Cities of the future: urban agriculture in the third millennium

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After the Industrial Revolution, urbanites became separated from nature, confined as they were to narrow indoor spaces, and prevented from feeling the soil under their feet by modern transportation and urban infrastructures. The residence and the workplace became separated. Although the urban sprawl spread to consume many formerly rural spaces, some green areas persisted inside metropolitan areas.

The first type of planned urbanization created to bring people closer to nature was the garden city of the nineteenth century, designed for low population densities. Small houses were surrounded by a garden and public green spaces were conceived for the whole urban community. Several neighbourhoods and towns were built according to this design in France, Germany, the United Kingdom and the United States, usually directly linked to heavy industries and well-known private enterprises (e.g. Krupps or Pullman). By the end of the century, the Spanish visionary Arturo Soria y Mata expressed his notion of the ideal city through a particular form of garden city, i.e. linear in shape (Terán, 1982). Residences were surrounded by woodland and had horticultural spaces and family gardens. The British planner Ebenezer Howard theorized a concentric model of a garden city, similar to the satellite towns and green belts of twentieth-century cities.

Even so, urban agriculture was seen as an oxymoron until the 1980s. With the evolution of environmental sciences, urban planners began to emphasize the importance of interrelationships between human beings and nature. Urbanites could

appreciate the immutable cycle of seasons that our ancestors had marvelled at, before the age of artificiality and machines. In most cities, home gardens remained the only bond with nature, and nurturing small livestock or pets, together with watering, fertilizing and cropping fruit plants, or tending spices, vegetables and medicinal plants, enhanced the well-being of urbanites. Today, as some Western European and North American urban populations increasingly seek out green space, cities are being transformed, spreading through the countryside, intertwining built-up and farming spaces.

Urban agriculture experiences

Europe

France

Highly productive agricultural activities are taking place within most European metropolitan areas. In the environs of Paris, only 10 percent of the Île de France is occupied with intensive farming, yet peri-urban agriculture accounts for about 35 percent of the regional crop deliveries in value, mainly in the form of vegetables, flowers and fruit. Producers usually sell their produce directly to Parisians or at local markets (Pujol and Beguier, 1998).

Britain

In London about 30 000 active allotment gardeners control a total of 831 ha of public land, 13.4 percent of which is located inside the urban area and the remainder in the outskirts of the British capital (Crouch, 1997). In the peri-urban areas, market gardening dominates, covering 13 566 ha of public or private land; however, this is largely in decline as a result of continuous urban development pressures. There are also eight city farms in London, up to 2.5 ha in size, "with some horticulture production, where animal keeping predominates" (Garnett, 2000, p. 481). Additionally, there are about

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A home garden in Lisbon

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1 000 beekeepers in Greater London, producing a total of about 27 000 kg of honey annually (Garnett, 2000).

Russian Federation

In the Russian Federation, more than half the population of St Petersburg (4.73 million in 1999) is engaged in cultivation in backyards and basements, on rooftops, in vacant spaces near houses and in peri-urban farms (*dachas*). *Dachas* are usually commercially oriented and privately owned and produce mainly fruit, vegetables, potatoes and flowers. They supplement the family budget of about 2 million urbanites all over the country (Gavrilov, 2000). Also in St Petersburg there are several thousand pensioners and middle-aged people who practise subsistence-oriented agriculture.

A main feature in the Russian Federation is maintaining traditional cultivation practices, based on the use of manure and compost. There is not normally enough cash for the purchase of chemicals, so most Russian gardeners and urban farmers are active in the field of sustainable organic agriculture (Moldakov, 2000).

Spain

Evidence from Madrid and Barcelona indicates that, beginning in the 1980s, it became fashionable for urban dwellers to spread beyond the city boundaries in search of peri-urban greenery. This trend has led many Spanish to buy or rent small plots of land and to start family-owned market gardens. Some of these farms, formed by the middle and upper classes subdividing large portions of previous rural property, are considered illegal. In this way, very small plots have been generated clandestinely, which are badly equipped and lacking the necessary infrastructure. These plots are used for part-time subsistence horticulture and fruit-tree plantations, with excess produce frequently being sold *in situ* (if the plot is located close to a main road) or in the nearby big city through hawking and street trading (García-Bellido, 1986; Garaitagoitia, 1988).

Portugal

In Lisbon, intra-urban, microscale agriculture is widely practised in inner yards, where oranges, tangerines, dates and even bananas and avocados are often grown, in conjunction with subsistence horticulture. In suburban municipalities, shifting farms (due to continuous urban sprawl) and roadside agriculture plots are common, where vegetables, flowers and very good grapes – suitable for the production of the finest wines – are grown. In some municipalities cattle, sheep and goats are reared for milk to make cheeses. Ostriches are also reared – their meat is highly appreciated by consumers, particularly since the outbreak of mad cow disease (bovine spongiform encephalopathy – BSE) in some parts of Europe (Madaleno, 2001).

Almost one-third of the Portuguese population lives in Lisbon. In the area surrounding the city, along the rich alluvial Tagus valley, intense riverine horticulture is practised as a highly profitable form of peri-urban agriculture. Tomatoes are the most important products. Some foreign firms also use the fertile soil and the mild climate to grow ornamental plants, specifically tulip bulbs, which are exported to the Netherlands.

The Netherlands

The Netherlands has a long tradition of peri-urban agriculture. Community-based Dutch organizations of producers and consumers exist, in which the growers provide a sufficient quantity and quality of food, while the consumers agree to provide direct support to the producers. One example is a horticulture farm located at the city boundaries of Wageningen, which uses biological farming principles that offer urbanites the possibility of deciding when and what to harvest,

City farm programmes

In the European City Farms programme, operated by a federation active within the European Union , the primary activities are practised on a small scale, ranging from watering plants, compost making, planting and caring for trees or vegetable gardens, or milking cows. The programme aims to provide children, young people and adults with opportunities to develop more respect for the farmers' tasks and challenges, to become engaged in community and educational work, and involved with the production of healthy food (Robertson, 2000).

Fast food businesses and super- and hypermarkets tend to give the misleading impression that animals, cereals, fruits and vegetables come out of paper or plastic bags in kits, ready to be eaten, in standardized shapes, sizes and forms, conveniently hygienic. The idea of city farms in Europe – already active in Denmark, France, Germany, Portugal and the United Kingdom – is to reacquaint people with livestock and bring them closer to biological agriculture and nature, to encourage a desire for a better urban environment and, above all, to stimulate initiatives for sustainable development.

Sustainable development

The term "sustainable development" can be defined as satisfying the needs of the current generation, without jeopardizing the future generation's ability to meet their needs. It should be stressed that this sort of ecological sustainability is closely related to economic and technological sustainability, meaning efficiency in the use of resources, and with a demand for social justice, that can be called social sustainability (Ginsberg, 2000).

These programmes could be extended to other developed areas and most developing countries would be advisable. Just as national parks and reserves contribute to conservation of genetic diversity and education about the environment, city farms can act to promote agriculture and environmental protection in urban settings. City farm programmes aim to create pedagogic farms; achieving this objective is only possible through public promotion and political engagement.

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A pedagogic garden in Telheiras, Portugal

through a commitment to buying a share of the production (De Kring, 1997).

Near East

Israel

In Jerusalem an interesting example of a city farm can be found, where ethnically diverse communities grow food and work together, in a country ravaged by political instability and cultural differences. The goals of the farm are to promote sustainable food systems for affordable and pesticide-free organic food, and to encourage ecological solutions to conserve land and water in a difficult setting. Above all, it aims to foster local solutions to social problems. The farm also has a pedagogical function: it is visited by over a thousand children each week, who are shown how to conserve nature, recycle solid wastes and reuse wastewater, helping them learn how to create practical ecological solutions for a sustainable city. People are encouraged to bring food scraps to the farm to compost, receiving in return organic vegetables or training in growing biological produce in community gardens placed at their disposal (Kaufman, 1999).

Africa

Mali

One of the most interesting examples of food production within and around city boundaries is to be found in Bamako, Mali's capital city located in the fertile Niger valley. Bamako is self-sufficient in vegetable production, and cattle are raised to produce milk, butter and meat. In 1997, there were 1 780 farmers registered in the city (population 1 million), ranging from formerly rural settlers, women's associations, cooperatives and middle-class public officials engaged in highly profitable forms of commercial agriculture (Sidibe, 2000).

Senegal

In Dakar, where 21 percent of the Senegalese population live, semi-industrial poultry ventures, which provide about 30 percent of the national needs, can be found, together with farms cultivating legumes, fruit and flowers. Household plots are also to be found, usually family owned and very small in size. In fact, plots of less than 1 ha in size account for 70 percent of the cultivated land (Mbaye, 1999).

Togo

In Lomé, there are two main types of production: the food grown during the rainy season (e.g. maize and cassava), cultivated on relatively fertile clay soils, and the home gardens tended all year round on sandy soils. Individual urban agriculturalists farm small plots commercially; horticulture dominates these plots, closely followed by spices and medicinal plants (Schilter, 1991).

Mozambique

The southern part of the African continent provides very interesting examples of peri-urban agricultural practices. In 2000, a Portuguese team conducted a study in Maputo, the capital of Mozambique. The survey indicated that approximately 6 200 women grow food and raise small livestock, such as chickens, on the outskirts of Maputo (Madaleno and Correia, 2001).

These women are integrated into several cooperatives run by the General Cooperatives Union (GCU), a highly organized and productive agricultural structure, occupying about 2 100 ha of peri-urban land. Health care and education for the youngsters is also

provided by the GCU; thus its social function is as important as its economic role within the Maputo metropolis (Madaleno and Correia, 2001).

activities includes making land available on a usufruct basis; the transfer of modern and environmentally sustainable techniques and technologies from extension services

Brazil

A study of urban agriculture undertaken in 1998 at Belém, located in the Brazilian Amazonia, by the Tropical Institute of

One of the biggest challenges of the third millennium is the need to create "sustainable cities" which provide food, shelter, basic services and jobs to the urbanites of the developing regions

Latin America and the Caribbean

Cuba

In Cuba, the city of Havana accounts for 20 percent of the islands' population. Havana has an agricultural potential of about 300 km^2 or 41 percent of the province territory (Novo and Dubbeling, 2000). Official support for urban agriculture started in the 1990s, as a result of food shortages brought about by the decline of imports and food aid from the formerly socialist European sphere.

More than seven out of ten Cubans live in urban areas (Novo and Murphy, 2000). Government recognition of primary sector

and research institutions; providing seed distribution facilities throughout the city; and the training of women, men and children.

Production can be broken down as follows:

- 316 company farms (supplying state entities);
- 178 basic cooperative production units;
- 48 loans and services cooperatives;
- groups of small farmers and gardeners cultivating more than 20 000 orchards and small parcels of land with an average area not exceeding 1 200 m^2 (Novo and Dubbeling, 2000).

Lisbon with the assistance of three local university students found that one in three households grew food and non-food products or raised cattle (Madaleno, 2000a). Fruit cultivation was the most important agricultural activity surveyed within the city boundaries. It contributed to improving the nutritional status of less wealthy families and was largely practised by women, using very small home gardens, in conjunction with the cultivation of other species, including ornamental plants. Medicinal plants were next in order of popularity, followed by spices and vegetables. Ducks and chickens were the

A cultivated plot in Presidente Prudente, Brazil

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preferred livestock choice of the urban agriculture practitioners, and duck and chicken raisers were sponsored by either the municipality of Belém or Pará state.

In the southeastern city of Presidente Prudente, in the more industrialized São Paulo state, a municipal project called "Feed Prudente" promoted the cultivation of vegetable plots by low-income families. These plots were made available mainly because the local authorities lacked sufficient funds to maintain the public areas.

A 1999 study found that retired or unemployed growers, particularly men, tend sweet potato, cassava and several types of legumes, all year round (Madaleno, 2001). They make extensive use of organic fertilizers. Extension services provide ploughing machines and water pumps and provide free seeds, at least for the first crop (Madaleno, 2000b).

The future of urban agriculture

How will the cities of the future look? It has been a passion for many to imagine the future of urban settlements. The most illuminated visionaries have devised Utopian drawings and plans of their ideal cities. Sometimes these were simply spectacular – or science fiction. Many were garden cities – spaces where human beings can happily associate with nature.

Urban agriculture, defined here as food and non-food production dispersed throughout urban and peri-urban areas, can certainly play an important role and occupy a considerable amount of space and people's time in the cities of the future. Among the main benefits of activities of this nature is an improvement of the nutritional well-being of urbanites. For developing countries, this may be significant for food self-reliance, jobs and survival strategies.

Urban agriculture provides an opportunity for purposeful recreation and educates youngsters about health and environmental issues; it helps to develop community bonds because it intensifies cooperation between people and the sense of sharing. Urban agriculture constitutes a positive way to improve the urban environment, enhancing the wide range of benefits that people derive from public open spaces.

Some of the probable features in third millennium cities, from the perspective of intra-urban and peri-urban agricultural production activities, may be the following:

- Community gardens could be places where people come together to cooperate in the growing of food. Urban agriculture might enable people to recall their rural past and appreciation of the environment. Of course, frequent training and education would be necessary.
- Pedagogic farms, aimed at different age groups and types of people, would be another possibility, and could be promoted by local authorities. Contests and prizes for the best home gardens, street bushes and trees or even window boxes could promote people's interest in enhancing the appearance of their city and in household cultivation.
- In developing countries, family gardens could be encouraged as a way of helping to solve social problems. Their cultivation would be mutually beneficial for poor families and for municipalities that lack funds to maintain public areas. Urban agriculture has been effective in creating jobs and generating profits, but above all it could contribute to family food security and dietary quality, especially among the urban poor.
- Many cities of the future will experience problems regarding urban solid and liquid waste management. Community efforts will be needed in addition to the public sector collection, reuse and resource recovery of garbage and residues. Improving environmental sanitary conditions will require new technologies and training, particularly in cities of the South. Compost making and its use in home gardens for food and flower production may be one of the most advisable forms of waste recycling for cities of the future.

One of the biggest challenges of the third millennium will undoubtedly stem from the urbanization of the developing world and the need to create "sustainable cities" that provide food, shelter, basic services and jobs to the urbanites of these regions. In the developing world, the growth of cities has been intense in the last five decades, dependent on large migratory movements. Mass poverty, social conflicts and spatial segregation have been recorded in many urban areas. Serious discussions on social integration policies, improvement of intercultural understanding and ecological awareness are therefore becoming imperative.

The cities of the third millennium will be the responsibility of concerned citizens, who aim to stimulate and enhance the well-being of humankind through promotion of contact between humans and nature.

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Cities of the future: urban agriculture in the third millennium

Urban agriculture, defined as food and non-food production dispersed throughout urban and peri-urban areas, can play an important role in the cities of the future. A main benefit of these activities could be an improvement in the nutritional status and food security of urban people. Urban agriculture may contribute to food self-reliance, jobs and effective survival strategies. It provides an opportunity for purposeful recreation and educates young people about health and environmental issues. Producing food in a city environment helps to develop community bonds because it encourages cooperation and a sense of sharing. Children, young people and adults have opportunities to increase their understanding of, and respect for, the tasks and challenges faced by farmers and to be directly involved with the production of healthy food. Urban agriculture constitutes a positive way to improve the urban environment, adding a further dimension to the wide-ranging benefits urban people derive from public open spaces. In this article, the evolution of cities and use of green space in Europe and North America are explained. Recent experiences in urban agriculture in a number of countries in Africa, Europe and Latin America are described. It is argued that urban agriculture can foster local solutions to social, environmental, political and economic problems in a diversity of settings.

Les villes de l'avenir: l'agriculture urbaine et le troisième millénaire

L'agriculture urbaine, à savoir le phénomène de production alimentaire et non alimentaire que l'on observe dans l'ensemble des tissus urbains et périurbains, pourrait, dans l'avenir, jouer un rôle important dans les villes, notamment en améliorant la situation nutritionnelle et la sécurité alimentaire des citadins. L'agriculture urbaine peut contribuer à renforcer l'autonomie alimentaire et les perspectives d'emploi, tout en rendant plus efficaces les stratégies de survie. Elle est une occasion de loisirs orientés vers un but, tout en formant les jeunes aux questions touchant la santé et l'environnement. La production alimentaire en milieu urbain contribue à développer les liens communautaires en encourageant la coopération et la notion de partage. En s'y consacrant, les enfants, les jeunes gens et les adultes ont l'occasion de se familiariser avec les tâches et avec les difficultés des agriculteurs, et à davantage les respecter, tout en étant directement engagés dans une production vivrière saine. L'agriculture urbaine constitue une démarche positive d'amélioration du milieu urbain, ajoutant une dimension à l'éventail des avantages offerts aux citadins par les espaces publics ouverts. Le présent article décrit l'évolution des villes et l'utilisation des espaces verts en Europe et en Amérique du Nord, et relate des expériences récentes d'agriculture urbaine dans plusieurs pays d'Afrique, d'Europe et d'Amérique latine. Son auteur préconise le recours à l'agriculture urbaine comme source de solutions locales aux problèmes d'ordre social, écologique, politique et économique qui sévissent dans toute une série de contextes.

Las ciudades del futuro: la agricultura urbana en el tercer milenio

La agricultura urbana, entendida como una producción alimentaria y no alimentaria en zonas urbanas y periurbanas, puede desempeñar un papel importante en las ciudades del futuro. Una de las principales ventajas de estas actividades podría ser la mejora del estado nutricional y la seguridad alimentaria de la población urbana. La agricultura urbana puede facilitar la autonomía alimentaria, generar empleo y constituir una estrategia eficaz de supervivencia. Supone una oportunidad de esparcimiento útil y educa a los jóvenes en temas relacionados con la salud y el medio ambiente. La producción de alimentos en un entorno urbano contribuye a desarrollar las relaciones dentro de la comunidad porque fomenta la cooperación y el sentido de compartir. Niños, jóvenes y adultos tienen ocasión de comprender mejor, y respetar más, los trabajos y las dificultades que afrontan los agricultores, así como de participar directamente en la producción de alimentos saludables. La agricultura urbana es un modo positivo de mejorar el entorno urbano, añadiendo una dimensión más a los amplios beneficios que la población urbana obtiene al disfrutar los espacios públicos abiertos. En el presente artículo se explica la evolución de las ciudades y el uso de los espacios verdes en Europa y Norteamérica y se describen experiencias recientes de agricultura urbana en una serie de países de África, Europa y América Latina. Asimismo, se plantea que la agricultura urbana puede abrir soluciones locales para los problemas sociales, medioambientales, políticos y económicos en diversas circunstancias.