesses (SCAR, 2011).

5.2 Evaluation of the technical and human requirements

From a practical point of view, urban agriculture can indeed be integrated within today's cities in Europe. An evaluation of the technical and human requirements led to the following conclusions:

- First, at present, there is a satisfying level of *scientific knowledge* about the design, installation and maintenance of an urban garden/farm in Europe; or, alternatively, the access to such information (scientific literature, best practices, etc.) is favored byIC technologies,nowadays widely spread among Europeans.
- Second, an element of divergence in Europe is constituted by *the level of technological innovation* applied to food production at the city level (high vs. low tech farming systems): if high tech solutions are implied, a higher sustainability is obtained. For instance, the use of a drip-irrigation system fueled by photovoltaic panels which distributes harvested rainwater (*Potage-Toit project*, Brussels) vs. the use of public water sourced from a drinking fountain (*Orto di Aguzzano,* Rome).
- Third, there is *a weak still promising level of human involvement* in urban agriculture. Weak since it is far from being mainstream and several gardeners interviewed said their main source of concern was the lack of "manpower" needed to carry on the project, especially in case of no-profit activities. Promising since new profiles of individuals interested in UA are emerging: the

young highly educated generation and the expert professional men with a background extraneous to agriculture, yet strongly moved by environmental and social concerns.

- Fourth, t*he role of the public institutions* is different according to the European country and its civic culture. However, it can be generalized that in Northern Europe local authorities are more pro-active and aware of the potential of UA (Bristol signed the first Food Council in 2011; in The Netherlands the food issue emerged in the political agendas as early as 2007; the French ministry of agriculture committed a report to the International Urban Food Network (IUFN) on the "city-region food systems" to investigate the possibility of adopting a regional plan in the Parisian Great Region; *whereas* Rome or Barcelona still considered UA as a mainly social and educational activity and their engagement with food policy is limited to the recognition and legalization of public open spaces devoted to gardening). Yet, even in Northern Europe, the institutional approach is often criticized or ignored by the citizens. (Bristol's first reviewing report denounced a gap between what the officials said on projects/initiatives promoted and what citizens understood about them) revealing the *rather* s*pontaneous transversal bottom-up nature* of agriculture practiced in the cities all over Europe.
- Fifth, one factor making the difference is the *financial support* offered by local institutions especially at the early stages of a project (e.g. Brussels' municipality

subsidized the *Potage-Toit*project with 15.000 euro/year *whereas* Rome keeps the city's green areas in a state of abandonment).

- Sixth, there are failed cases of collaboration between the private and the public, which witness how much politics could hamper the development of urban agriculture –an existing caseof urban garden in dangeris the BerlinerPrinzessinnengarten.

5.3 Urban Agriculture in Europe: state of play and future perspectives

In conclusion, it could be said that, urban agriculture starts to re-emerge in Europe. It seems to be a *very young trend*, rather than a well-established phenomenon. Indeed, it has just received attention by citizens and public authorities, it appears to be led by a bottom-up heterogeneous group of actors (which is hard to define as a movement) and it lacks of a comprehensive conceptualization due to a deficit of reliable data and due to the experimental phase in which most of the cases studied lay.

Therefore, its role as adaptation strategy is still *ambiguous*: there is not a uniform understanding of the way in which urban agriculture should be integrated with the other urban policies. Certain Europeans believe that food production in urban settings offers mainly environmental and educational services, whereas others sustain it should have a more productive and profit-oriented role. It follows that

different models emerge according to the sustainable dimension that they pursue the most (environmental, social or economic). So, at present, the main cleavage is between profit-oriented urban agriculture (economic impact prized first) and social recreational and educational urban gardening activities (social-environmental benefits prized first).

In conclusion, it is possible to identify the following perspectives:

- Given that the majority of the European projects today are experimental or in early stages, their future development should be monitored
- Given the lack of reliable and comprehensive data about UA in Europe, further research should aim at devising a specific method of analysis in order to systematically determine the city's potential for UA. For that approach to be comprehensive, it should integrate the various disciplines related to the study of the urban area
- Joint efforts by public authorities (municipalities, governments) and research organizations could capitalize past experiences and exchange best practices
- The spread of innovation technologies on urban food production could ease the integration of agriculture in the city – facilitating, for instance, the retrofitting of existing buildings or the re-purpose of old infrastructures

- The spread of information and communication technologies (web, social networks) facilitates the exchange of information and the involvement of the citizens in UA activities.

The way towards more sustainable and resilient city's food systems seems to be paved across several European cities. Hence,today's Europe should only walk through it, bravely and right now.

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On-site Visits and/or Interviews

Mr. Giacomo Salizzone, Orti Dipinti, Firenze (19/02/2014)

Mr. Filippo Dattola, Le début des Haricots, Bruxelles (13/09/2014)

Mr. Alberto Modesti, Orto Tre Fontane, Roma (05/09/2014)

Ms. Paola Marzi, Dip. Tutela Ambientale, Protezione Civile, Ufficio Orti Urbani, Roma (09/09/2014)

Urban garden “Orto di Aguzzano",municipal famers’ market and Aguzzano’s urban park, Rome (17/01/2015)

Mr. Marco Clausen, Prinzessinnengarten, Berlin – interviewed by email (02/2015)

Conferences

6th AESOP Sustainable Food Planning Conference – Finding Spaces for Productive Cities, November 5-7, 2014, Leeuwarden, The Netherlands

Urban Agriculture Strategy Meeting –Drivers For Sustainable Urban Food Production, organized by ICLEI –Association of Local Governments for Sustainability and Plantagon AB in partnership with RUAF Foundation, May 28, 2014, Bonn, Germany