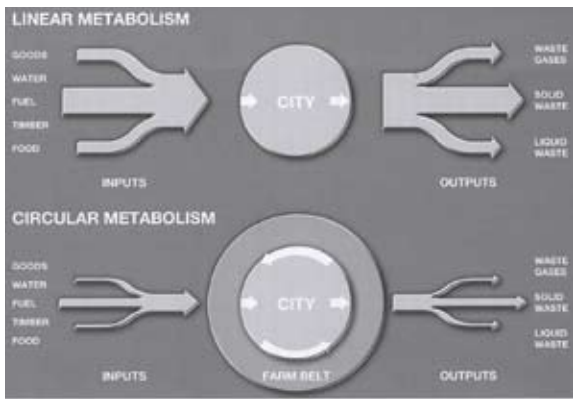
## A PRODUCTIVE INTRODUCTION

### I. Why should urban designers care about agriculture?

This is indeed an odd question. After all, urban designers deal with urban environments, and agriculture is only found in the countryside, isn't it? So what is the point?

### I. 1 Reason #1: Because it might help saving the planet

Cities consume daily large quantities of processed food or products imported from distant countries. Consequently they use more and more energy for goods transportation and produce increasing quantities of plastic or paper packaging. Moreover modern cities have a "linear metabolism", which means that they consume resources and reject waste without paying attention to their ecological impact. This type of metabolism contrasts with the "circular metabolism" of natural systems, where recycling is introduced at the end of the chain. (1)



Herbert Girardet, *Cities, People, Planet*, (London: Wiley-Academy, 2004), p. 125

A recent study undertaken by the Development Planning Unit of the University College London demonstrates that most goods sold in European urban supermarkets are not local or even national. "*Bread is made from wheat grown in Americas, fruits come from North Africa, meat from Argentina and fresh vegetables are often flown in daily from Africa, Central America and Southeast Asia*." (2)

Other researches even show that, for economic reasons, many countries import food they are able to produce locally. Following this "food swap phenomenon" the UK trade in great amounts of milk, while exporting even larger quantities of the same product.

"*A typical British Sunday dinner, consisting of ingredients that are all produced locally, travel an average of 24 000 miles from farm to plate*." (3) ❶

According to Andre Viljoen, "*The site of Heathrow airport used to be London's market garden. Its sandy soil is very suitable for vegetable growing. Today, even thought it is largely concreted over, Heathrow is still London's major food supplier, but in a rather different way: food is flown in from across the globe. Such a global harvest offers us great culinary variety, but it requires the availability of vast quantities of fossil fuels.*" (4)

"Food miles", the distance food travels from field to plate, thus increase regularly. In the United Kingdom they rose by 15% between 1992 and 2002 and food now accounts for 30% of the goods transported on British roads (5). The good news is that the consumers' awareness increases as fast as the food miles themselves…

The reasons for this situation are complex. It is a direct consequence of the Green Revolution 4 which enabled many countries to trade food surpluses, and the globalisation of economic exchanges during the late 20th century. The centralised system imposed by supermarkets is also to blame, which requires that food be transported to be packaged at a central depot before being sent many miles back to be sold (possibly close to where it was produced in the first place). Consumers are also responsible when they insist upon eating strawberries all year round, or when they take their car to shop to a distant supermarket when closer local shops are available. All these travelled miles increase energy consumption, pollution and CO2 emissions, not even considering the environmental damages of creating new roads and new airports.

However, food miles can sometimes be misleading as an indicator of the environmental impact of the food industry. For example, a recent report demonstrated that it is less environmentally friendly to consume British tomatoes grown in fuel-heated greenhouses than to import tomatoes from Spain, where no heating is used because of the warmer climate (6). The environmental impact of food should thus be assessed more precisely, 1 using other tools, such as the Ecological Footprint.

Yet, it cannot be denied that food miles and the growing disjunction of producers and consumers is responsible for a large part of the environmental impact of the food industry. Thus, growing food locally, within our cities or suburbs, is an option that has to be considered seriously.

B. Halweil, T. Prugh (eds.), Home Grown: The Case for Local Food in a Global Market, Worldwatch Paper 163, Washington D.C.: Worldwatch Institute, 2002, p. 19 ❶

See Nicolas' Alter-City for qn exploration of the relationships between goods transport, economics & the city

(1) Herbert Girardet, *Cities, People, Planet: liveable cities for a sustainable world*, (London: Wiley-Academy, 2004), p. 125

(2) Adriana Allen and Nicholas You, *Sustainable Urbanization – Bridging the green and brown agendas*, (London: The Development Planning Unit of the University College London, 2002), p. 63

(3) B. Halweil, T. Prugh (eds.), Home Grown: The Case for Local Food in a Global Market, Worldwatch Paper 163, Washington D.C.: Worldwatch Institute, 2002, p. 19

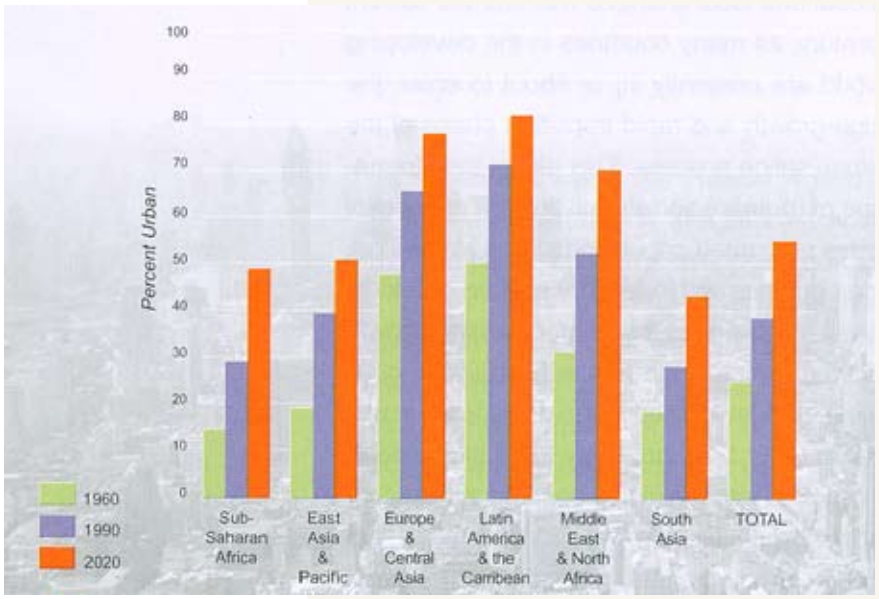
(4) Andre Viljoen, *CPULs Continuous Productive Urban Landscapes*, (Oxford: Architectural Press, 2005), p. 33-34

(5) BBC website, Food matters, http://www.bbc.co.uk/food/food_matters/foodmiles.shtml

(6) Department for the Environment, Food and Rural Affairs, The Validity of Food Miles as an Indicator of Sustainable Development, July 2005 (accessible online: http://statistics.defra.gov.uk/esg/reports/foodmiles/execsumm.pdf)

## Big feet, small planet

Nowadays, 6.3 billion people are being hosted by our planet and by 2050 this figure is expected to grow by fifty percent, to some 9 billion people. Cities population has dramatically increased during the last century. While in the beginning of the nineteenth century, one tenth of the human beings lived in the cities, today cities host half of the Earth's population. Out of the 52 billion hectares of the Earth surface, 30% are made of land. Only 55% of the land areas are biologically productive and cities occupy no more than 2% of this territory. Cities use far more natural resources than available on their own territory. Things get even worse when we consider the space needed to handle the waste they produce.




Adriana Allen and Nicholas You, *Sustainable Urbanization,* (London: The Development Planning Unit of the University College London, 2002), p. 4

Adriana Allen and Nicholas You, *Sustainable Urbanization,* (London: The Development Planning Unit of the University College London, 2002), p. 41

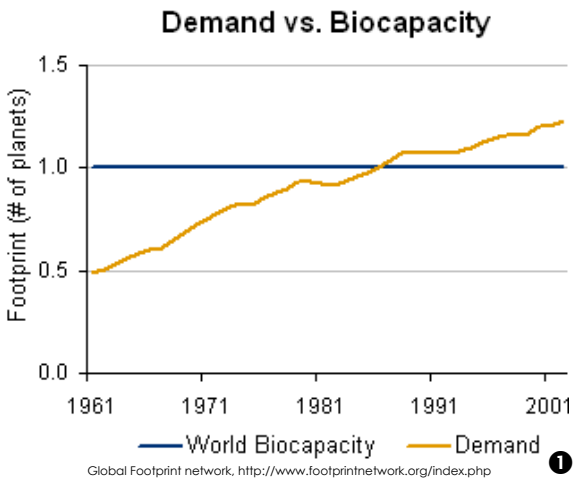
Cities apply an increasing pressure upon the environment. Today the notion of "Ecological Footprint" developed by the Canadian ecologist William Rees and his colleague Mathis Wackernagel enables us to calculate the ecological impact of our cities and lifestyles in order to evaluate if we are living within the possibilities of our natural resources. "*The Ecological Footprint is a measure of the "load" imposed by a given population on nature. It represents the land area necessary to sustain current levels of resources consumption and waste discharge by that population.*" (Wackernagel and Rees) The aim is clear: it is to quantify human use of nature in order to warn us that we have to lower our consumption and change our habits.

The "Global Footprint Network", a team of scientists whose aim is "*to increase the effectiveness of the Ecological Footprint as a tool for promoting ecological, social and economic sustainability*" quantified the Ecological Footprint of nations in 2005. Looking at the figures, the ecological deficit of some countries is pretty clear: they use more natural resources than they actually have available within their land. Considering the 6,225 million people populating the Earth, the global deficit is – 0.4 ha per person. This is mostly due to developed countries' lifestyles.

The graph ❶ shows "*the ratio between the world's demand and the world's biocapacity in each year, and how this ratio has changed over time. Expressed in terms of "number of planets,*" the biocapacity of the Earth is always 1 (represented by the horizontal blue line). This graph shows how humanity has moved from using, in net terms, about half the planet's biocapacity in 1961 to over 1.2 times the biocapacity of the Earth in 2002. The global ecological deficit of 0.2 Earths is equal to the globe's ecological overshoot."

Urban agriculture and local food production are seen as means of reducing the ecological footprint of cities. The first step for a sustainable urbanisation is the development of strategies enabling cities to stay within the potentials and limitations of natural ecosystems in energy, water or food.

Sources:
Mathis Wackernagel and William Rees, *Our Ecological Footprint*, (Canada: New Society Publishers, 1962)
Adriana Allen and Nicholas You, *Sustainable Urbanization – Bridging the green and brown agendas*, (London: The Development Planning Unit of the University College London, 2002)
Global Footprint network, http://www.footprintnetwork.org/index.php




Global Footprint network, http://www.footprintnetwork.org/index.php ❶

**Running beyond our limits: London's ecological footprint** 2

Using the ecological footprint methodology, Herbert Girardet quantified London's footprint in his book "Cities, People, Planet". Among other things, the estimation includes "*the energy used in agricultural production, transportation and processing, the land surface required for producing pet food and the sea surfaces required for fisheries.*"

The analysis shows that each Londoner currently uses about 6.63 hectares of productive land and water for his own goods and services.

If we consider that there are two hectares of productive land and water available per person on Earth (Allen and You), each Londoner needs up to tree times more the available area per capita.

This result literally illustrates that the 7 million Londoners, occupying 159,000 hectares, actually use the productivity of more than 40 million hectares.

"*If every human being used resources the way we do in London, we would need three planets rather than the single one we have*" according to Girardet. And if we considered American, Australian or Canadian, with their even larger footprint of 10 or more hectares per capita, the developed countries should start right now looking for 7 other planets in order to sustain their modern lifestyle!

Sources:
Herbert Girardet, *Cities, People, Planet: liveable cities for a sustainable world*, (London: Wiley-Academy, 2004)
Adriana Allen and Nicholas You, *Sustainable Urbanization – Bridging the green and brown agendas*, (London: The Development Planning Unit of the University College London, 2002)
City limits London, A resource flow and ecological footprint analysis of Greater London, www.citylimitslondon.com


http://www.londonremade.com/images/footprint_map.gif

## I. 2 Reason #2: Why not?

The antagonism between cities and agriculture is not a fatality, as can be illustrated by a rapid overview of History.

Before the industrial revolution, most cities practiced agriculture in their own hinterland; for conservation issues, food was produced close to the consumers. Reliant on their rural land for food, water and other materials, cities had a moderate ecological impact on the environment. The example of the medieval *hortulus* – vegetable garden and orchard – illustrates that the Monasteries of medieval cities had gardens providing the inhabitants with food and medicinal herbs.

http://www.geocities.com/yagubo/

Things started to change with the industrial revolution and the rapid urban growth of industrial cities. From the 19th century, an increasing land pressure in and around cities for industrial activities, and later for suburban extensions, pushed the less profitable agricultural activities further away from cities. This created the traditional dichotomy city / country. In a way, it is as if agriculture, a traditional activity belonging to the past, had to make room for industry, the modern activity of the future.

Moreover, there was a harsh competition between farmers: in order to survive, they had to increase their productivity, thus make a more intensive use of new agricultural technologies such as those developed during the Green Revolution 4. But these costly technologies were only profitable on large stretches of land. Consequently, small farms close to the cities were the first to disappear as they could not expand.

From the second half of the 20th century, with the globalisation of economic exchanges, the centrifugal forces that pushed farmers away from cities started acting far beyond the regional scale but rather on an international scale, with increased social and environmental damage.

Agriculture now declines in some countries and booms in others.

As a result, our urban civilisation tends to forget agriculture. Even if agriculture is employing 42% of the world's population (1), for most urbanites the only relationship with agriculture operates through packaged food bought in supermarkets. Campaigns such as Jamie Oliver's "Feed Me Better" campaign cast light on the fact the an amazing proportion of English schoolboys and –girls are not able to identify properly some common foods. (2)

**Things change**

However, in the developed world at least, the conditions that created this situation have evolved.

First, the city itself has changed. The radial city and the traditional distinction between downtown and suburbia is now gradually replaced by a less structured network of residential enclaves, business districts or suburban subcentres all defined as "edge cities" by Joel Garreau. (3) In reaction, a greater concern arises among urban planners and designers about mixed land use. This might be an opportunity for urban agriculture.

Second, urban sociology teaches us that our post-modern urban civilisation is now based on consumption, whereas modern cities of the industrial era were based on production. (4) This creates new conditions in which the diversity of ways of lives, the eclecticism and "collage" of styles and the spectacular and "themed" environments predominate. The opposition of urban vs. rural lifestyles thus becomes irrelevant. Among the many trends of post-modernism, Nan Ellin identifies a "romantic resurgence" which feeds from a growing dissatisfaction with modern lifestyles and a nostalgia for a supposedly better past. (5) At the same time, urbanites are not ready to relinquish technology. A renowned urban agriculture would certainly be successful in this new cultural context if it was "marketed" properly in order to match those contradictory desires. The examples of the evolution of market gardening in the Parisian suburbs 3 or the creation of new links between citizens and farmers in Japan 5 illustrate

(1) The World Factbook, https://www.cia.gov/cia/publications/factbook/geos/xx.html#Econ

(2) Feed Me Better campaign, http://www.feedmebetter.com/

(3) Joel Garreau, *Edge city: life on the new frontier*, (New York, London: Anchor Books, 1992)

(4) Mark Jayne, *Cities and Consumption*, pp. 57-92, (Oxon: Routledge, 2006)

(5) Nan Ellin, *Postmodern urbanism*, (New York: Princeton Architectural Press, 1999)

### Suburban agriculture in Paris 3

The Montesson plain is one of the last market gardening areas in the western suburbs of Paris, just a few miles from the business district of La Défense. Its 188 ha of farmable land are completely enclosed by the urban sprawl.

In twenty years, 200 ha of farmable land and 83% of the farms have disappeared. Yet, the situation is not as bad as it seems. In fact, farmers happen to be younger: apparently, sons inherited their fathers, which tend to prove that their activity is viable.

Farmers in Montesson face a very harsh competition for land use, competing with other activities such as industries or offices. Thus they make a greater use of technology (heated greenhouses, mechanised harvesting, fertilisers…) in order to improve their productivity. They also develop a new marketing and many offer more quality and diversity (for example, unearthing forgotten vegetables) and sell on local markets instead of depending only on supermarkets' wholesale dealers.

It can be concluded that market gardening managed to survive in the Montesson plain because it accepted to adapt to new markets and switch to modern techniques.

The same kind of situation can be found in London in the upper Lea Valley.

Sources:
Jean-Baptiste Noé, L'agriculture en ville, une activité rentable ?, in 'La grande rencontre', UBAINE #11-12, (Paris: dévorateurs d'espaces, May-August 2006)

that such approaches can be viable.

Last, agriculture itself has changed. There is an increasing awareness about the excesses of the Green Revolution [4] and new methods are now available that are more environmentally friendly. [9] [10] With a reduced impact upon the environment, agriculture could more easily find its place within urban environments without fear of polluting watercourses or releasing large quantities of CO2 in the atmosphere.

All these changes open the way to the reconciliation of agriculture with city life. Agriculture could offer different urban environments; increase consumers' choices; develop as a "slow" remedy to the fast pace of contemporary cities; develop a new local culture based on the idiosyncrasies of the land, the "terroir", as an alternative to the global culture.

### The Green Revolution [4]

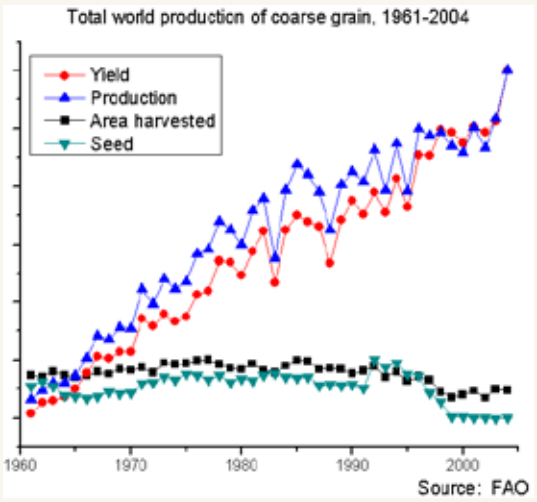
The Green Revolution is the name given to the increase in food production between 1944 and 1970, enabled by scientific and technological progress developed by Dr Norman Borlaug and others. The green revolution stemmed from two factors: the development of new plant varieties (like the improved strains of wheat, rice, maize and other cereals) and the application of modern agriculture techniques (like the intensive use of chemical fertilizers; the development of more efficient irrigation methods; the use of mechanized harvesters and other machinery; the development of chemical pesticides). Those technologies were exported all over the world, with the help of international financial institutions such as the World Bank.

Achievements

The Green Revolution techniques led to many vital achievements. They increased the agricultural production in some major developing countries and therefore prevented large scale famine. They also enabled food production to follow the population growth, ensuring food security.

It is estimated that the Green Revolution saved almost a billion human lives. Without it, agriculture would not have been able to meet the basic food requirements of the world's current population.

In 1970, Norman Borlaug won the Nobel Peace Prize.




Criticisms

Nowadays many criticisms are raised against the Green Revolution.

– Loss of biodiversity: the spread of improved plant varieties has resulted in the farming of fewer varieties of crops. Monocultures decrease the genetic diversity of crops, and augment the probability of crop diseases which leads to greater famine exposure.

– Health value and food quality: Since they have a reduced resistance to pests and diseases, monocultures demand an increased usage of pesticides. In addition, when produced for exportation, industrial agriculture involves long-term storage and long-distance delivery, which require chemical preservative for conservation. Their effects on health have often not been demonstrated.

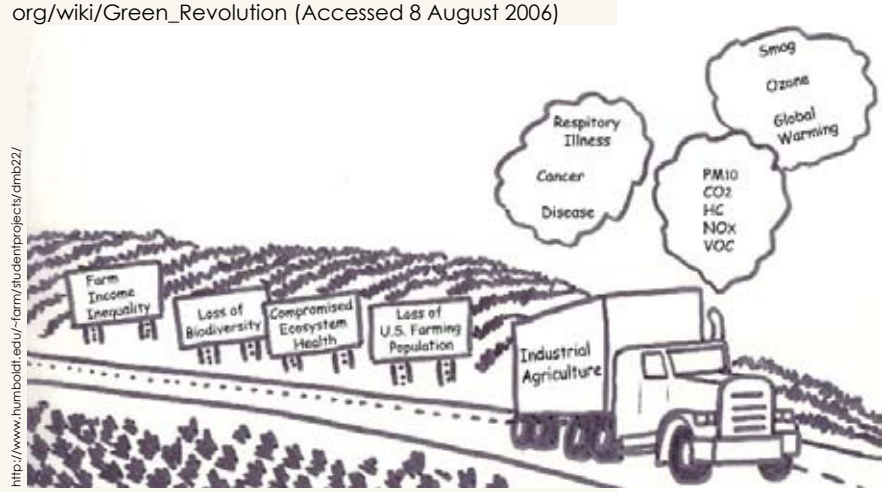
– Pollution: obviously food miles are responsible for a lot of toxic emissions. In addition, fertilizer, pesticide, and herbicide runoff continue to be major sources of land and water pollution.

– Soil degradation: Critics charge that the pesticides, along with heavy irrigation, erosion of the soil, etc. destroy soil quality over the long term and increase reliance on chemical inputs in order to compensate the deterioration… a vicious loop which may eventually fail.

– Massive displacements and increasing urbanisation: the consequence of Green Revolution techniques was the enhancement of large-scale industrial agriculture. Small farmers were unable to compete with the high efficiency of industrial agriculture. They often lost their land to large agriculture industries and emigrated in cities.

– Economic pressure on rural agricultural societies: most of the hybrid seeds (more productive than non-hybrid seeds) are sterile and force farmers to buy new ones each year, enabling "seed companies" to maximize their profit at the expense of farmers.

Sources:
Richard Body, *Agriculture, the Triumph and the Shame*, (London: Temple Smith, 1984)
Bernhard Glaeser, *The Green Revolution Revisited*, (London: Unwin Hyman, 1989)
Wikipedia, The Green Revolution, http://en.wikipedia.org/wiki/Green_Revolution (Accessed 8 August 2006)



http://www.humboldt.edu/~farm/studentprojects/dmb22/

See Anna's Socio Land Lab for an exploration of the fostering of local economy, the reinforcement of communities & means to help the weakest

## II. What is urban agriculture?

"*Urban (or peri-urban) agriculture is the practice of agriculture (include crops, livestock, fisheries, forestry activities) within or surrounding the boundaries of cities. The land used may be private residential land (use of private pieces of land, balconies, walls or building roofs), public roadside land or river banks. Urban farming is practiced for income-earning or food-producing activities. It contributes to food security and food safety in two ways: first it increases the amount of food available to people living in cities, and second it allows fresh vegetables and fruits to be made available to urban consumers. Because it promotes energy-saving local food production, urban and peri-urban agriculture are sustainability practices.*" (1)

(1) Wikipedia, Urban Agriculture, http://en.wikipedia.org/wiki/Urban_agriculture

Urban agriculture, which can be basically defined as agriculture in cities, can actually reflect a wide range of situations, depending on the context in which it is found (cities in developing countries or in developed countries) or the focus that one puts in the notion (environment, food security, community building…).

### II. 1 A brief history

The Tower of London - Andre Viljoen, *CPULs*, (Oxford: Architectural Press, 2005), p. 102

The very notion of urban agriculture is only relevant in the context of the modern city: as aforementioned, the divorce between agriculture and cities dates back from the Industrial Revolution. However, in UK, a strong tradition of private allotments developed during the 19th century [3] During the world wars, urban agriculture was temporarily given a boost as a means of reducing starvation. "*In 1944 these [allotments], together with gardens and other plots of land, including parks turned into fields, were meeting fully ten percent of national food needs and around half of the nation's fruits and vegetable requirements.*" (2) (A). Finally, after the Second World War, the welfare state aimed that people no longer saw the necessity of growing their own food.

(2) Andre Viljoen, *CPULs Continuous Productive Urban Landscapes*, (Oxford: Architectural Press, 2005), p. 101

**Source**
RUAF Foundation, What is urban agriculture?, http://www.ruaf.org/node/512

Since the 1970s, environmental awareness in the developed world and food security issues in developing countries gradually brought back urban agriculture on the forefront. Nowadays it can be found in many cities around the world. Different case studies included in this report try to illustrate some remarkable examples. According to Viljoen, 800 million people are engaged in urban agriculture worldwide. In developing countries, it is recognised as contributing to urban food security, alleviating poverty and improving local economy. In the developed world, urban agriculture helps reducing "food miles", involving citizens in food growing and bridging the gap between consumers and producers.

### II. 2 Some good reasons to promote urban agriculture

The reintroduction of productive land into our cities offers many opportunities, ranging from food and environmental issues to economic or sociological aspects. We tried here to summarise the main benefits that are usually associated with urban agriculture.

As urban designers focusing on urban agriculture, we should try as far as possible to take all these aspects into account in our work.

**Promoting local economy**

Urban agriculture helps local economies by creating jobs. If promoted furthermore by local governments, it could even play a key role in decreasing high unemployment levels in large cities and suburban towns.

**Enhancing and regenerating urban landscape**

Productive landscapes are attractive environments which can act as regenerators of urban areas. Therefore urban agriculture can serve as a marketing tool to increase land value by enhancing special local identity and character.

**Building / reinforcing the communities**

Local productive sites help different communities to interact and people of different backgrounds or abilities to meet and socialise. Therefore urban agriculture promotes sociability into our modern cities. It can help to break barriers and reduce discrimination. [6]

Productive sites can also have educational roles. This is largely illustrated by the different activities organised by London city farms. [27] [28]

**Helping the weakest**

Certainly urban agriculture contributes to urban food security and not only in developing countries. Indeed our modern developed cities do not lack in poor people; if inserted in governments' plans, urban agriculture could help homeless and other disfavoured people with food supply.

**Providing a healthier and more sustainable option**

Last but not least, urban agriculture usually makes use of organic farming methods [10]. Thus it supports a more sustainable production of food, decreasing the use of harmful pesticides and contributing to increasing biodiversity.

It promotes recycling by helping cities to make the best possible use of their organic waste materials. Urban farmers can use compost and manure available in the urban environment in order to "feed" their cultures.

By contributing to decrease the energy used in food transport, urban agriculture can play a key role in reducing greenhouse gases emissions, improving air quality and reducing noise.

Urban agriculture helps to enhance an environment-friendly food chain and contributes to bridging the gap between producers and consumers.

It also promotes a higher quality of food. In fact, urban-grown food eliminates the need for preservatives, as products do not need to travel long distances.

## Developing links between farmers and consumers in Sanchoku, Japan 5

Urban consumers are often disconnected from rural communities who produce food. Consequently consumers miss the necessary information to make choice about how and where the food they buy is produced. Most of the time consumers do not know if the farming practices damage or not the environment or if local agriculture is supported.

In order to address this problem, Japanese consumers in Sanchoku developed the Consumer co-operatives arrangement (co-ops). These co-ops are made from households and can vary in size from a few thousand to over a million households.

The role of co-ops is to create linkages between consumers and producers.

They enable the consumers to know about the production methods and farming practices. Consequently the co-op farms have to reach strict quality standards in order to ensure healthful consumption and sustainable care for the local environment. To guarantee that these standards are reached, co-op staff frequently examines produced food and inspect the farms.

Co-ops enable, through newsletters or proper labeling, that both product's origin and producer's identity are made clear to the consumer.

Finally co-ops try to bridge the gap between urban and rural communities. By building relationships between consumers and producers they help urban people to understand rural life and be aware of environmental concerns. Consumers can also visit co-op farms to see how food is produced. Reversely farmers can visit co-op members' houses, thanks to "home stays' schemes".

Nowadays co-ops continue to prosper, accounting for as high as one third of the food needs in the country. Those organizations make things progress by developing consumer's awareness and ensuring sustainable farming practices.

Sources:
Adriana Allen and Nicholas You, *Sustainable Urbanization – Bridging the green and brown agendas*, (London: The Development Planning Unit of the University College London, 2002)
International Co-operative Alliance, http://www.coop.org/coop/index.html (accessed 16 July 2006)

Adriana Allen and Nicholas You, *Sustainable Urbanization,* (London: The Development Planning Unit of the University College London, 2002), p. 149



## The Calthorpe Project in Camden, London 6

The Calthorpe Project is a multi-cultural community garden located in a bomb clearance gap of the densely residential and workplace areas of Camden in central London; on the hectic Gray's Inn Road, flanking the dental hospital. It is part of the London city farms and community gardens organization

27% of Camden population is made from ethnic minority groups; the largest one is Bangladeshi (6.4%). Calthorpe project offers several activities, all aiming to involve communities from different ethnic backgrounds. It is a place of repose, recreation and welcome. The Camden council contributes for half of the budget, as well as leasing the land. Grants and other sources of funding enable to meet the rest of the financial needs. The management of the project is made by a team of volunteers.

In the dense variety of activities proposed are included training groups for English language held in a small self-build construction building; an amphitheatre, a sport area, a playground for kids. It organizes artworks projects ranging from murals, mosaics to tile making and sculpture with multi-cultural theme.

In addition Calthorpe Project also proposes several gardening plots and greenhouses. Local residents can apply for one of the gardening plots. These plots are very popular within the local Bangladeshi community and the Bengali women's gardening group comes once a week to grow their own herbs and vegetables.

Moreover a special gardening group is run by a tutor, giving the possibility to learn gardening. It also collaborates with organizations working with people with learning difficulties and mental health problems.

Calthorpe project's team is enthusiastic to develop the ecological education potential of the garden and several workshops (as well as summer festivals) are proposed. In March 2004 an opera about "genetically modified foods and their effects on humans and the countryside" was taking place in the amphitheatre.

In addition of promoting relationship between communities from different ethnic groups, Calthorpe project enables the reintegration of agriculture into the urban fabric (among others activities). Involving the local residents, supported by the authorities, it builds the understanding of a sustainable approach to our cities.

Sources:
Clare Rishbeth, Ethno-cultural Representation in the Urban Landscape, Journal of Urban Design, Vol. 9. No 3, 311-333, Carfax Publishing, October 2004

Calthorpe Project, King's Cross, London – Green Space of the Month – March 2004, http://www.ben-network.org.uk/participation/green_spaces/gs_more_info/Calthp.html

For further information:
Federation of City Farms and Community Gardens, http://www.farmgarden.org.uk/

## III. Designing urban agriculture

### III. 1 Agriculture as an urban utopia

The relationships between the urban and the rural worlds underpin most of the history of planning and urban design in the 20th century. At the end of the 19th century, the city was seen by many (with some very good reasons indeed…) as a place of unhealthiness, alienation and congestion, whereas the countryside was considered a place of healthy air and freedom. Architects and the first urban planners often searched how to take the best out of the two worlds and merge them into a new kind of human settlement.

This is exactly what Ebenezer Howard did. In his book "Garden Cities of To-Morrow", first published in 1898 under the title "To-Morrow: a Peaceful Path to Real Reform", Howard developed the idea that a new "magnet" ❶, called the "Town-Country", would gradually attract people from both town and country. Howard was a doer and he explained very practically in his book how such a "garden city" could be developed. His ideas directly led to the creation of several garden suburbs and indirectly influenced most planning concepts of the 20th century, including the satellite towns that flourished in Europe after the Second World War. Unfortunately, some ideas were lost on the way, including the importance of local production. 7

On the other side of the Atlantic Ocean, almost simultaneously, regional planning emerged in the United States under the influence of Patrick Geddes, a Scottish biologist who was also an innovative thinker in the field of planning.

Geddes first introduced the regional scale in urban thinking and advocated a careful survey of all available regional resources before any planning intervention. Geddes also considered that a new era of technological innovation (train, car, telegraph, telephone, etc.) would lead to an age of urban decentralisation: cities, which were built during the "old" technological era, would be gradually replaced by smaller settlements mixing housing, industry and agriculture that would be interconnected thanks to new technologies. The first step for Geddes was to "*make the field gain on the street, not merely the street gain on the field*" (1), that is to say reverse the current trend of urban sprawl. ❷

Much of these ideas were developed further between the two World Wars by Lewis Mumford, one of the founders of the Regional Planning Association of America. For Mumford, new technologies were liberating agents and enabled to escape from the constriction of the 19th century city. According to Lewis:

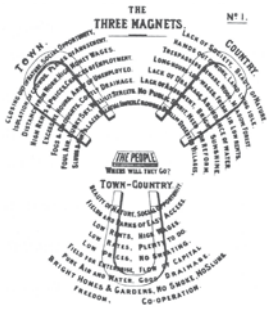
"*Regional planning is (…) the conservation of human values hand in hand with natural resources… Permanent agriculture instead of land-skinning, permanent forestry instead of timber mining, permanent human communities, dedicated to life, liberty and the pursuit of happiness*." (2)

Today, the word "permanent" would certainly be replaced by "sustainable", but Lewis' ideas sound still very modern.

In this new intellectual framework, Howard's garden city was revisited and expanded. The best illustration of this American adaptation of Howard's ideas is probably Franck Lloyd Wright's "Broadacre City" ❸, a utopian project designed in the 50s, which aimed to integrate modern technology into the natural landscape. For Wright, "*architecture and acreage (agricultural land) will be seen together as landscape*." (3) The generative power of the landscape is the essence of Wright's architectural thinking, which extends to agricultural land. This power fuels the convergence of urban and rural lifestyles, a distinction that becomes irrelevant if technology is used to promote democratic beliefs and citizen connectivity.

Except Franck Lloyd Wright, few urban theorists took an interest in agriculture after the Second World War. Agriculture did not really fit within the new paradigm of modernity, the city as a machine. However, its is interesting to notice that the very spiritual father of architectural modernity, Le Corbusier himself, had envisioned the modern suburbs as partly self-sufficient. Le Corbusier criticised garden cities and allotments in the way they were run in so an old-fashioned way ("*And the result of all this is a few pears and apples, a few carrots, a little parsley and so on. The whole thing is ridiculous.*"), but not in their very principle. He proposed to use more modern techniques and to share the workload between inhabitants and professional farmers, but emphasized the fact that "*this new type of housing scheme turns the inhabitant of the garden city into an agricultural labourer and he becomes a producer.*" (4)

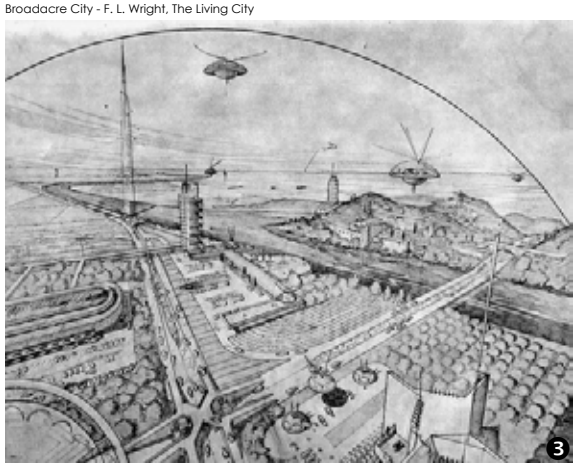
Today, the eclecticism of post-modernity together with the emergence of environmental awareness has opened the way to new kinds of utopias that try to merge architecture, cities and agriculture. Such propositions include the "Pig City" of the Dutch office MVRDV 8 or the very rational "Vertical Farm" concept developed at Columbia University 11. Both projects are based on a more modern, high-tech approach of agriculture. But does this have to be the case?




The Three Magnets - E. Howard, Garden Cities of To-morrow ❶

Urban sprawl and its remedy - Patrick Geddes, Cities in Evolution ❷

Broadacre City - F. L. Wright, The Living City



❸

(1) Patrick Geddes, Cities in Evolution, (London: Williams and Norgate, 1915), quoted in Peter Hall, Cities of Tomorrow

(2) Lewis Mumford, Regions – To live in, The Survey, 54, 151-2 (1925), quoted in Peter Hall, Cities of Tomorrow

(3) Frank Lloyd Wright, *The Living City*, (New York: Horizon Press, 1958)

(4) Le Corbusier, *The City of Tomorrow and its Planning*, (London: Architectural Press, 1947)

Peter Hall, *Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century* (3rd ed.), (Oxford: Blackwell, 2002)

Andre Viljoen, *CPULs Continuous Productive Urban Landscapes,* (Oxford: Architectural Press, 2005), p. 98-101

## The forgotten ideas of Ebenezer Howard 7

Some of the main ideas of Ebenezer Howard were "forgotten", more or less consciously, in the subsequent evolution of the concept of the "garden city". Among such ideas was for example the elimination of landlords in the new settlements and the municipalisation of the land in order to allow the capture of the "unearned increment" (the rise of land value due to public investment) by the community itself.

Another major forgotten idea is the self-contained community. According to this idea Howard proposed a city mixing residential and work areas in order to reduce commuting, but also mixing production and consumption so as to minimise goods transports.

Diagram n°3 of the book shows clearly the concentric circles which constitute Howard's ideal city: a central park in the core, which accommodates the main public facilities and shopping spaces; a residential belt embedding local public facilities such as schools; and, most interestingly for us, at the interface with the open countryside, a productive belt.

This productive belt is divided in two: the outer part is dedicated to primary production, including allotments and dairy farms. The inner part is dedicated to storing or transforming the raw materials produced either in the outer part or in the countryside: it includes for example a clothing factory, a furniture factory and a timber yard. Both parts are connected to the circle railway which encompasses the whole town, so as to allow imports and exports.

Howard's obsession with reducing transports brought him to include waste management in his scheme:

"*The waste products of the town could, and this without heavy charges for railway transport or other expensive agencies, be readily brought back to the soil, thus increasing its fertility*."

The productive activities included in the scheme aim in the first place at providing food and goods to the local people:

"*The farmer of Garden City has a market at his very doors* (…)"

But we also see that, by connecting those activities with the rest of the world through the railway, Howard actually did not believe in a fully self-sufficient city, but rather in a city minimising transports through producing locally as much as possible, but not everything:

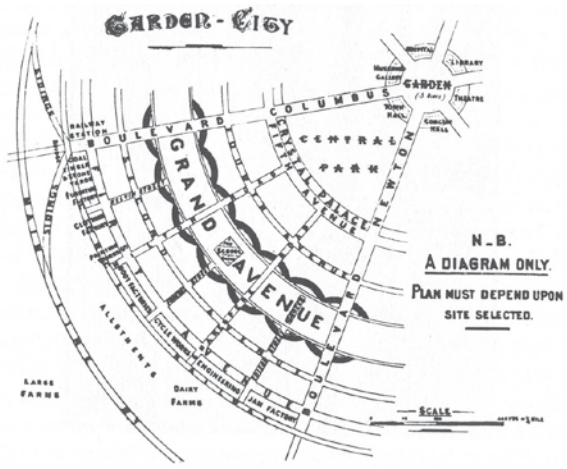
"*These farmers are hardly likely to supply them [the townspeople] with tea, with coffee, with spices, with tropical fruits or with sugar (…)*"

Howard concludes,

"*The combination of town and country is not only healthful, but economic (…)*"

This particular aspect of Howard's ideas was often misunderstood and thus omitted. The garden cities gradually became garden suburbs, i.e. monofunctional extensions of existing cities entirely dependent on them and contributing to urban sprawl. As for Howard, he was dreaming of mixed use communities with clear edges.

Sources:
Ebenezer Howard, Garden Cities of To-morrow, original ed. 1898 as "A Peaceful Path to Real Reform" (Powys (Wales): Attic Books, 1985)



Garden-City - Source: E. Howard, Garden Cities of To-morrow

## MVRDV: Pig City

8

The Netherlands produce some 16.5 million tons of pig meat each year, making it the European Union's leading exporter. In 1999 there were officially 15.2 million pigs in the country, which must be compared to the population of 15.5 million people. Including the space for meat processing, each pig requires 664 square metres.

In light of the recent epidemics (such as the swine fever or the foot-and-mouth disease), it has become clear that "something" must be done with today's Dutch pig industry. However, if purely organic farming methods were introduced, the pig industry would need 75% of the surface area of the Netherlands if the consumption and exportation were to stay at today's levels. That is of course no realistic option.

Dutch architecture office MVRDV collaborated with the Dutch Ministry of Agriculture, Nature and Fisheries in order to explore alternative scenarios. They imagined a radical proposition: that it might be possible to consolidate the entire pig farming industry into compact farm units, eliminating the need for transport and distribution and reducing the risk of spreading diseases.

Pig City proposes 76 towers, each measuring 622 metres in height. The pigs are kept on the 87x87-metre floors. Large balconies allow the animals to rummage around under trees outside. A slaughterhouse is housed in the plinth, and pigs for slaughter are moved in lifts. On top is a fish farm that supplies some of the food needed. Each tower also contains a central slurry-processing plant and a biogas tank, which easily caters for the tower's energy needs. To reduce transport costs, 44 towers are located in the port; the other towers are located close to major cities.

If pigs are efficiently kept in stacked "apartments" in such a way that they enjoy better conditions, the meat acquires a better taste, livestock transport becomes unnecessary, diseases are eliminated, and the Netherlands acquires more space, according to MVRDV.

To accompany the proposal's launch, Stroom, the centre for visual art in The Hague, organised a discussion entitled Morals on 09.05.2001. Seven specialists in the fields of ethics and animal rights, organic farming, politics and pig farming were questioned about the proposal. Most of the speakers vehemently opposed the Pig City proposal. Their criticism centred on the dangers of centralisation. Should one element be put out of operation, then the consequences for the whole system couldn't be foreseen.

MVRDV's project is a courageous proposal which takes an extreme starting point. Interestingly enough, we see that people's negative reactions during the discussion concerned more the dangers of excessive concentration than the very principal of vertical farming, even if the issue of the "negative image" of pig flats was raised.

Sources:
MVRDV, *KM3, Excursions on capacities*, (Barcelona: ACTAR, 2005)
ArchiNed, http://www.archined.nl/archined/3251.html

Pig City - MVRDV, KM3/Excursions on Capacities

### III. 2 What kind of agriculture for the city?

We can identify two opposite trends among the advocators of urban agriculture.

On the one hand, the majority of planners, economists, social scientists… who write about urban agriculture consider as obvious that it has to use organic methods in order to be fully sustainable: no chemical pesticides or fertilisers should be used; livestock should be free range, etc. 10 The problem is that this kind of agriculture is usually more space-consuming than the average.

On the other hand, some consider that the only viable option for feeding large cities with local products is the intensive use of high tech farming techniques, such as hydroponics, 18 in order to minimise the area of land needed.

In order to see clear, we estimated the quantity of land needed to feed yearly one person with two extreme levels of farm land yield, corresponding to these two trends. For simplification purposes, we only considered fruits and vegetables crops because the data was otherwise too complex to gather and compile.

- Extensive gardening using traditional techniques, which corresponds roughly to the organic trend, is the most space-consuming method. Based on the WHO recommendation to eat 0.5 kg of fruit and vegetable a day and on the National Society of Allotment and Leisure Gardeners average productivity ratio of 10.7 t/ha/year (1), we calculated that 170 m² of farmable land per person are required.

- For intensive high tech farming using hydroponics, using the data compiled by the Vertical Farm project (2), which is based on an average daily income of 2,200 calories per person, we estimated that an approximate surface of 17 m² is required to provide one person with his essential portion of fruit and vegetable. (This figure would rise to 24 m² if we included chicken and fish.)

We can see that there is a ratio of 1:10 between the two. Therefore, this is an important choice for the designer wishing to embed agriculture in urbanism.

However, the opposition between "traditional" organic farming and "high-tech" farming might dissolve in the future as new techniques emerge which try to take the best of the two 9. Ideally, we would have methods that enable to reach the yields of high-tech farming, yet are as sensitive and environmentally friendly as organic farming.

(1) Tara Garnett, Urban agriculture in London: rethinking our food economy, in Growing Cities Growing Food: Urban Agriculture on the Policy Agenda: A Reader on Urban Agriculture, (RUAF Foundation, 1999): accessed online on http://www.ruaf.org/node/90

(2) The Vertical Farm project, Feeding 50,000, study conducted by Dickson Despommier, http://www.verticalfarm.com/plans-2k4.htm

#### ICM: Integrated Crop Management 9

Looking to industrial and organic agriculture techniques separately, none of them is able to meet at the same time the environmental, health and economic conditions of sustainability. Consequently a potential solution could reside in the combination of those different methods in an integrated system of crops protection. This combination could then answer the profitability and production requirements, while assuring environmental protection and food security. This is currently being developed as the Integrated Crop Management (ICM).

"*ICM is a method of farming that balances the requirements of running a profitable business with responsibility and sensitivity to the environment.*" (ECIFM)

Merging flexibility and efficiency, ICM combines the latest agricultural technologies with principles of sustainable farming practices. It promotes people and health as well as environment safety, without forgetting to secure profitability.

ICM is a "site specific" approach which unites:

– A better knowledge of crops rotation;

– A careful choice of stronger seed varieties;

– A "site specific" choice of cultivation techniques, including biological and biotechnological techniques, as well as genetic methods;

– A minimal but necessarily reliance on chemical products, and their application at the adequate moment in crops' growth, in order to avoid negative consequence on food quality;

– The enhancement of wildlife habitats, promoting natural ways to fight pests (introducing "natural enemies") while maintaining parasites below a nuisance threshold economically tolerable.

Sources:
ECIFM, the University of Reading, Integrated systems, http://www.ecifm.rdg.ac.uk/integrated_crop_management.htm
Phytofar, Protection des cultures, la Lutte Integree, http://www.phytofar.be/fr/pro_lut.htm

## Organic agriculture 10

Organic agriculture relies on ecosystem management practices, fostering natural processes and excluding external synthetic inputs (such as chemical fertilizers or pesticides). It enhances the health of the ecosystem, its biodiversity, natural cycles, and natural biological activity of the soil. Organic farming systems also promote ethic animals' care and veterinary drugs are usually prohibited. In many countries, organic agriculture is defined by law. Farms have to achieve specific criteria in order to gain the right to call themselves or their products "organic". To obtain the label, farms have to be controlled by organisms which – for a fee – deliver them the certification. It is normally illicit for a non-certified farm to use the "organic" term for commercial purposes.

Achievements

Organic agriculture has a lot of evident and known positives aspects. They all echo with criticisms raised against large-scale, chemical-based agriculture (CS: Green Revolution). Organic farming methods enable soil quality preservation; increase the awareness about food processes; often promote linkages between producers and consumers; provide healthier food; reduce pollution by avoiding chemical inputs; etc.

Criticisms

– The fashion: Organic is nowadays a powerful market, which knows exactly how to take advantage of public consciousness. The affirmation "It is good, it is organic!" is largely cried out. And today the shelves of organic shops even host toilet paper. The fact that it costs trice as much as in other supermarkets does not seem to matter because it is supposedly healthier and more sustainable. However, there is no evidence that buying over-packed organic tomatoes from Kenya in UK is sustainable. Therefore, the organic market's rapid expansion is more driven by fashion effects than by scientific facts. Yet organic farming has doubtlessly many positive aspects, as mentioned above. Thus it is necessary to make a distinction between organic agriculture and organic food. Whether the food is tastier or healthier has little to do with its positives effects on the environment. For example, part of the food proposed in UK's different organic shops, catering services or restaurants comes from foreign countries; hence the associated issue of food miles.

– Environment and human survival: Norman Borlaug claims that "adopting organic farming methods on a global scale would be more detrimental to the environment than conventional farming." He asserts that "if organic farming is to feed the globe, it will require a dramatic increase in cropland area, and that achieving this goal will ultimately lead to wide-scale deforestation." (quoted by Wikipedia) Being the initiator of the Green Revolution, Borlaug may not really be objective. Nonetheless it is easy to understand that if organic farming – occupying today a minor part of the natural landscape – had to increase in size, larger-scale effects would have to be seriously considered.

– The certification: organic framing is defined by a control of external inputs, following checklists of allowed and forbidden elements. But with rules come exceptions, and what will be prohibited or not in the organic checklist will often depend on the fee paid to the certification organism… Can we really be sure that the broccolis we buy at high price in organic shops are truly organic? For example, "many organic farms rely on manure that is not organic (meaning it comes from animals not fed and raised organically) to continue fertilization. This technically does not violate the traditional definitions of organic produce because there are no inorganic components added to the manure (…)" (Wikipedia)

– Health value, pollution, soil degradation: Organic agriculture avoids the release of any synthetic pesticides or fertilizers in the environment and the food. However natural pesticides (derived from plants) are allowed. "Critics claim that many synthetic pesticides are improvements on natural pesticides, that they are less dangerous to humans and more environmentally friendly." (Wikipedia) In both cases, the evidence of their harmlessness has still to be demonstrated. Yet many people consider chemical fertilizers as evil and only approve of natural ones.

– Food contamination and quality: as organic farming does not use synthetic pesticides, the food exposure to natural pests is higher. This, associated with the use of manure, carrying natural pathogens, raises the question that organic food may be less safe than non-organic one. No proves have yet been shown, neither in favour nor in disfavour of organic food.

Sources:
Wikipedia, Organic Farming, http://en.wikipedia.org/wiki/Organic_farming
DEFRA, The strategy for sustainable farming and food, facing the future, (London: Department for Environment, Food and Rural affairs, 2002)
Unearthing the truth about organic food, http://www.spiked-online.com/Articles/00000002D21D.htm

http://www.ecolearningcenter.org/csa2.jpg

### III. 3 Urban agriculture as a planning and design exercise

We saw that urban agriculture can encompass a large variety of situations, from suburban agriculture using traditional techniques situated at the edge of the city or in large pockets of empty land surrounded by urban sprawl, to high tech downtown agriculture using high tech methods.

Starting from the two extreme yields calculated in the previous section, we embarked upon a little planning and design exercise in order to imagine what self-sufficient communities could look like. ❶

**A self-sufficient community using only extensive farming methods**

Using only extensive farming methods, a large fraction of the land must be dedicated to farming (up to 95%). The resulting neat density of the whole settlement, including farmable land, remains low, whatever the residential density used: with a local residential density of 500 dph, it reaches only 28 dph.

In terms of spatial organization of the settlement, we can imagine two opposite directions ❷.

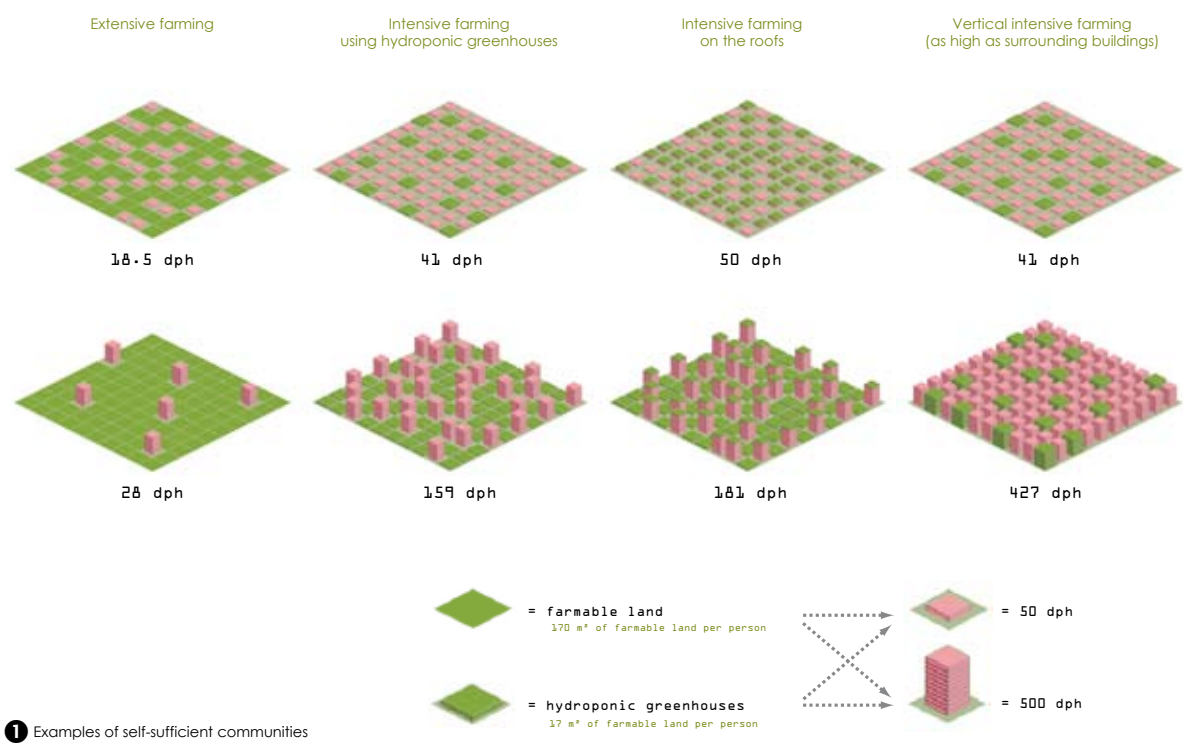
The first option is to concentrate all housings in a dense core and set large agricultural plains around this core. This is more or less the "green belt" model inherited from history, when cities grew their crops just outside their clearly marked boundaries. However, this model is not compatible with spreading cities and shifting city limits, as farmable lands have to be pushed further and further away and the distance between producers and consumers increases.

The second option is to mix as much as possible residential zones and productive surfaces in order to adapt more easily to shifting urban conditions and decrease at the same time the distance from producer to consumer. The problem is that with extensive agriculture, we get something that does not quite look like a city, but rather like a patchwork of small communities. The distance between the communities depends on their size. In our example, each 10,000 district is separated from the others by at least 500 m of fields. This is too much to really call it a city.

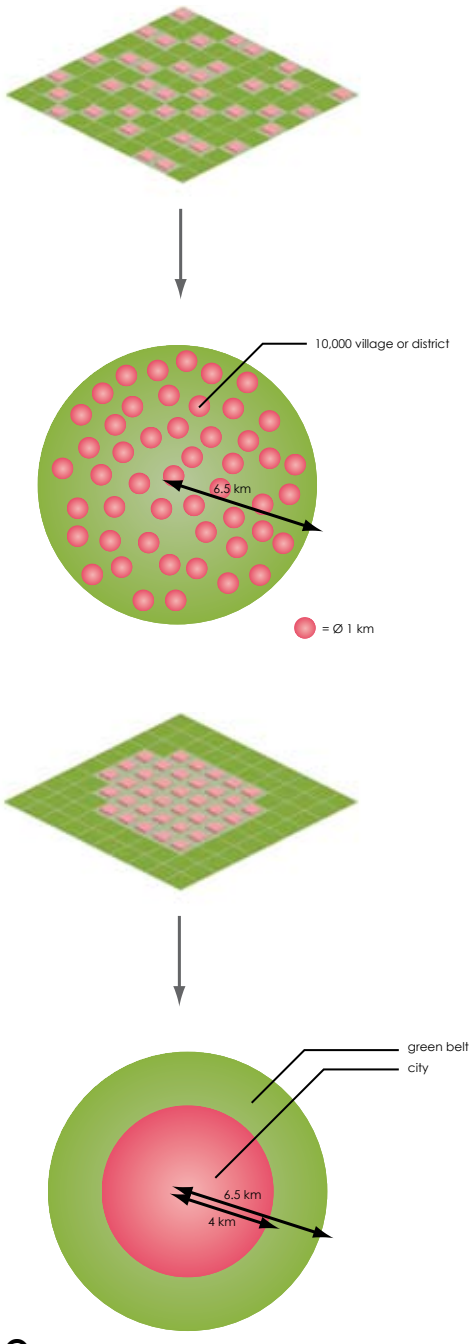
Can we do better than that? Is there a sustainable, truly urban alternative to the "green belt" model?

**Using more intensive techniques**

Using more intensive technique such as hydroponics, we can easily reach neat densities of 41 to 159 dph (including farmable land), depending on the local residential density used.




❶ Examples of self-sufficient communities




❷ Extensive farming & 50 dph residential density

This is enough to create an urban continuum in low residential densities (18% of the land only is dedicated to farming with a residential density of 50 dph). In higher residential densities, though, 68% of the land is still used for farming.

This can be bettered with the use of the roofs of the buildings in addition to ground-level fields. In low residential densities, if all roofs are used this is more than enough to supply the whole city. However, in higher residential densities, there is less roof surface and the use of roofs to grow crops does not help much.

The use of vertical hydroponic farms must then be considered for these high densities. Assuming that these farms are as high as neighbouring buildings, the percentage of land used for farming drops to 18%, whatever the residential density.

**Conclusion**

The exclusive use of extensive farming methods do not allow to build a satisfactory model of self-sufficient city. The model of the productive "green belt" surrounding the city cannot compete with urban sprawl and proved its inefficiency. A more mixed model would be at the same time more efficient (i.e. decrease distance between producers and consumers) and more flexible. Such an urban model cannot be conceived without the help of high tech farming techniques.

On the other hand, the exclusive use of high tech techniques would probably be rejected by citizens as creating an excessive and impoverishing uniformity of the food: people ask for different tastes, different smells, different colours, which requires different conditions of sun, wind, rain and soil.

In the context of existing cities, no unique solution can be promoted anyway and the best must be made of all possible opportunities: traditional fields in suburban pockets, roofs in low density neighbourhoods, vertical greenhouses on empty plots or on the top of buildings in city centres…

**The Vertical Farm project** 11

The vertical farm is presented by its advocators as the new paradigm of agriculture in the 21st century and as the solution to many environmental and health issues. It was studied and developed theoretically within the Department of Environmental Health Studies of Columbia University, New York City, under the direction of Dick Despommier.

A typical vertical farm would be a multi-storey building accommodating greenhouse-based agriculture, or more generally indoor agriculture (this can also include the farming of some freshwater fishes, crustaceans or molluscs). A vertical farm might also be able to host some fowl or pig farming, though larger farm animals such as sheep or goats might be a problem.

Farming would occur in a fully protected and managed environment, independent from external climatic conditions, allowing year-round crop production. It would also produce its own energy and recycle its own waste.

Based on studies of food support in extraterrestrial environments (such as a space station or a colony on the moon), Mr Despommier calculated that a minimum 25 square metres of intensively farmed indoor space would be necessary to provide enough food for one single individual (2,200 calories/day). Thus, an 18-storey farm the size of a New York City block (23,000 square metres) with 3 stacked layers of plants or animals on each floor would provide enough food for 50,000 people.

Many advantages of the vertical farm are advanced:

– It would prevent food shortages resulting from draughts, floods or pests;

– It would allow open air farmland to be returned to the natural landscape, thus restoring its ecosystem functions (i.e. increasing biodiversity or trapping CO2);

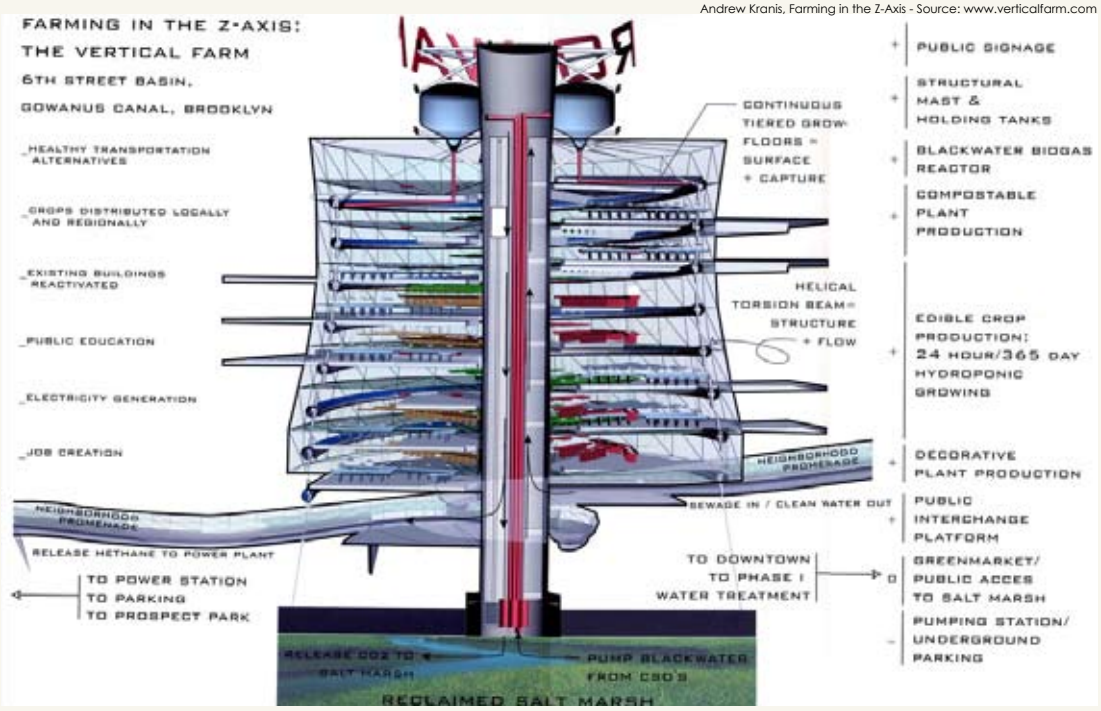
– It would dramatically reduce the use of fossil fuels;

– It would help deal with many urban issues, such as converting abandoned urban properties, creating new employment opportunities and creating sustainable environments in urban centres.

Unfortunately, the vertical farm remains a theoretical construction so far. Moreover, its advocators fail in addressing some important social or cultural issues, such as its acceptability by neighbours. Indeed it can be hypothesised that some "NIMBY" behaviours would be observed. Consumers would probably complain as well, on the account that crops would all grow in the same artificial environment and lack diversity. Last, the economic equation is today far from being balanced, and a vertical farm project would require a massive amount of public investment.

Sources:
The Vertical Farm project, http://www.verticalfarm.com

Andrew Kranis, Farming in the Z-Axis - Source: www.verticalfarm.com



## IV. Beyond agriculture

Urban agriculture can be considered as part of ecological or economic cycles. But in order to propose a fully sustainable option, it must consider those cycles in their entirety.

### IV. 1 Energy

Growing food requires energy: the energy of the sunlight, the energy that drives water to the fields, the energy for harvesting crops. This energy can be provided by natural elements (sun, rain…) or by human toil through manual irrigation and harvesting. But in modern agriculture, nature and human beings need to be given a hand in order to improve productivity: machines are used to pump water or harvest crops; greenhouses are heated to allow faster growth cycles; artificial lighting compensates the lack of sun… The sustainable nature of urban agriculture would be completely pointless if it required massive amounts of fossil energy. Thus, the use of renewable energies must be considered whenever possible.

See Anna's Socio Land Lab for an exploration of "green" energy production with Colza plantations

Reversely, urban crops or crops waste [29] can be used to produce "green" energy and could be an eco-friendly alternative to fossil energies in cities.

### IV. 2 Waste

http://www.essexcc.gov.uk/

Another cycle that has to be considered in its entirety is waste. For example, growing food requires nutrients that can be found in composted urban organic waste. [12] Thus, urban composting and organic waste collection should be favoured.

### IV. 3 Industry

The whole point of urban agriculture is to bring closer producers and consumers, but this could potentially extend far beyond food. New urban industries could develop, that would rely on urban crops, such as paper making, textile, cosmetics, etc. Indeed, urban agriculture could open the way to a renaissance of small urban industry.

http://www.southvillage.com/image/agr_Farm_06.jpg

http://www.cureorganicfarm.com/images/lisacsadistweb.jpg

### A nutrition cycle in Ghana

12

The Sub-Saharan Africa is facing a rapid urban growth, which is seen as a major threat with regard to urban food security, environment protection and waste management. Indeed, cities are vast producers of wastes, organic waste included. While in rural areas, organic waste is returned into food production cycle, in urban areas it ends up in rubbish dumps, creating environmental and health problems. On the other side, the rural overworked soil in Sub-Saharan Africa is depleted and there is a raising necessity for organic soil nutrients.

The Urban Agriculture Group of the International Water Management Institute considered the use of nutrients from recycled organic city waste in agriculture as a potential and began an analysis in three African cities of Ghana: Accra, Kumasi and Tamale.

Following the four segments of the "nutrient recycling loop" (Demand, Supply, Process and Setting), the study evaluated "food flows across the rural-urban interface" and developed a potential recycling plan.

In addition of enlightening that there is enough organic waste reusable in rural land (Supply), the study also showed that it is an opportunity for involving communities in compost activities (Settings). A composting station is currently being developed (Process), seeking adequate technical options to provide good quality compost at an affordable price. The study also revealed that farmers are not sufficiently concerned to pay for compost (Demand), which makes the cost of compost stations unlikely to be covered unless subsidies are provided by the government.

Giving compost to rural areas while reducing waste in the city is a positive aspect of enhancing linkages between the cities and their agricultural hinterland.

This study in Ghana illustrates that a good understanding of urban-rural nutrients flows can effectively decrease health risks and pollution in cities, as well as reduces soil fertilization problems in rural areas. Through situation and policy analysis, through dialogue with the different actors, the resulted framework of "nutrient recycling loop" enhances a sustainable approach of the city and its relations with the rural environment.

Sources:

Adriana Allen and Nicholas You, *Sustainable Urbanization – Bridging the green and brown agendas*, (London: The Development Planning Unit of the University College London, 2002)
Pay Drechsel and Dagmar Kunze, *Waste Composting for Urban and Peri-Urban Agriculture: Closing the Rural-Urban Nutrient Cycle in Sub-Saharan Africa*, (United Kingdom: CABI Publishing, 2001)
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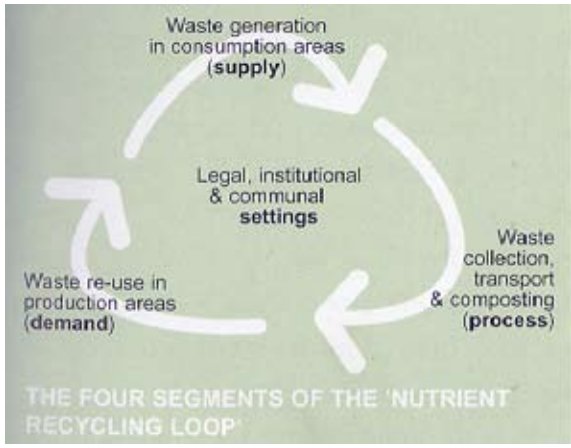


Adriana Allen and Nicholas You, *Sustainable Urbanization*, (London: The Development Planning Unit of the University College London, 2002), p 61