

Urban agriculture in the framework of sustainable urbanism

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Doctoral thesis

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Introduction and methodology

PART

Chapter 1

Introduction

CHAPTER 1 - Introduction and objectives

This chapter presents the general background of the thesis focusing, in particular, on its main topics, city and agriculture. First, the city is presented as an artificial ecosystem emphasizing its metabolism. Then the main benefits and problems of cities are addressed. Third, the role of cities in achieving sustainable development is exposed. In addition, the complex scheme of food in cities and its problems is presented. Fifth and last, the narrow and historic relationship between agriculture and the city is exposed as a potential area for sustainable development in both compact and sprawl cities.

1.1. The urban ecosystem: Symbiosis between green and gray

The city is an indissoluble part of the complex environment (Amaya, 2005). The constant growth in the number and size of cities and the ensuing transformation of virgin landscapes pose significant challenges for reducing the rate of biodiversity loss and guarantee ecosystem functionality and human welfare (Haase et al., 2014). Currently, urban sceneries are the daily environment of the majority of global population (54 %) (Figure 1), and by 2050 it is expected to increase to 66 %; of which 90 % corresponds to Latin America's population, 80 % to European and US citizens, and almost 50 % to Asians (United Nations, 2014a). By its nature, the city can be understood as a triangle: population, activity, territory. There is a close interrelation between the three sides of the triangle. But the population and its activities can unbalance the territory side, making it the most vulnerable of them. Before this, the need to see the city with an ecological approach arises, accentuating the relationships between the population and its living space (Amaya, 2005).

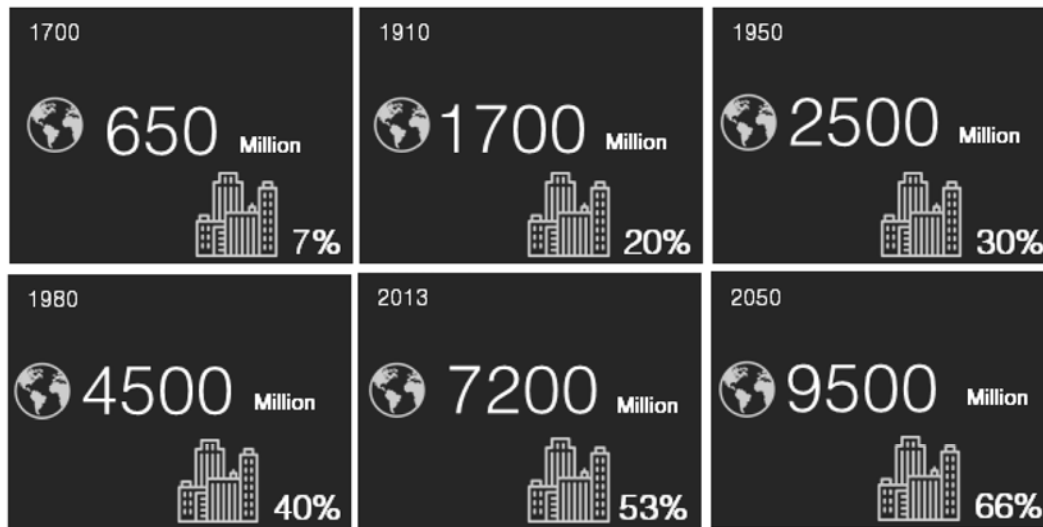


Figure 1.1 World's population and urban population: Evolution and previsions (1700-2050).

Source: Own elaboration based on United Nations (2014)

Biodiversity is the basis of ecosystems and the services they provide (MA (Millennium Ecosystem Assessment), 2005a), and cities can be understood as ecosystems, being mankind and his societies subsystems of them (Margalef, 1986). The city contains a community of living organisms, a physical medium that is transformed as a result of internal activity, and a functioning based on exchanges of matter, energy and information (Higuera, 2006a). Cities can be defined as dynamic and open systems (Barrios, 2012), and must be analyzed and managed like any other type of ecosystem (EEA, 2010). But we must bear in mind that cities have almost total dependence on the rest of non-urban ecosystems, since they are based on the exploitation of the services provided by them (materials, food, energy, water, etc.) and demand the assimilation of what their metabolism excretes to nearby (pollutants, waste, sewage, etc.) and distant (greenhouse gases) ecosystems (EEA, 2010). Also soil

sealing and the process of urbanization incite variations, principally a decline, in species diversity (MA (Millennium Ecosystem Assessment), 2005b).

The concept of considering the city as a living system is not new (Higueras, 2009). (Geddes, 1904; Hanson and Machlis, 2008; Machlis and Hanson, 2011; Mumford, 1938; Piccinato and Astengo, 1988) and other authors exposed the idea of the ecosystem. But it is in the decade of the nineteen seventies, following the Man and Biosphere program of UNESCO (UNESCO, 1970), when ecologists highlight their interest in considering cities as an artificial ecosystem. In this sense, it is possible to distinguish two trends within urban ecology: the first studies from the perspective of nature in the urban habitat, and the second focuses on the analysis of matter and energy flows in urban ecosystems (Barrios, 2012).

The cities differ from natural ecosystems in the flow relationships of matter and energy between biotic, specifically in two main areas: the production of waste and the heterotrophic character (Barrios, 2012; Mejía-Tobón, 2012). The system's waste in nature is the raw material of another; on the contrary in the cities this phenomenon does not always develop, that is, it may not have a closed or circular cycle metabolism. As for the heterotrophic organism, the city can be considered as an incomplete heterotrophic system dependent on large bordering (and non-bordering) areas for energy, food, fibers, water and other materials; since it does not have an inexhaustible source of energy that guarantees its operation indefinitely (Higueras, 2009; Naredo, 2001; Odum, 2007).

The model of matter and energy exchange of a city is the opposite of that of a natural ecosystem, since in these the cycles are very short and the transport of materials and energy is eminently vertical. The cities present large horizontal routes of water, food, electricity and fuel resources; they are also capable of exploiting other distant ecosystems and causing important territorial imbalances on a local, regional or planetary scales (Higueras, 2006b). This refers to the linear metabolism that cities present. On the other hand, cities are very complex organizations and without comparison with any other existing structure or organization, in which their connections extend over the entire planet, influencing distant spaces thanks to technology and new transport networks (Higueras, 2009).

In this sense Sukopp and Werner (1983) points out the following characteristics for an urban ecosystem:

- Production and accumulation of urban organic and inorganic wastes.
- Use and consumption of secondary energy on a large scale.
- Large flows of import and export of materials and products, among them food (mostly coming from rural areas).
- Increased air, water, and land pollution.
- High water consumption to supply population.
- Alteration of the original soil, with important earth movements.
- Change in thermal equilibrium conceived as an urban "thermal island".

These characteristics must be taken into account in order to identify the actors participating in the systems that make up the ecosystem, and to be able to analyze the particularities and relationships that exist between the constructed abiotic environments (Mejía-Tobón, 2012). In addition, we must consider the cycles of the urban ecosystem: atmospheric; hydrological; of organic matter and waste; and energetic. So, facing the problem of unsustainability, studying the city as an ecosystem, is presented with a cultural and scientific interest. (Bettini, 1998).

1.1. The dualistic nature of urbanization

Historically, cities have allowed people to progress socially and economically (INAFED, 2017). The connection between the phenomenon of urbanization and per capita income, and the positive link between population agglomeration, productivity and economic activity in cities is reinforced by numerous studies (Ciccolella, 1999; Henderson, 1991; Jones and Koné, 1996; Krugman, 1991;

Lemelin and Polèse, 1995; Polèse, 2001). In this sense, for a long time, the role of cities in favor of the creation of wealth and innovation has been recognized. Nevertheless, they also create some problems such as pollution and disease. So, the city is not just a sum of households and production units to serve the market or for public consumption. It is a creation in itself, the result of structural factors and individual and collective behavior, but also a condition and cause of actions and attitude (CEPAL et al., 2015). And therefore, the city also pose many problems in the physical, social and political-administrative dimensions (Capel, 2003) that accelerate the imbalance between nature and city (Pérez, 2006). To mention a few:

- Overexploitation of natural resources to supply construction materials in the face of the city's unstoppable growth, causing Greenhouse Effect Gases (GHGs), among others, that contribute to the problem of Global Warming and other impacts (Kennedy et al., 2009; Satterthwaite, 2008).
- Urbanization of rural areas close to the city creating irregular settlements and generating conurbations, soil degradation, depletion of natural resources, soil contamination, contamination of water sources and total destruction of ecosystems and ecosystem services that are found around cities (FAO, 2014a).
- Lack of resources for basic services and lack of adequate housing (UN Habitat, 2012).
- Air pollution produced by the large motorway and street network generated by the intensive use of vehicles and transport (UN Habitat, 2012).
- Displacement and migration of people from the countryside to the city, due to forced displacement due to wars over territories and the inability of rural areas to retain its population (FAO, 2014a).
- Loss of cultural identity, customs and traditional habits of the migrant population or urbanized rural areas around cities (Valentino, 2013a).
- Food insecurity, deterioration of urban food regime and malnutrition taking on the dimension of a pressing problem (FAO, 2000).
- Generation of zones of environmental vulnerability characterized by poverty, diseases, crime, pollution, degradation of the natural environment, etc. (UN Habitat, 2012).
- All these environmental problems are generating serious social problems such as poverty, extreme poverty, health problems and poor quality of life of the inhabitants (UN Habitat, 2012).

As Valentino (2013) says, several researchers and institutions recognize the environmental and social crisis that cities present currently worldwide:

- The trend towards urbanization has enormous consequences for measures aimed at reducing poverty, ordering natural resources, protecting the environment and responding to climate change (UN Habitat, 2012).
- Cities are places of production and consumption of most industrial products. They have become parasites within the landscape, huge organisms that absorb energy from the planet for their maintenance: tireless consumers, tireless polluters (Rogers and Gumuchdjan, 2000).

- We are facing a city that increases social segregation, with an inordinate development of infrastructures that consume land and territories, materials and energy and supports a real estate practice that encourages the replacement of buildings in front of their rehabilitation and conservation, increasing the waste of resources and the production of waste (Hernández, Agustín Vázquez, 2010).
- Cities are organizations that consume 75% of natural resources and generate 75% of planetary waste, which constitutes a significant environmental threat (Castillo, 2008).

Given this, it is necessary to rethink urban planning and make proposals aimed at generating changes in the way in which cities conceptualization and design are addressed, and focusing on sustainable development and the Sustainable Development Goals (United Nations, 2016). Actually, cities hold the key to the solutions of many global problems: they allow the flourishing of local markets and international business, encourage scientific experimentation and technological development, provide efficient transport systems and erect more inhabited spaces (Steele, quoted by Gordillo et al. (2010)).

1.2. City: the key to sustainability

The expansion of cities seems to be an irreversible fact within the evolutionary process of geographical space (Amaya, 2005). Cities can boost the ecological progress of the global economy by improving the efficiency of energy use in transport and buildings, as well as of water supply and waste disposal systems (UN Habitat, 2012). The sustainable city is not only an urban solution to the problem of the occupation of a territory, it is a dynamic and interrelated vision that seeks a direct relationship between the physical structures that make up the territory and its inhabitants (Arosemena, 2012).

This urban model is adjusted to the value of urban efficiency and urban habitability, a morphologically compact city, intricate in its organization, metabolically efficient and socially cohesive (Rueda, 2002). Arosemena (2012) points out three conditions that must be present in a city to be considered as sustainable:

1. It is a city with mixed land uses, to avoid large displacements in space, and that recognizes the carrying capacity of natural ecosystems.
2. It has a compact shape, in order to reduce distances in travel and thus avoid high fuel consumption.
3. It has low levels of poverty, it has a diversified economic base, it conserves green areas and it is not based on the use of private automobile.

So, including sustainable 'green' solutions into new and existing developments it is one of the most efficient ways to promote the reduction of emissions and delivery of zero carbon development, and the shaping of sustainable cities (DCLG, 2006). In this sense, after the Summit of the Earth (1992) several terms that refer to the relationship between green and urban sustainability have been generated: green urbanism, ecological urbanism, eco-cities, sustainable cities, among others (Devolder and Block, 2015). All these terms focus on addressing the problem of climate change, environmental impact, loss of biodiversity and increase inhabitants life quality, as well as food security and social cohesion.

Green urbanism is the idea including both urban and environmental sustainability. Beatley (2003) defines it as the practice of creating communities beneficial to human and the environment. It is an attempt to shape more sustainable places, communities and lifestyles, consume less of the world's resources and reduce environmental impacts of cities and dependence on long-distance inputs:

fossil fuels, food supplies, building materials, and others (Hodson and Marvin, 2010, 2009; Suzuki et al., 2010). Beatley (2003) indicates that what we need today are cities greatly more ecological in design and functioning, because they are the key to confront climate change, biodiversity loss and other environmental changes. So, he identifies six design characteristics (Table 1) that exemplify green urbanism in cities. It can be noted that urban agriculture (UA) plays a fundamental role in the goal of a sustainable city and it helps achieve most of the six features, as can be seen in Table 1.

Table 1.1 Intervention of food production in the Beatley's (2003) vision of green urbanism.

Green Urbanism characteristics	Food production
1. Strive to live within their ecological limits, reduce their ecological footprints, and acknowledge their connections with and impacts on other cities.	X
2. Are designed for and function in ways analogous to nature.	
3. Achieve a circular rather than a linear metabolism, which nurtures and develops positive symbiotic relationships with and between its hinterland.	X
4. Strive toward local and regional self-sufficiency and take full advantage of and nurture local/regional food production, economy, and power production.	X
5. Facilitate and encourage more sustainable, healthful lifestyles.	X
6. Emphasize a high quality of life and the creation of highly livable neighborhoods and communities.	X

In the same line and as a critique of the current urbanization processes, the theory of ecological urbanism draws from ecology -through the application of ecological principles- to incubate and inspire an urbanism that is more socially inclusive and environmentally sensitive (Mostafavi, 2010). So, a sustainable city seeks to keep urban processes going by making use of less quantity of resources and producing a smaller amount of waste by the recycling of materials (Arora et al., 2017). Also, Lehmann (2010) noted that in order to develop a sustainable city, it is necessary overlapping mixed-use activities, infrastructures systems for renewable energies, living and working building typologies explored on the urban scale, public transport and individual energy-efficient building designs; and sets out a list of 15 principles for local action and a more integrated approach to urban development. (Lehmann, 2010) was founded on the outline triple-zero (zero fossil-fuel energy use, zero waste and zero emissions) and highlighted the need for the integration of food production in cities through the following principles:

- **Principle 5. Urban biodiversity, landscape and gardens;** present inner-city gardens, urban agriculture and green roofs to maximize the resilience of the eco-system through using the city for food supply and urban landscape.
- **Principle 11. Short supply chains and local food, urban agriculture and food security;** comprise local food production, an emphasis on urban farming, introducing "slow food" enterprises, healthy food systems and to cut down on petrol-based transport.

Although the food production has great backing, access to resources, land or urban space in particular, is central. Therefore, it is necessary that food production systems are accompanied by actions that support the sustainable development of the city, in four spatial levels: regional and metropolitan; city; community; and building (Y. Jabareen, 2006; Y. R. Jabareen, 2006).

1.3. Food in the urban ecosystem

Urbanization generates a weighty transformation in the human relationship to food (FAO, 2015a): as cities expand, so does the urban consumer demand for food (FAO, 2009). But in addition to the demographic aspects, trends and economic conditions greatly influence the amount of food consumed and available to the population. The most important factor is the level of income (FAO, 1998a). When incomes increase, people consume larger quantities and different types of food. The recent food and financial crises have highlighted the problem of urban food insecurity in developing countries. Urban households have seen their purchasing power diminish (FAO, 1998b). So, providing

adequate amounts of nutritious food and accessible to the urban population, particularly for the poor, is the present challenge of cities (FAO, 1999a).

Most of the food consumed in cities has to be bought and poor families occupy between 60 to 80 % of their income on it (FAO, 1998b). Whereby, the poor urban population can hardly acquire sufficient quantities of food to meet their needs and preferences (FAO, 1998b). **Food insecurity** means not having the means to obtain enough food to meet nutritional needs (FAO, 2011a). Food insecurity risks in urban areas are inherited from our failing systems (FAO, 2016a). The vast majority of foods consumed in cities are produced in rural areas far from the consumption sites in cities (FAO, 2016b). Nowadays, the configuration of the food system was changed by globalization (Kremer and DeLiberty, 2011), and is based on low transportation costs and government policy. That is to say, the local and regional food networks were replaced by national and international food networks (Lyson, 2012), and eating local food is no longer an apparent option to people living in major cities (Chen, 2012)

So, to reach the consumer, food goes through many different channels and there are many people who intervene in different marketing, negotiation and organization systems, generating a complex and extensive framework that threatens urban food security (Figure 2). This framework involves a interdependent and complex foods flow, characterized by intensification and long travelers between production and consumption processes, which has negatively affected the availability and access to fresh foods (Bertran, 2017). This is mainly due to the increase in the price of staple foods and at the same time the decrease in the price of industrialized food (high in sugar and with low nutrition levels) (Torres, 2012). In dietary terms this has resulted in the change to a diet with higher consumption of fats and sugars, which together with the reduction in physical activity (due to the mechanization of the processes of daily life) are the causes of the epidemic of obesity that affects some world regions (Kaufer–Horwitz and Garnica–Correa, 2008).

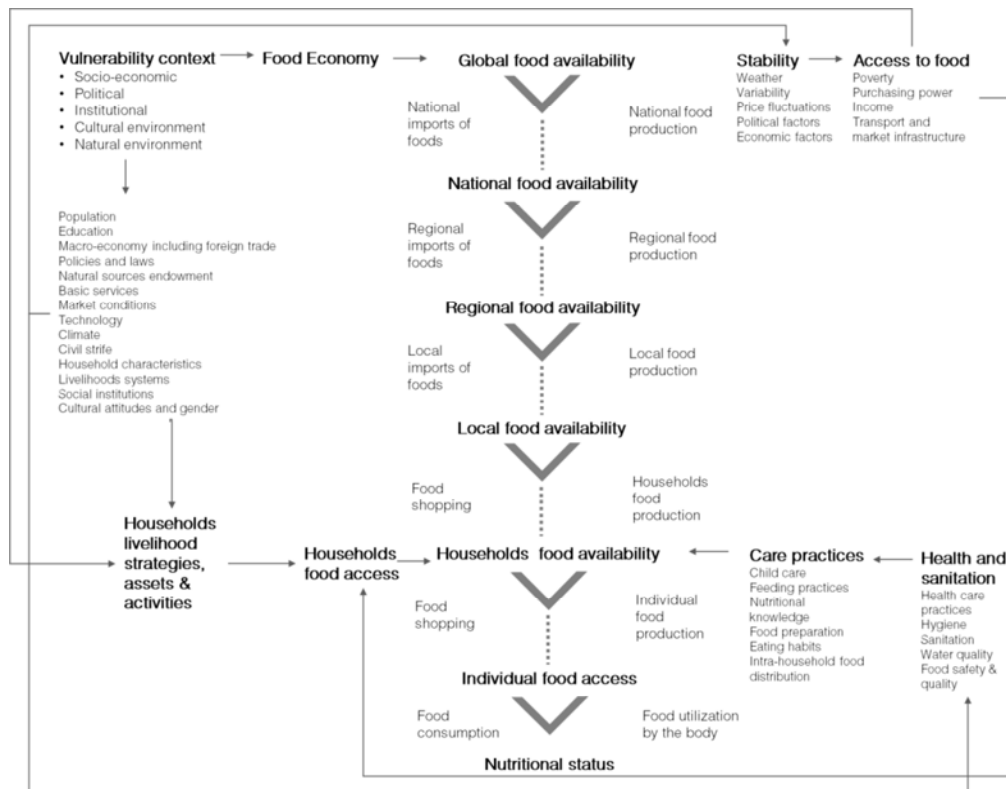


Figure 1.2. Conceptual framework for food security from global food availability to people's nutrition security. Source: Own elaboration based on FAO (2008)

The growing food needs of urban populations, their variations in diet and the current way in which urban food supply chains operate have implications that go beyond city limits, reaching rural areas (FAO, 2015b). This is why it is necessary to develop cities that feed their residents by implementing food production models within their own urban limits (FAO, 2015b). So, to meet these needs, food systems - production, distribution and consumption phases - must become more sustainable and local (FAO, 1999b).

Given this, it is necessary to promote urban improvements that prioritize sustainable production of food within cities. An alternative with a high percentage of viability turns out to be the Urban and Peri-urban Agriculture (UPA), since it presents a high degree of adaptation to the built context, through the flexibility and variety of forms of union with the city (Nadal et al., 2015). This strategy of incorporating UPA, increases the likelihood of accessing the consumption of food of high nutritional quality, as well as generating social cohesion, improving the economic income from the sale of the surplus, allowing participatory planning of the territory, and stimulating green areas generation in cities (FAO, 2014b).

1.4. Agriculture in the city

UA and UPA are concepts that are handled in different ways, depending on the aspect that is intended to highlight. Hence there are various definitions of it, including:

- Reduced areas located in the urban perimeter that are intended for intensive farming and the breeding of small domestic animals, mainly chickens or other similar and also, although rarely, dairy cows. This production is mainly carried out in vacant lots, patios and terraces that are transformed into community and family gardens; and is practiced exclusively by people who live and work in cities (Zaar, 2011).
- Activities associated with growing crops and some form of livestock in or near cities for local consumption. Consumed by the producers themselves or by other people when marketing the products. (Rees, 1997).
- Located in the city and its periphery and responsible for cultivating, producing and distributing food and non-food products, using human and material resources -reused-, while providing products and services to the urban area (Mougeot, 2006).
- Activity that produces, processes, and markets food and other products, on land and water in urban and peri-urban areas, applying intensive production methods, and (re)using natural resources and urban wastes, to yield a diversity of crops and livestock (Smit, 2001).

However, the most commonly used definition is that provided by the FAO: "Urban agriculture is understood when it refers to small areas (plots of land, orchards, margins, terraces, containers) located within a city and destined to the production of crops and breeding of small livestock or dairy cows, for own consumption or sale in surrounding markets (FAO, 1999c)". It is important to note that a broad understanding of urban and peri-urban agriculture must take into account the various activities of households to achieve food security, and to create income. Community-based and individual food production in cities must meet further needs of the urban population like sustainable urban development and environmental protection (FAO, 2001)

It should be noted that some authors usually make a difference between the term UA and UPA in relation to its location with respect to the city. UA is often considered to be developed within the city limits and UPA is on the edge of a metropolitan area; but both grows, processes and distributes a diversity of food products (Smit, 2001) (Figure 2). Moreover, both are integral to rural production and improves food in urban systems supply (Veenhuizen, 2006).

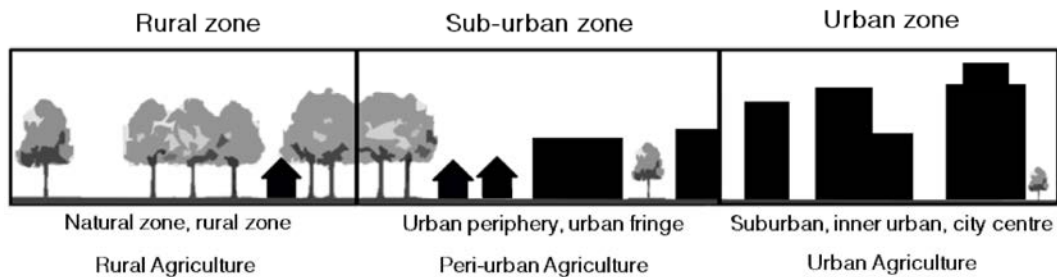


Figure 1.3. Agro-urban spectrum.

Mougeot (2000) indicates that in every city and at any given time, agriculture and supply of its products are developed or come from three regions: rural, peri-urban and intra-urban, resulting in three class of situations with respect to the quantity to which agriculture intervene in the city:

- A. Small, the most agricultural products consumed in the city comes from a rural area.
- B. Medium, when the peri-urban area is responsible for providing many supplies and agricultural products but it is supported by the city and the rural area that provide similar quantities under worst among them.
- C. Large, when agricultural products are produced in the same city, a lesser amount in peri-urban and the import of food from rural areas is minimal (Figure 3), with the latter being more integrated into the urban ecosystem.

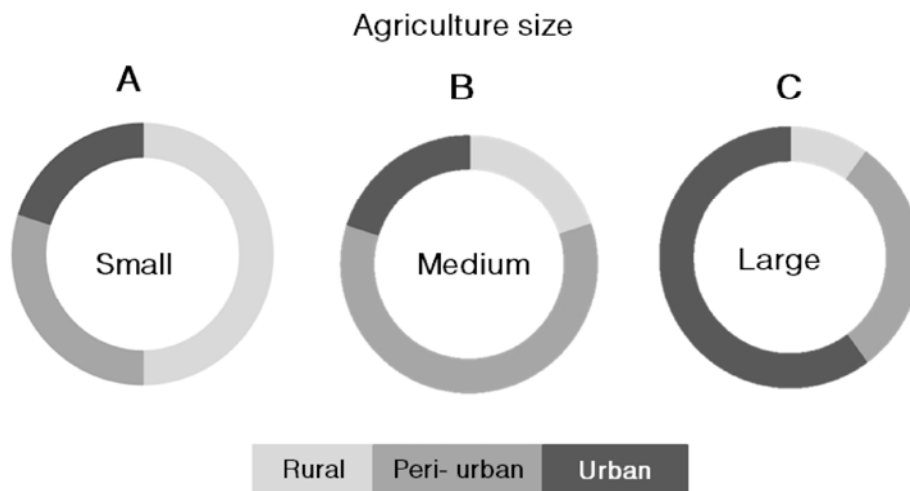


Figure 1.4. Agriculture size in the city.
Source: Adapted from Mougeot (2000).

For the development of UA some basic conditions are needed, grouped in five major areas (Figure 4): physical infrastructure and services, natural, economic, socio-cultural and institutional conditions (Jacobi et al., 2000). These major areas include climatic conditions, food preferences and access to space, availability of water and others. Also, the supporting factors give an indication of the "quality" or "performance" of agricultural activities in a city. They make it easier for people to get involved in it and raise its preference as a survival strategy against other alternatives. In many cases, it indicates

the shift of UA being an informal, partly illegal activity to an accepted legal income opportunity (Jacobi et al., 2000).

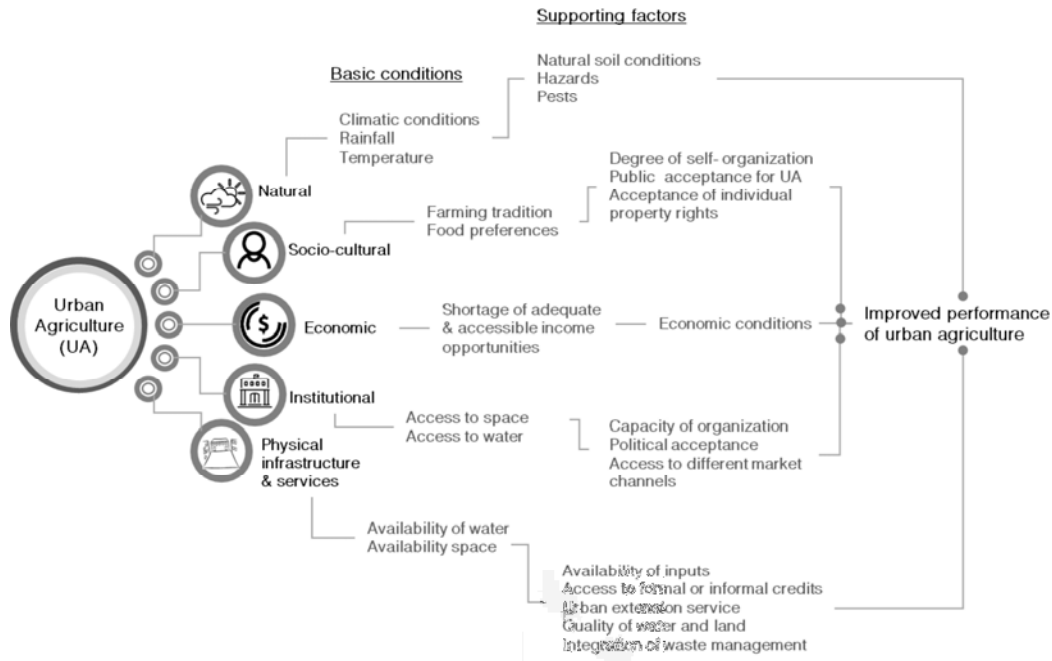


Figure 1.5. Basic conditions and supporting factors for Urban Agriculture.
Source: Own elaboration based on Jacobi et al. (2000).

Regardless of the size of agriculture in cities (UA or UPA) and the basic conditions for its development, its importance lies in that it is a crucial component of sustainable development in the strategy to reduce the negative effects of urbanization (Berger, 2013), because it harmonizes social, environmental, and economic aspects of sustainable development (Kingsley et al., 2009; Kisner, 2008; Mougeot, 2006; Pearson et al., 2010; Smit, 2001; Viljoen et al., 2012). Agriculture in cities seeks to increase food security for vulnerable urban and peri-urban populations, producing fresh and safe food for self-consumption in small spaces such as the backyards of houses and the terraces of buildings (FAO, 2014b).

It also generates numerous benefits, improving the food supply, health conditions, urban climate, local economy, social integration, quality of residents life, and urban climate, while stimulating the productive reuse of urban organic waste and reducing the urban energy footprint (Ceron-Palma, 2012; De Zeeuw, 2010; Dorr et al., 2017; Grard et al., 2015; Orsini et al., 2013). But agriculture in cities also poses certain risks and problems related to its proximity to densely populated areas:

- Dangers to health and environment resulting from inadequate aquatic and agricultural practices.
- Reduction of the environment capacity to absorb pollution.
- Increased competition for land, water, energy and labor.

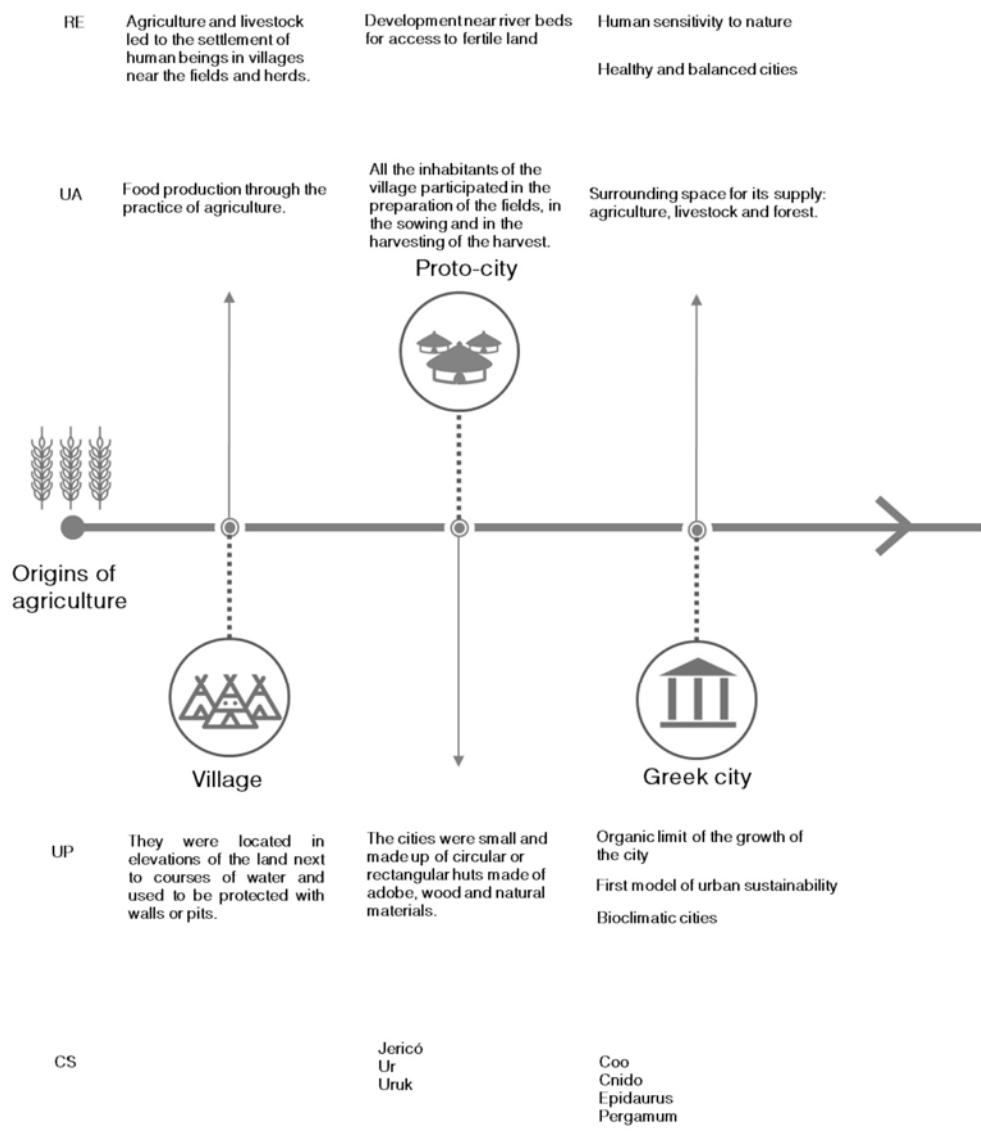
However, these problems are not exclusive to agriculture in the city, but rather depend on the productive practice and the rationality with which the management work is carried out, the use of agrototoxic substances and the management of waste; and not on the type of agriculture, urban or rural.

1.5. Urbanization: a historical relationship with the agriculture?

In recent times, agriculture has traditionally been associated with the imaginary of rural environment (Orsini et al., 2013), but the reality is different; agriculture and city are intrinsically related from the beginning. The urban phenomenon has almost seven millennia of existence and the city arises at the moment when man abandons his way of life as hunter-gatherer and becomes sedentary by the discovery of agriculture. In a synthetic way, five stages of evolution of cities can be identified (Erazo, 2012):

- 1st. First human settlements: man becomes sedentary and first settlements appear (12 500 a.C.).
- 2nd. Emergence of villages: surplus production and social relations beyond the clan (11 600 a.C.).
- 3rd. Transit from rural to urban: first cities are constituted by means of the appearance of commerce, the generation of a social structure, the formation of a fiscal structure, the communication between cities, the construction of laws and the structuring of a political and management body (9 500 a.C.).
- 4th. Urban expansion: eighteenth, nineteenth and twentieth century, characterized by the growth of cities around the world.
- 5th. New concept of city: current moment with a new form of conception of the world based on Sustainable development (1990 - beginning of the twenty-first century).

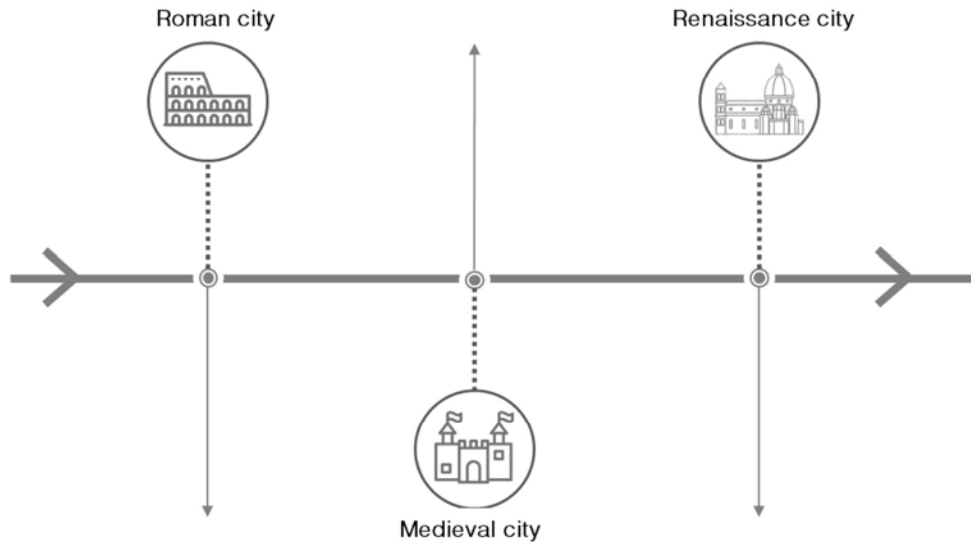
Consequently, the study and analysis of city and agriculture cannot be separated and the fact that agriculture in the city emerges as an instrument of food supply cannot be denied (Erazo, 2012). The conception, modality, forms, users, technologies and functions of urban agriculture have varied throughout history as indicated in Figure 5, but it has always been shown as a fundamental element in urban improvement strategies. In essence, the emergence of the city from the village was possible thanks to improvements in agriculture and food preservation technologies; in specific to the culture of cereals, reason why it is possible to be spoken of agricultural cities, cities of the wheat, the rye, the corn and the rice (distributed by all the world) to talk about to the main source of feeding (Cortes Rojas, 2009).



RE: Relationship with the environment
 UA: Urban Agriculture
 UP: Urban planning
 CS: Cities

Figure 1.6. Evolution of the city and urban agriculture.
 Source: Own elaboration based on Quintero Bosetti and Gómez Rosales (2012) and Kotkin (2005).

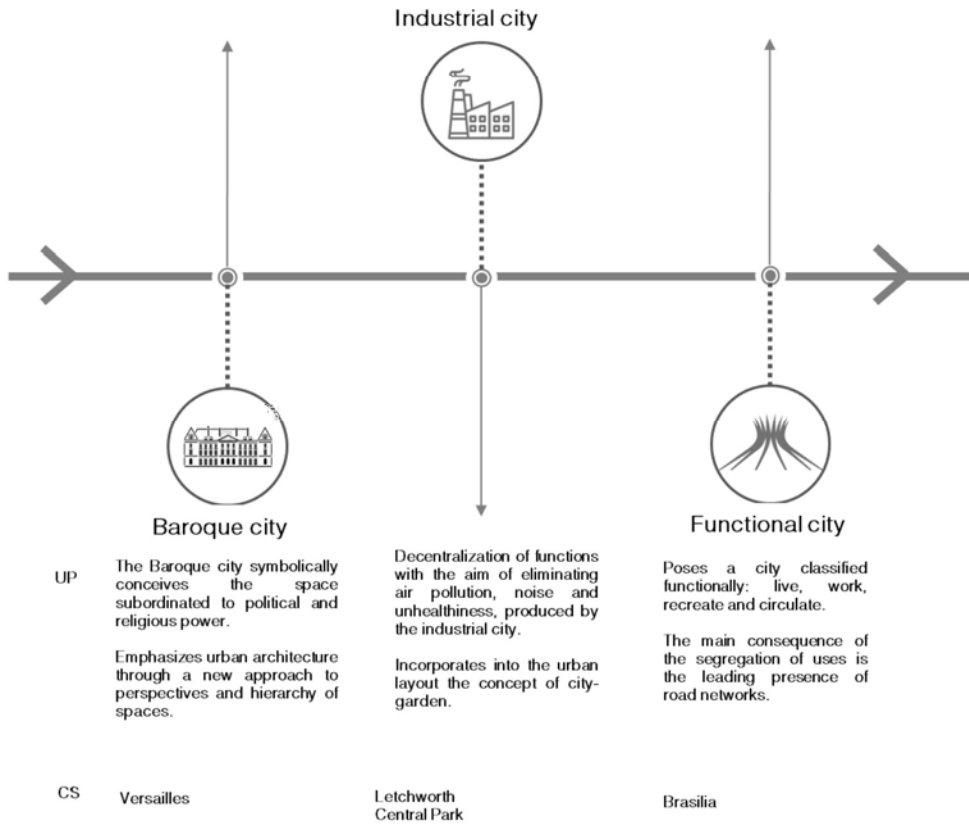
RE	Selection of the site according to its climatic, productive, safety and transport conditions.	Cities and countryside as a single whole.	They give importance to the field-city relationship. Foundation of cities in places with desirable environmental conditions, considering the winds, climate, temperature, fertility of the land and strategic location.
UA	Incorporation of green in private and public gardens and forests	Place of exchange for the agricultural and artisan production of the surrounding area.	Agricultural cultivation in terraces



UP	Urban layout ordered from the cardinal points and because of prevailing winds Bioclimatic cities	The essence of the medieval city is the hidden, the surprise, the improvised opening and the diversity of sequences. They were restricted more by natural and social conditions than ecological.	Urban layout recapturing the foundations of Greek and Roman cities, where streets and squares are interrelated to ensure citizen development. Foundation and development of ideal cities drawn in checkerboard in America during the colonization.
CS	Tárraco Emerita Augusta	Venice Special case: Spain and its Islamic influence, whose attitude towards nature implied the idea of beautifying the garden, its exemplary works are the Alhambra and the Generalife.	Palmanova Trujillo

RE: Relationship with the environment
 UA: Urban Agriculture
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RE	The growth and the flowering of the natural become subordinate elements to the geometric design of the public space.	The essentially biological criteria of dynamic and organic equilibrium are applied to the city, stating that once the optimum is reached, a city can not increase more in area and population.	Criticizes the model of a historic city due to its scarcity in green areas and the distancing of nature in the interior of the city.
UA	In the new Baroque order, the garden and the park become the symbol of urban planning.	Agriculture is not developed as part of the activities of the city.	Incorporation of green in private and public gardens and forests



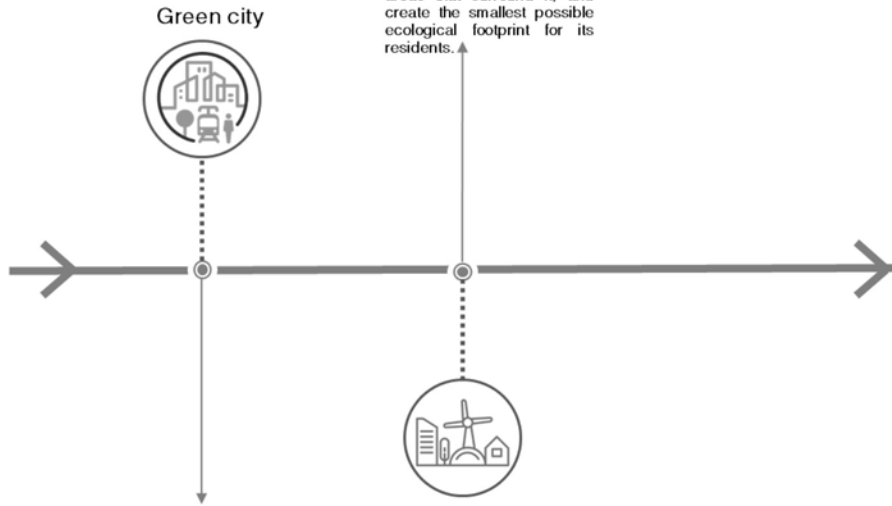
RE: Relationship with the environment
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RE It has its conceptual grip on the precepts of ecology as the economy of nature.
This is the basis for the work on ecological planning, applied ecology, environmental ethics, human ecology and special ecological planning

The idea of eco-cities emerges as a new approach to sustainable development

UA Incorporation of urban agriculture

An ecological city can provide itself with minimal dependence on the rural areas that surround it, and create the smallest possible ecological footprint for its residents.



UP This model deals with ecological and human planning, based on the interaction between the natural and cultural systems of the dynamics of living ecosystems.

The city is friendly to the environment, in terms of pollution, land use and reduction of the causes that contribute to global warming.

CS

RE: Relationship with the environment
UA: Urban Agriculture
UP: Urban planning
CS: Cities

Gradually, the urbanization process developed, and cities expanded as the topography allowed. In the seventeenth century cities began to multiply, but they kept gardens within the cities to guarantee food in case of war. It is with the development of long distance trade, the numerical calculation and the minting of coins, when the limits of the city are lost (Mumford, 1938). Everything that could be cultivated or manufactured in the city could be obtained from other regions through pillage or trade. Over time urban civilization applied mercantile pragmatism to the natural environment and began the process of eliminating free spaces for cultivation in the interior of the city and growth at the expense of the surrounding fields (Mumford, 1956).

It is from the Industrial Revolution when a new phase of economic, technical and social transformations changes the concept of city. New social contents, urban forms, urban fabrics, ways of life and many other innovations appear in the configuration of urban areas. All this is accentuated by the impact of new technologies, changes in production and consumption processes and industrial capitalism as an economic system; they provoked a new urban order in which agriculture was expelled from the cities (Cortes Rojas, 2009). Maintaining this concept of city, various urban forms have been developed to date, highlighting two opposite ones: the diffuse city (sprawl city) and the compact city (Figure 6).

The sprawl city or diffuse city (horizontal city), typical of countries of Anglo-Saxon tradition, transcends its origins and spreads throughout the territory, configuring itself as a set of specialized areas for housing, commerce or industry. They usually have a center that agglomerates the commercial and cultural sector and a periphery that extends along a large area with residential suburbs and redoubts for industrial use. They are the product of the "mobilization" of society, the mechanization of agriculture and the overcoming of urban anchoring in industry and services. This separation generates segregation and does not allow interaction in the same way as the compact city (Awad, 2013; Bolán, 2003; Y. R. Jabareen, 2006; Quintero and Gómez, 2012).

This form of city is usually associated with urban development in Latin America, because they have certain similarities. But it should be noted that urbanization in Latin American cities is different compared to European cities. This is because they originated from a process of conquest, in which their main aspects of form and morphology were planned. It was until centuries later when these characteristics of birth were overcome, giving rise to different stages in its evolution and conformation: colonial city (compact city), sectorial city (1820-1950), polarized city (1950-1990) and fragmented city (from 1990) (Bähr and Borsdorf, 2005; Borsdorf, 2003; Janoschka, 2002; Martínez-Toro, 2014).

The compact city (vertical city), typically Mediterranean, occupies an integrated urban space in which various social, economic and cultural agents intervene, making the city a truly complex entity, where interaction among its inhabitants is possible (Awad, 2013). This is a high-density, mixed-use city, with clear boundaries (Jenks and Burton, 1996; Williams et al., 2000). Compact urban forms are currently acknowledged to be the most effective urban system that is positively associated with urban life (Fahy and Ó Cinnéide, 2008; Jenks and Jones, 2010; Rueda, 2002). This model was reinforced for numerous reasons: compact cities are argued to be efficient for more sustainable forms of transport and are seen as a sustainable use of land; in social terms, compactness and mixed uses are associated with diversity, social cohesion, and cultural development; and they are also argued to be economically viable because infrastructure can be provided cost-effectively per capita, and population densities support local services and businesses (Burton, 2003; Y. R. Jabareen, 2006; Williams et al., 2000).

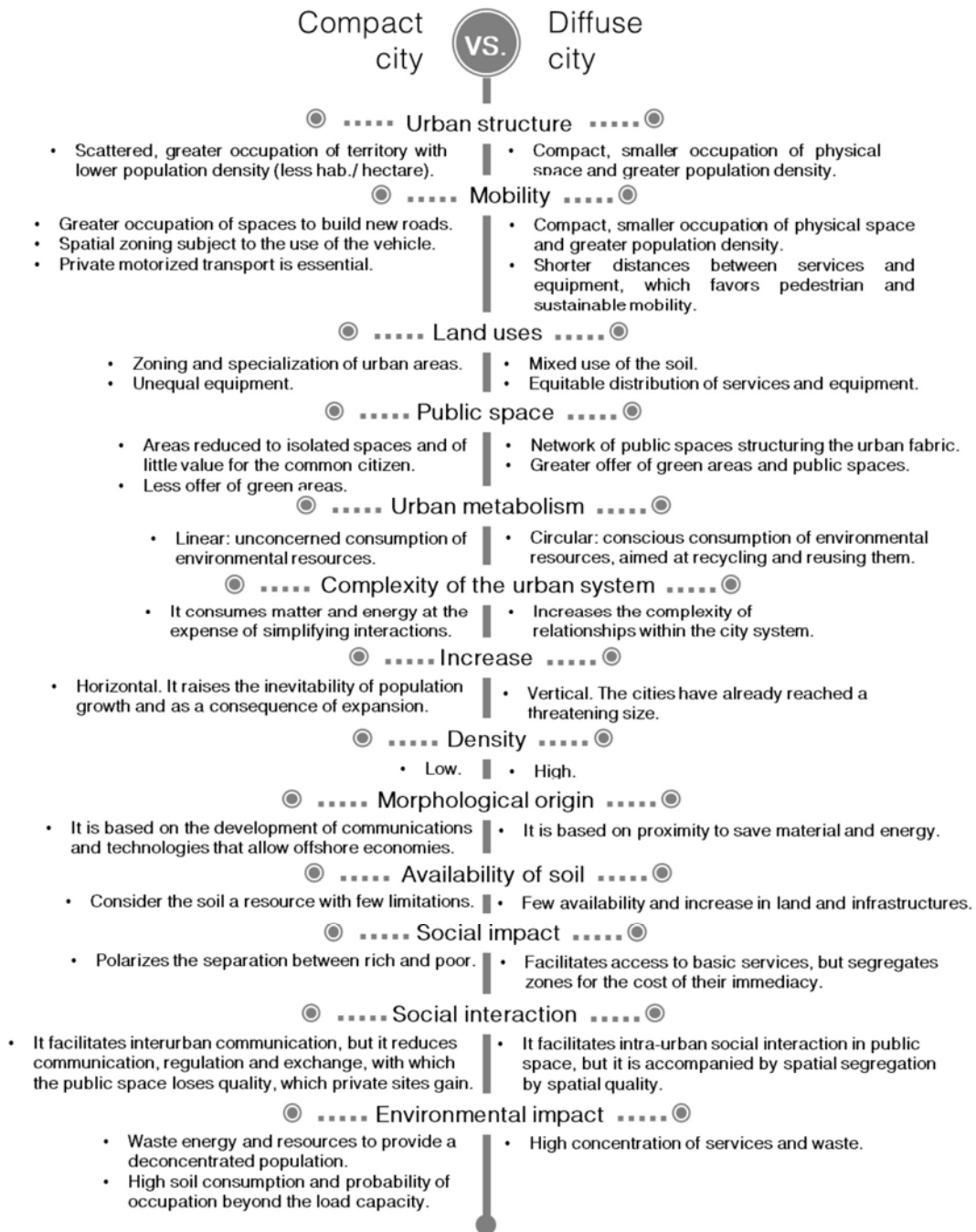


Figure 1.7. Comparison between the diffuse city and the compact city.
 Source: Own elaboration based on Quintero Bosetti and Gómez Rosales(2012) and Sanabria Artunduaga and Ramírez Ríos (2017).

Usually, the form of the current cities has been perceived as a cause of environmental problems (Haughton, 1997; Newman and Kenworthy, 1989), but beyond a physical construction, the city is contact, regulation, exchange and communication between alive beings. So, though urban form affects the environmental impact of the city, people and their behavior ultimately determine the negative or positive environmental impact of urban areas. Finally, it is important to say that it cannot

be affirmed in its totality that compact cities are more sustainable than sprawl cities since extension is not necessarily the synonym of deregulation of growth trends, nor is compactness synonymous with order and successful planning (Milder, 2012; Sanabria Artunduaga and Ramírez Ríos, 2017). And urban development in the coming years will be influenced by new social, governmental and economic conditions, specifically by the ways of life of society and globalization (Chavoya et al., 2009).

Chapter 2

Urban Agriculture in the Framework of
Sustainable Urbanism

CHAPTER 2 - Urban Agriculture in the Framework of Sustainable Urbanism

This chapter is based on the following journal paper:

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Abstract

Agriculture is one of the key steps in the development of humanity. Since its inception, the city has been closely related to agriculture, the presence of which was essential in ancient civilizations. Even so, agriculture was expelled from the big cities in the modern urban planning of the 20th century, such as Chandigarh de Le Corbusier and Brasilia de Lucio Costa.

To date, the demographic growth of urban areas and their short and long-term forecasts have reassessed the importance of urban agriculture. FAO estimates that urban and suburban farms provide food to about 700 million city dwellers (one quarter of the world's urban population), who generate income and produce food as one of the determining factors for the food, technology sector, industrial, energy, economic, political, urban, social, business and environmental, among others; looking to reduce the impact of transport, packaging, and underselling of food and promoting food safety.

This article classifies and analyzes the current forms of urban agriculture, from the most technological industries of mass production to social initiatives of urban gardens. The aim is to obtain a critical cataloging of the current forms of urban agriculture through a bibliographic review, where its fields of application, advantages, and disadvantages are observed and from this, to give forecasts of the future of the sector and determine its influence on the planning and development of the cities in the day tomorrow.

These new urban approaches are more sustainable from an environmental, economic and social point of view, and include urban agriculture as an essential part of the system, which as a consequence will end up giving a new shape and image to cities.

Keywords: city, environment, food safety, urban agriculture, urbanism