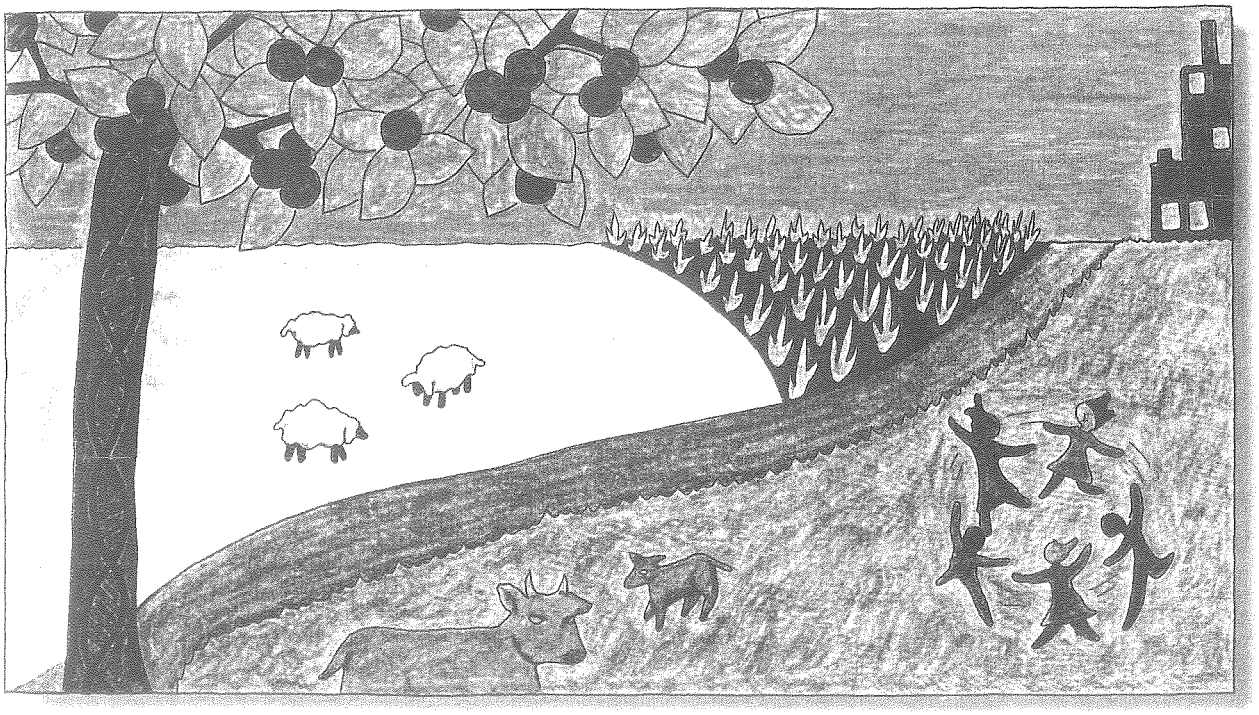
World Review of Nutrition and Dietetics
Editor: A.P. Simopoulos
Vol. 102

Healthy Agriculture, Healthy Nutrition, Healthy People

Editor
A.P. Simopoulos



Healthy Agriculture, Healthy Nutrition, Healthy People

Volume Editor

Artemis P. Simopoulos

The Center for Genetics, Nutrition and Health, Washington, D.C., USA

45 figures and 47 tables, 2011

KARGER

Basel · Freiburg · Paris · London · New York · New Delhi · Bangkok · Beijing · Tokyo · Kuala Lumpur · Singapore · Sydney

Part III

Simopoulos AP (ed): Healthy Agriculture, Healthy Nutrition, Healthy People.
World Rev Nutr Diet. Basel, Karger, 2011, vol 102, pp 226–243

Urban Agriculture and Urban Design

Vikram Bhatt

MCHG, School of Architecture, McGill University, Montreal, Que., Canada

Over the past two centuries, significant advances have been made in understanding the human nutritional needs and the diet with concomitant health improvements. Similarly, we have also tackled a wide range of infectious diseases allowing many of us to live longer and better than our ancestors did. This has been largely possible because of the scientific and technological advances made in 19th and 20th centuries and their parallel economic development, which started in the West, but is spreading rapidly in Brazil, Russia, India, China (popularly known as the BRIC countries) and other less developed nations. The social dimensions of economic and behavioral changes which have followed, however, are impacting negatively, particularly on the lives of urban dwellers, who are experiencing a rise in cancer, heart disease and diabetes rates. Chronic health problems cause over 70% of all deaths and are at the root of 75% of healthcare costs in the province of Quebec, Canada. Worldwide, health expenditures are now increasing at a faster pace in the developing world in comparison to industrialized countries [1].

According to World Health Organization (WHO) and the World Economic Forum, India will incur an accumulated loss of $237 billion by 2015 due to unhealthy lifestyles and faulty diets [2]. It would be wrong, however, to assume that urban areas are inherently unhealthy – a hangover of 19th century industrialization era thinking. On the contrary, cities today are generally better equipped and organized, especially in terms of health awareness and care infrastructure, and hence, they can identify, prevent and treat maladies of all kinds more effectively than rural areas. In urban settings, particularly from the point of view of noncontagious chronic woes, commonplace urban design aspects are also critical. These include items such as the shape and size of the community; physical setting of the settlement; and the density, planning patterns and design of their neighborhoods as well as residential quarters. These play important role in the daily lives of people and can either help or hinder healthy and active living.

Unhealthy lifestyles have creeped onto us without us realizing it. The WHO [3] stated in 2002 that 'in many regions, some of the most formidable enemies of health are joining forces with the allies of poverty to impose a double burden of disease, disability and premature death in many millions of people'. This is affecting both the rich and the poor; however, the manner in which it impacts different constituencies is not the same. Recognizing the pitfalls of broad generalization, it can be safely stated that in the wealthier West, chronic noncommunicable diseases are on the rise among the relatively poor; whereas in the developing South, they are affecting the rapidly expanding middle class. Moreover, particularly in

developing countries, a growing number of urban poor are living in squatter settlements and slums. They are missing not only basic services such as water supply, drainage and roads, but also lack the economic opportunities for advancement and are often food insecure. Indeed, this is the double whammy that developing nations are facing. On one side is the rapidly expanding middle class that is facing the deluge of obesity (including childhood obesity) and sedentary lifestyle-related health issues such as diabetes, hypertension and cardiac problems; and on the other side are the citizens of ill-serviced neighborhoods which are left to tackle the so-called traditional maladies related to malnourishment, gastrointestinal problems, sexually transmitted diseases, and early childhood and maternal problems of health.

Urban Design and Health

According to the WHO estimates [4], 'The year 2007 saw, for the first time, the majority of human beings living in urban areas. This trend will continue with 6 in 10 people living in towns and cities by 2030.' As a growing number of people move to urban areas, the social, economic and behavioral impact of this historical change is being felt both in the North as well the South, and urban design plays an indirect role in the transformations which are taking place.

Northern Cities

As cities prosper and grow, as well as expand and spread out exponentially, more and more people are living farther and farther from their places of work. Today, in North America for example, the majority live in suburbs where the housing densities are so low that they cannot support any real form of public transit system, forcing residents to rely on automobile transport. According to Alan Pisarski [5] in his Commuting in America III study, which examined daily travel patterns based on U.S. Census data from 1990 to 2004, the average US commuter's daily national travel times increased from 22 min to 25.5 min, and a great majority of these commuters, close to 80% to be precise, were single occupant vehicle users. Based on these numbers, one can assume that an average US commuter drives between 25 and 30 miles (40–48 km) per day.

Besides the daily commute, the automobile is used to run both small and large errands and to go everywhere and to do everything! The health impacts of various transportation systems have been studied extensively by different researchers; therefore, using various keywords and subject headings, our team conducted an extensive literature search from 27 online databases of over 200 studies related to the health, economic and urban quality effects stemming from investments in transportation infrastructure. We found that health impact assessment literature provides a clear framework from which to study the changes in urban transportation, including a move towards public transit. Previous research also revealed that road accidents and air pollution are the obvious urban transportation effects to quantify, but so is insufficient physical activity which is one of the major causes of obesity [unpubl. survey conducted by the Minimum Cost Housing Group (MCHG)]. One approach is to get people out of their automobiles by creating pedestrian-friendly places or retooling existing neighborhoods to reduce car dependence. A wide range of initiatives, particularly ones that encourage active living, such as sustainable neighborhoods, smart growth, public transit-oriented developments, networks of pedestrian and bicycle friendly paths, etc., are gaining preeminence in the West [6].

Automobile dependence negatively impacts two age groups: children and the elderly [7], as they cannot or are not permitted to drive, and thus, could be increasingly isolated from the routine activities and social networks of family and friends. As such, urban mobility and connectivity have direct health implications. In his work, *The Effects of Age on the Driving Habits of the Elderly,*

Xuehao [7] summarizes this dependence for the elderly:

'Being elderly not only makes elderly drivers reduce daily driving exposure, avoid driving at night, avoid driving during peak hours, and avoid driving on limited-access highways, but also make them drive at lower speeds, drive larger automobiles, and carry fewer passengers. Despite their effort of self-protection, however, the elderly still show a higher risk of crash and injury per unit of exposure than the middle-aged. If policies induce the elderly to further adjust their driving habits to offset the external risks of their driving, their risk of crash and injury would be reduced and society as a whole would be better off. The elderly, however, are likely to be worse off as a consequence of reduced mobility.'

Urban mobility and connectivity or lack thereof, i.e. having the ability to reach to and use food and service networks of the city, is a critical issue in terms of food security. According to Lister [8], 'While Toronto has a wide variety of food choices, there are clearly gaps in the urban fabric where basic access to high-quality food is a problem, particularly for low-income residents, who are often new immigrants and senior citizens with limited mobility. . . Furthermore, food prices in low-income urban areas are often the same or higher than in more affluent neighbourhoods. When prices were analyzed across Toronto, the [prices in] poorest neighbourhoods were second only to the wealthiest.' Furthermore, Shigley [9] adds that in San Francisco's Tenderloin district, 'nearly 30,000 residents lack easy access to basic grocery stores. According to 2000 census, about one-quarter of Tenderloin residents live below the poverty line. A handful of ethnic markets and corner stores provide a smattering of fresh fruits and vegetables, but most of the food available in area's convenience shops and liquor stores hardly qualify as nutritious.' He goes on to report that 'the 2008 study 'Designed for Disease' found that people with higher Retail Food Environment Index score – that is with greater access to fast food and convenience stores than grocery stores – were more likely to be obese and diabetic.'

Bhatt et al. [10] also brings up another group with similar issues: 'In studies related to food security, an often-overlooked subgroup is the disabled population. While data are not readily available for Montreal, recent studies of Toronto by Lister (2008) revealed that 48% of food-bank clients are disabled. Social isolation and food insecurity too often afflict those who have problems with physical mobility. It is vital to address the needs of this largely invisible group.'

Southern Cities

Cities are economic and developmental motors and are seen as beacons of hope by millions of rural migrants trying to escape poverty, hunger or conflict. As a result, urbanization in developing countries is more intense than in the North and the scale of it also remains unprecedented [11]. In recent times, the WHO [4] states that 'the growth of urban areas in low-income countries has been four times faster than the growth in high-income countries. In addition, while large cities of developing countries will account for 20% of the increase in the world's population between 2000 and 2015, small and mid-size cities (less than 5 million) will account for 45% of this increase.'

One negative consequence of the rapid urbanization is that an ever-growing number of urban poor are now left to fend for themselves because the local formal systems are unable to accommodate or absorb new urban migrants. In sub-Saharan Africa and in South Asia, the portion of the urban population living in informal settlements is often greater than the portion residing in formal areas. The slum population, currently estimated at 1 billion, could rise to 1.5 billion by 2020 [12]. As Mike Davis [13] notes, our globe is rapidly becoming a planet of slums. The physical as well as the food security needs of this other half, which is the broad target group of the UN Millennium Development, urgently needs to be addressed. Few solutions, however, are forthcoming.

Urban Design and Urban Agriculture for Healthy Cities

To address the critical need of food security and health of economically disadvantaged slum dwellers in the South and socially isolated mobility impaired individuals in the North, the MCHG of McGill University has initiated several action-research projects under my direction. Established with the assistance of the Canadian Federal Government in 1970, the MCHG is a research unit of the School of Architecture with an international orientation that focuses attention on the human settlement problems of the poor. Our wide experience has taught us that there are no absolute or clear-cut solutions to the complex problems of human settlements because their context significantly varies from one case to another. Therefore, housing research and contextualized problem-solving is a paramount activity of MCHG. In the new millennia, MCHG started a new program entitled 'Making Edible Landscapes', which is a research initiative to study and demonstrate the significance of productive planting or urban agriculture in cities and seek out ways to incorporate these activities in their respective contexts.

According to Resource Centers of Urban Agriculture and Food Security:

> 'Urban agriculture can be defined shortly as the growing of plants and the raising of animals within and around cities. . . The most striking feature of urban agriculture, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological system: urban agriculture is embedded in – and interacting with – the urban ecosystem. Such linkages include the use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans, etc. Urban agriculture is not a relic of the past that will fade away (urban agriculture increases when the city grows) nor brought to the city by rural immigrants that will lose their rural habits over time. It is an integral part of the urban system.'

Urban agriculture cannot become an integral part of the urban system on its own, more attention needs to be paid by the design professionals, such as architects, planners and urban designers, to the needs of urban agriculture. There is growing demand for it, but little concerted action. Most of the actions in this field have been done in isolated fashion and in a policy vacuum. For example, our research has shown that Montreal's Community Gardens Programme, one of the largest in North America with more than 90 allotment gardens serving more than 9,000 clients, was developed in a piecemeal fashion and mostly in response to community demand. Similarly, the celebrated White House vegetable garden that was launched by Michele Obama, First Lady of the United States, underscores the same point. Users and communities are demanding action from our municipal authorities and professionals; however, because the action is not forthcoming, they are often taking matters into their own hands. The spread of informal urban agricultural activities of the slum dwellers also proves the same point.

Action-Research Projects

To redress this disconnect, our team has worked on several action-research projects. These creative urban design solutions have tried to integrate urban agriculture within the urban systems to tackle the complex problem of food security. The following is a short description of how these urban design and urban agriculture projects were realized with community action. Two types of pilot projects, comprising three actual schemes are included, namely: (1) 'Edible Campus', which is an urban agriculture project driven by a community-university partnership for the mobility-impaired in Montreal, Canada, a northern city; and (2) 'Making the Edible Landscape Project', which is urban upgrading (slum upgrading) combined with urban agriculture in the southern cities of Colombo, Sri Lanka, and Rosario, Argentina.

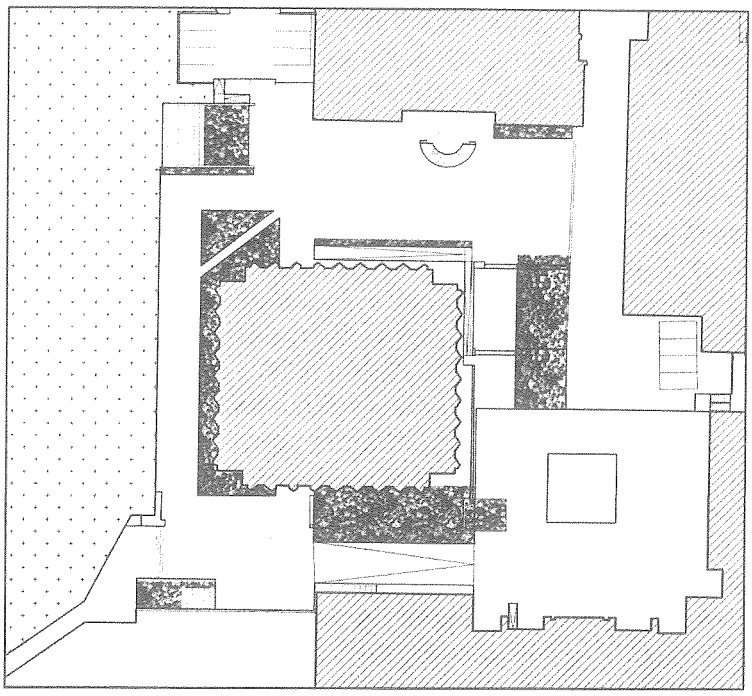


Fig. 1. Plan of the McGill Edible Campus Project: garden layout including of the 2010 expansion.

Making the Edible Campus

In the spring and summer of 2007, our team of volunteers and researchers from Alternatives and Santropol Roulant (two leading NGOs) and the MCHG designed and incorporated a productive growing operation in a concrete-covered prominent urban corner of McGill University's downtown campus. The result, the Edible Campus, was a 120 m^2 container garden that involved citizens in the creation of green, edible community spaces. The Edible Campus has also demonstrated how productive planting can be woven into urban spaces without diminishing their utility or functionality, while at the same time exploring strategies for increasing food production in the city and improving spatial quality by exploiting underutilized and neglected space [14] (fig. 1).

Who Cares for the Garden?

In summer time, the ideal period for growing in Canada, there are not many students on the campus of the University. Therefore, the Edible Campus is maintained by volunteers. Many of them are, of course, from the University, but a large number also come from nearby offices and other commercial institutions. Planting is done in self-regulated containers, and therefore, the upkeep of the garden is rather limited. We maintain three weekly shifts of a few hours in duration to which volunteers can sign up for. Santropol Roulant maintains a list of volunteers, both for the garden and their 'meals on wheels' kitchen, as that is also taken care of by volunteers, which is the only effective way to build up and maintain such community-based programs. Saturday morning shifts are generally reserved for parents with children, which allows us to introduce youngsters to the questions of 'how to', 'what' and 'why' of urban gardening. This has emerged as a very successful educational component of the program. Following its lead, other summer camps which are run on the campus also use our garden as an educational and entertainment place for their sojourns (fig. 2, 3).

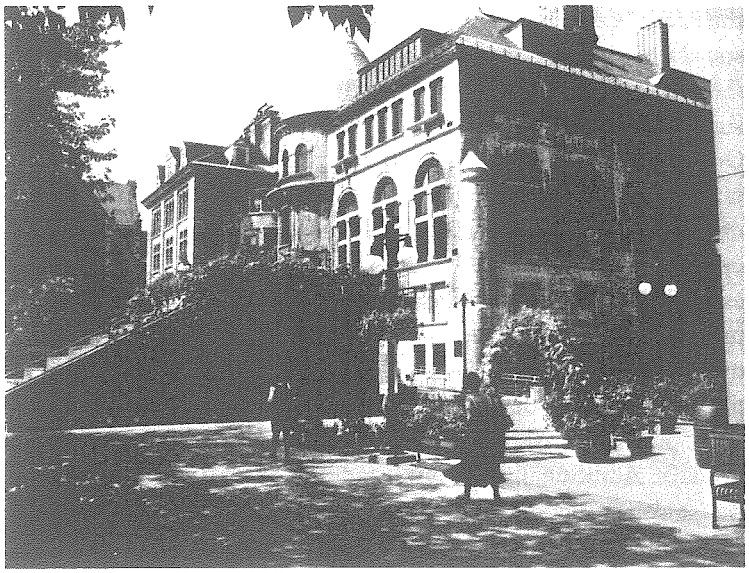


Fig. 2. Productive planting can be woven into urban spaces without diminishing – rather enhancing – their utility.

Fig. 3. Volunteers taking care of the garden.

Where Does the Produce Go?

Another, as well as the most significant, aspect of the project is its target beneficiaries. Gardeners do not partake in the harvest of the Edible Campus. The harvest from the organic garden is primarily used by Santropol Roulant for their 'meals on wheels' program which delivers freshly produced nutritious meals to between 80 and 100 mobility-impaired clients, a good number of whom are also elderly. Santropol Roulant aims not only to meet

their clients' dietary needs, but also to break their social isolation.

The warm period in temperate Canada is short, so the growing season runs from March to October. Nevertheless, from the month of June onwards, our seasonal garden was able to meet more than 30% of the daily needs of the 'meals on wheels' program. In the past 3 years, we have expanded the garden and were able to share fresh produce baskets with needy families living in an under-serviced neighborhood. With the latest expansion of the garden, introduced in May 2010, we hope to meet a target of 50% of the fresh daily produce. Additionally, it is important to note that we are also producing more than 25 different types of vegetables, including cucumbers, eggplants, tomatoes and squash, and about 10 fine herbs, such as basil, parsley and thyme. Therefore, we are able to maintain a wide variety and the best organic quality and freshness of produce.

Making the Edible Landscape

'Making the Edible Landscapes' questions our attitudes to urban landscaping. Traditionally, cities are seen as centers of food consumption and rural areas as places of production by both local authorities and designers – we tend to create city landscapes for beauty, not utility. With this in mind, why not make landscapes which are also productive – edible? 'Making the Edible Landscapes' demonstrates the productive aspect of urban landscapes and also manages to create more democratic cities by embedding these initiatives in urban upgrading projects in poor districts. More importantly, in the design process, urban agriculture was made a permanent feature of neighborhood planning and housing design. With funding support from the International Development Research Centre, MCHG of McGill University and Urban Management Program of the United Nations Human Settlements Program, we coordinated this action-research project in collaboration with the ETC-Urban Agriculture Unit in the Netherlands.

Case 1: Rosario

Rosario. Location and City Background. Rosario, located in the Province of Santa Fe in Argentina, is situated on the right bank of the Parana River and is divided into six districts: center, north, north-east, west, southwest and south. The north-east and west are the largest sectors (44 and 40 sq km, respectively), and the south is the smallest (19 sq km). One of the upgrading projects we worked on was situated in the west district and another one in the south district. Rosario has a population of about a million inhabitants. Following the economic crisis of 2000, a significant percentage (42%) of the population faced poverty, of which 17% were in extreme poverty by 2004 [15]. Of the total area of 17,869 Ha, 12,357 Ha is considered urban while the remaining 5,512 Ha are considered rural. Additionally, the Municipality of Rosario has a density of 50.86 inhabitants per Ha, but it is important to note the difference between urban and rural densities. While the urban density is very high, reaching 73.46 inhabitants per Ha, the rural densities (and mostly in peri-urban areas) are extremely low at 0.21 inhabitants per Ha. Our upgrading and urban agriculture-related interventions were in two communities, namely Molino Blanco and La Lagunita, both of which are situated in peri-urban low-density zones. Therefore, it was relatively easy to integrate productive growing in these localities.

Rosario Team. The local team in Rosario included the following partners: the Municipality of Rosario, in particular the Municipal Urban Agriculture Program and the Directorate of the Housing Public Service (SPV); the Center for Urban Environmental Studies (Centro de Estudios del Ambiente Urbano; Faculty of Architecture); National University of Rosario; and the Centre for Agro-Ecological Production Studies (Centro de Estudios de Producciones Agroecologicas.

Slum Upgrading and Urban Agriculture. In early 2000, Rosario had 91 irregular settlements housing almost 115,000 inhabitants (13% of the total population), and these settlements occupied 10% of the developed land. In 2001, the municipality launched the Rosario Habitat program, aimed at abolishing the existence of the two parallel cities – the poor and the rich – by upgrading the city's excluded settlements. The sites to be upgraded were chosen based on the environmental risks that they faced, such as lack of sanitation, roads and lands prone to inundations. Additionally, informal settlements were to be regularized. The potential impact of the project, therefore, was seen as truly democratizing. The program was cofinanced by the Inter-American Development Bank (60%) and the Municipality of Rosario (40%). Therefore, we had to adhere to a number of design norms such as extra wide road widths and other parallel infrastructure, which required us to relocate an additional number of residents in the upgrading process. Nevertheless, we were able to turn around this handicap by utilizing these extra widths by incorporating urban agricultural activities within the public right of ways. We managed to create places for urban agriculture-related activities such as market stalls, covered shelters and semi-greenhouse spaces and places for animals, by creating what we termed 'productive streets'. Yet another inherent advantage of the existing Rosario neighborhoods was the relatively large plot sizes. Most of the plots varied between 150 and 250 m^2, which allowed residents to have not only reasonably sized ground related-dwellings, but also a small garden or a vegetable patch as a part of the homestead. As a part of the Edible Landscape Project we did not initiate any growing on individual plots, which was left up to individual families. Instead, our urban agriculture efforts were focused on collective lands near and around the existing and newly planned settlements.

Places for Collective Urban Agriculture. Rosario City had vacant land available that could be used for urban agriculture. In fact, the existence of a great variety of undeveloped land – private and public – offered a great opportunity to a wide range of groups of urban poor to improve their economic condition by putting into use the existing underused land. The vacant land in the Municipality of Rosario was both public and private: more than half of it belonged to the private sector, but there was still a good amount of land in government hands which could be used for urban agriculture. As a part of another earlier project, an inventory of all vacant lands in the city was developed with the help of the geographical information system. Based on that study and other information from the city, three sites on such lands were identified for the Edible Landscape Project: Molino Blanco South (original), Molino Blanco West (new) and La Lagunita.

Molino Blanco South (Original) and West (Newly Built). These sites are situated at the southern fringe of the city limits. It housed approximately 1,000 families and the site was chosen because of its potential for incorporating a productive park and urban renewal within a planned street grid. The site measured approximately 20 Ha and belonged to the municipality, therefore, there was no conflict of ownership. As part of the city's upgrading program, the settlement could be regularized, thus giving titles to the residents and bringing them the basic municipal services such as potable water, sewage, drainage, gas, electricity, paved roads and pedestrian paths. Unfortunately, about 30% of the population had to be displaced, as their homes were on an area prone to flooding. However, the Municipality of Rosario arranged a new site to resettle the displaced families – the new Molino Blanco West. Thus, the Making the Edible Landscape Project in Molino Blanco South focused on the potential for creating an urban agriculture demonstration on the flood-prone areas, plus incorporating urban agriculture features within the street grid proposed in the current upgrading program (fig. 4, 5).

Fig. 4, 5. The land that previously was not utilized and collected garbage and debris was transformed into community gardens.

The MCHG produced design proposals exploring ways to work with the community to enhance and include qualities already present in the informal settlement. As a part of the upgrading project, the residents who were dislocated from Molino Blanco South (original) were relocated to the south-west limits of the city, in a settlement appropriately named Molino Blanco West (newly built), a community of 224 new dwellings. The SPV was responsible for the design of these new dwellings and the layout of the community. The design proposal included housing plots varying in size from 100 m^2 to 122 m^2, with smaller plots facing main streets and larger ones having inner locations. It is important to note that this proposal also provided residents with basic municipal services and growing opportunities. It was remarkable that as residents were being relocated from Molino Blanco South to West, they began to add to their new dwellings. Additionally, in their move, many families chose to uproot and bring with them trees from their pervious homesteads which were being destroyed (fig. 6).

La Lagunita. Another neighborhood that was upgraded as a part of this exercise in collaboration with the SPV was La Lagunita, which was comprised of 253 dwellings with a population of about 1,000 residents. In this case, the residential area that was once a slum was upgraded by bringing appropriate services and giving land titles. In addition, we introduced a public park that was conceived as a comprehensive public green area or 'productive plaza' (plaza productiva). The design of the plaza included a number of urban agriculture features such as a demonstration area, collective planting space, and picnic and play areas for basketball and football. The project was conceived as a participative and consultative design process, working in close collaboration with the local community and partners. Many of the residents of La Lagunita work as garbage collectors in the city and use horse-drawn carriages to transport the recycling waste that they bring back to the neighborhood to sort and sell. It is critical to have an appropriate place for their animals. In order to accommodate the horses, a stable was incorporated into the design of the public park. The productive plaza was inaugurated in 2007 and continues to serve as an ideal outdoor leisure and play area combined with an exemplary productive growing place for families living in the vicinity. Concerning the Rosario Urban Agriculture and Urban Upgrading Project, we were able to combine urban design with urban greening that promoted preservation of open spaces for natural habitats, active recreation and multifunctional

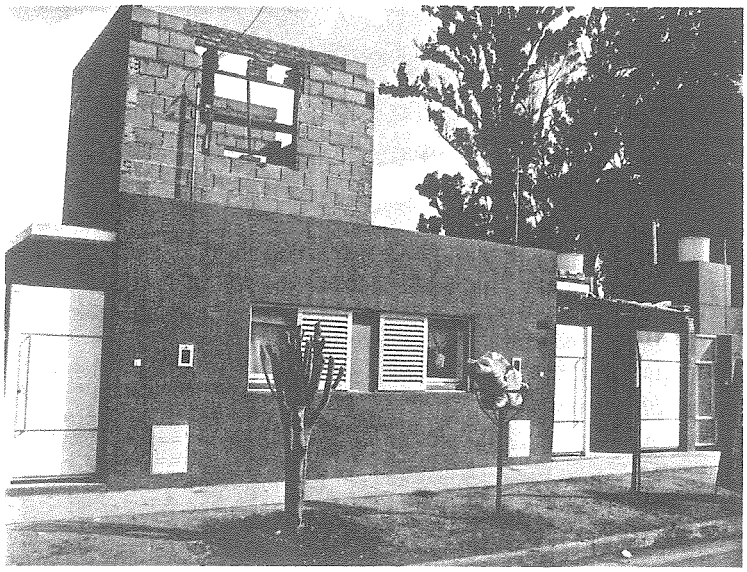


Fig. 6. Molino Blanco West. Residents relocated from Molino Blanco South expanded their new homes and landscaped the sidewalks (notice two fruit-bearing trees planted in front of the house), and the community developed a stronger identity.

agriculture. Furthermore, we were able to illustrate the benefits of integrating food production into the design and management of spaces to improve food security and reduce malnutrition in cities, reduce poverty by enabling income generation, and improve the urban environment by making cities more habitable [16] (fig. 7, 8).

The Impact of the Upgrading and Urban Agriculture Initiative. There is no doubt that the residents of the upgraded neighborhoods and those who were relocated in the new development have benefited from the physical upgrading and, more importantly, from the security of tenure. The urban agriculture component is directly helping the beneficiaries of the project because they can utilize their own grown produce. Additionally, the urban agriculture component of the project is large enough that participants are producing much more than they require and consume at home. This is possible because of the technical help that the urban agriculture department of the city is providing. The city helped residents in setting up an exemplary organic growing operation; they helped prepare the grounds, provided supplies for fencing the growing areas, and gave lessons on how to practice composting, worm-composting, natural organic feeding systems of plants, etc. The city also helps the producers with marketing their produce via a network of markets which are setup in prominent locations in the city. Now, quality, fresh produce that is certified organic is easily available to the middle- and high-income residents at their doorsteps. Thus, the Rosario urban agriculture initiative is able to address the double whammy of food security and quality fresh produce for the segment of the population that is getting obese.

Case 2: Colombo

Colombo, Location and City Background. Colombo, the capitol of Sri Lanka, is a port city that was built by its colonial rulers. To the north, the city is bounded by a river and to the west by the sea; the south and east boundaries adjoin two municipalities. The northern part of the city is on a relatively high elevation where the residential quarters of colonial rulers were first built. This area is currently a congested low- and middle-income

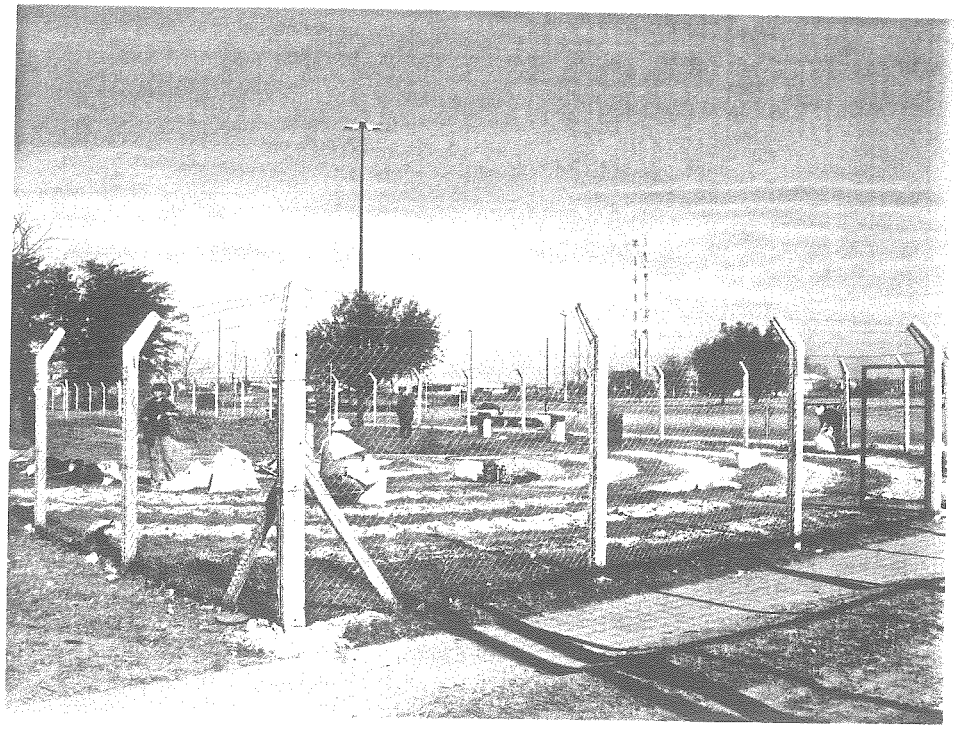


Fig. 7, 8. Different stages of the La Lagunita community's productive plaza garden. Images courtesy of Marielle Dubbeling.

area. The central business district is located in and around the Port of Colombo and towards the southern direction. High-income areas are located towards the south-east, while low-income communities are located on the east and northern periphery of the city.

The average population density as per the 2001 census was 172 persons per/ha, but this is not evenly distributed. The most dense areas are found in the pockets of informal settlements and the inhabitants living in these underserved areas accounts for about 50% of the city population. Of the total housing stock, about one half belongs to middle- and high-income, while the other half belongs to the low-income population. The low-income housing stock has been subdivided into several categories depending on the nature of the structure. According to a city-wide survey of low-income resettlements carried out by the Ministry of Urban Development and Housing in 1998/99, the following subcategories of low-income settlements were identified: slums (25,000), shanty slums and squatters (13,313), relocated housing (14,814), old deteriorated quarters (2,757) and unplanned pavement dwellings (870). Accordingly, more than half of the low-income families are living in slums and squatter housing.

Slum Upgrading and Urban Agriculture. The city of Colombo, for that matter the island nation of Sri Lanka, has a long history of slum upgrading programs. A number of programs initiated by various agencies and implemented by governments of various shades and political leanings have implemented them. The key ones among them are the following:

- UNICEF-assisted Urban Basic Service Improvement Program (UBSP) implemented between 1978 and 1986.
- The Slums and Shanty Improvement Program implemented by the Urban Development Authority from 1978 to 1984.
- The Million Houses Program implemented by the National Housing Development Authority, realized between 1984 and 1989.

According to the official city policy, it is estimated that as many as 70% of low income houses have been upgraded and or improved under the government-led housing improvement initiatives implemented in the city since 1978. This is a significantly high number compared to many other cities in South Asia; nevertheless, much still remains to be done. When we started the Edible Landscape Project in Colombo in partnership with the Colombo Municipal Corporation and Sevanatha, a local NGO involved in urban development, there was no major housing improvement program in the city. But within the context of the small upgrading initiative supported by the Dutch Government and the UN ESCAP we were able to identify Halgaha Kumbura, an old slum on the eastern edge of the city that lacked most services, as an ideal candidate for urban upgrading.

Land Use and Urban Agriculture. According to the plan developed by the Urban Development Authority of Colombo, the following land use pattern was identified: residential, 1,402 Ha (37.60%); commercial, 225 Ha (6.03 %); institutional, 411 Ha (11.02%); industrial, 149 Ha (3.99%); cultural, 249 Ha (6.68%); transportation and utilities, 983 Ha (26.36%); vacant and nonurban uses, 262 Ha (7.03%); and other, 48 Ha (1.28%). Based on these gross numbers, the Colombo Municipal Corporation postulated that there were enough opportunities in the city to incorporate urban agriculture on vacant lands in the city. However, within the context of Halgaha Kumbura, the neighborhood to be upgraded, there was hardly any free land available for urban gardening and our team was forced to consider growing within the restricted confines of the settlement (fig. 9, 10).

Halgaha Kumbura Low-Income Settlement. Halgaha Kumbura measures approximately 10 acres (about 4 Ha), housing 2,742 people living in 556 dwellings. Of these, only 79 (less than 15%) can be considered permanent housing units. The settlement was formed by illegal occupation of an area formerly used as a dumpsite, next to a canal.

Fig. 9. Plant nursery in the backyard of the ayurvedic pharmacy.

Fig. 10. Distribution of the plants from the ayurvedic pharmacy.

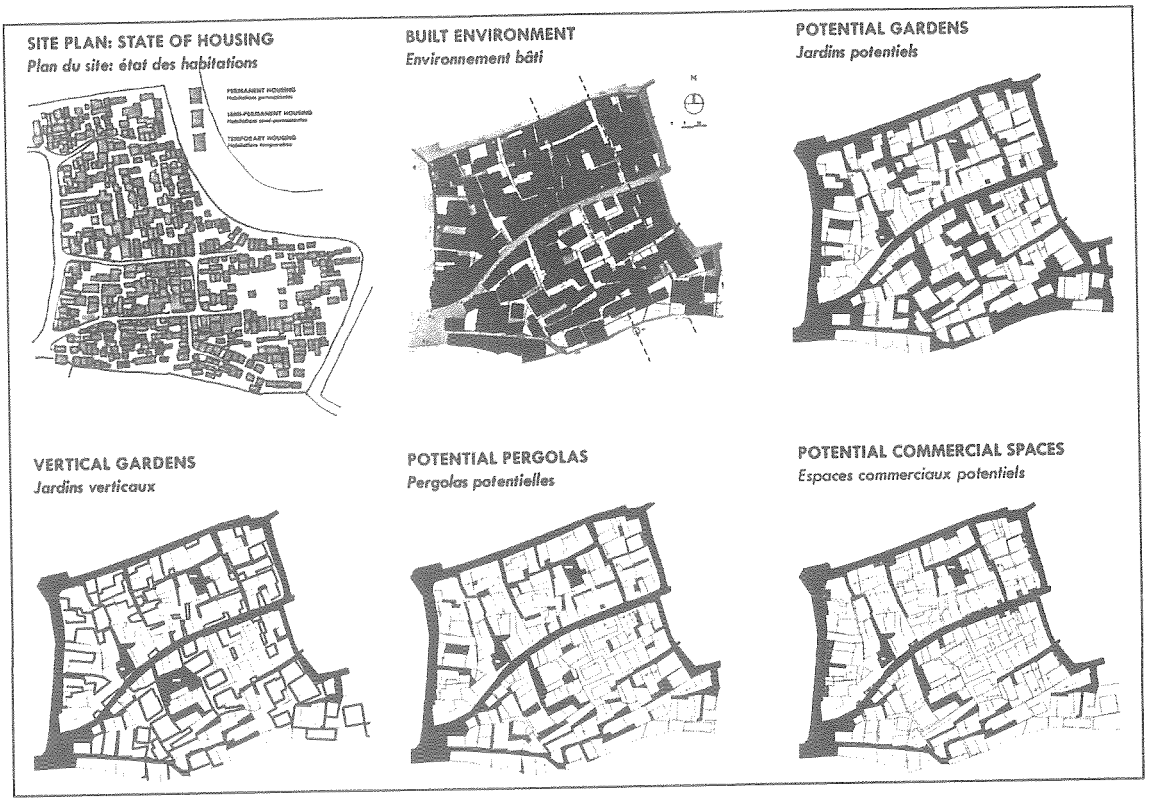


Fig. 11. Halgaha Kumbura is very dense with limited space for growing, so we incorporated growing of nutritional supplement in tight and vertical locations.

The settlement lacks common facilities, especially because of the dense layout; still there are a number of religious shrines to be found here. The main occupation of the residents here is unskilled labor and informal business activities. The average monthly income per family is estimated at LKR 4,000. It is a very low-income neighborhood, but the community is strong and has managed to be recognized by the local authority and have acquired residential voting rights to elect members for the municipal council and national assembly. Sevanatha, our NGO partner, coordinated the urban agriculture and upgrading by mobilizing the community. Existing community organizations were strengthened through the existing community development councils established by the Public Health Department of Colombo Municipal Council. Four community development councils were formed by demarcating the settlement into four zones based on the physical boundaries of the community [17]. Working closely with the community, including sweat equity involving almost all citizens, the neighborhood was upgraded one lane at a time. (fig. 11).

Urban Agriculture Challenges. Compared to the neighborhoods of Rosario, which were being upgraded, Halgaha Kumbura is much denser. The average lot size in Halgaha Kumbura is only 50 m^2 and there was hardly any growing place available on individual plots. The situation was not very different in the public realm either. The design team made special efforts to incorporate growing

in tight places and even in vertical locations along walls and laneways. The agriculture department helped in this regard by arranging on-site demonstrations for the community on how to grow in containers, vertical places and specially designed growing columns.

Growing Nutritional Supplements. Since the growing areas in Halgaha Kumbura were limited, our team worked closely with the Public Health Department of the Colombo Municipal Council, particularly the ayurvedic department, which runs a network of more than 25 clinics throughout Colombo. It is remarkable that the city runs a parallel system of clinics: one traditional ayurvedic and another western allopathic. Ayurvedic medicine is the traditional system of treatment based on the use of herbs, massage and other natural treatments. Its knowledge of therapeutic and nutritive qualities of different plants is well recognized. Like the allopathic clinics of the city, ayurvedic clinics also maintain a rigorous record of their patients' health profiles. Based on their records, we were able to determine some key dietary deficiencies of residents living in the neighborhood of Halgaha Kumbura. Fortunately, this complex task proved to be relatively easy as the main pharmacy of the ayurvedic network, which produces a good portion of their medications, and a large affiliated clinic are located next to Halgaha Kumbura. The idea was to meet these deficiencies with the help of dietary supplements. However, instead of seeking medicinal supplements, we opted for plants and herbs which could form a part of the habitual diet or could easily be incorporated into daily food items, e.g. porridge, and were high in the required food supplements, e.g. iron. We expanded the nursery in the pharmacy compound to grow special herbs and plants. Plants, seedlings and cuttings were distributed among the community to promote their growing and use in daily cooking. Elected officials and administrators of the highest level, including the mayor and governor of the capitol region, participated in the distribution process to signify the importance of this venture (fig 12, 13).

The Impact of Upgrading and Urban Agriculture Initiatives. Halgaha Kumbura was divided into four quadrants to facilitate participative upgrading, and this worked well. Moreover, the actual upgrading that was done lane-by-lane also proved effective, and since any preconceived abstract widths and alignments of the lanes was not considered critical to the upgrading, none of the original residents were required to move for the upgrading process. The entire upgrading exercise has progressed well, but at a relatively slower rate compared to the other project. This is because of limited local resources. The level of community participation in the upgrading process on the other hand, particularly in terms of design decisions and the actual physical work – sweat equity – in transporting materials and supplies and the construction work, was outstanding. Men, women and children of all ages pitched in by moving concrete components, hauling gravel and mixed concrete. Masons and builders provided professional help in installing drains and for the construction of roads and pavement areas. Through working in the evenings and over weekends, most of the upgrading was done. The uptake of urban agriculture has proven uneven. Some families have shown great initiative, while others have been reluctant to partake in the process. We have not had an opportunity to determine why this is so.

Conclusions

Concerning the Edible Campus, we have been able to maintain an effective community-university partnership and reach out to needy clients. We are entering the fourth season of this program and the success of it has inspired other new initiatives on other university campuses. As mentioned earlier, we have been able to expand the garden and keep up the good volunteer force to take care of this activity. Really needy and targeted clients are

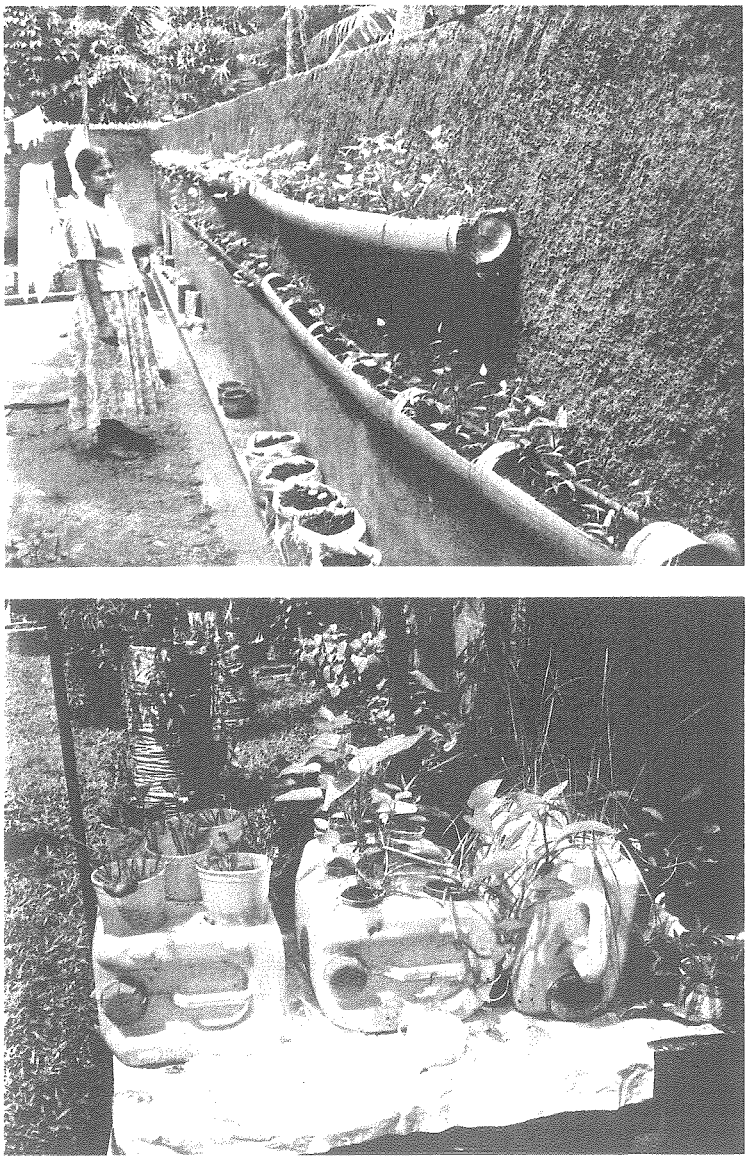


Fig. 12, 13. Vertical growing and use of recycled containers.

benefiting from the fresh produce via creative urban design and community action. In addition, the university campus has benefitted enormously. We have transformed a bleak underused urban space into an attractive garden. Both the Rosario and Colombo upgrading and urban agriculture projects were realized in 2005–2006.

We strongly believe that urban agriculture benefits those who practice it and the surrounding community. These benefits range from upgrading of the physical fabric of the community to enhancing its economic viability, social participation and, of course, health benefits of fresh produce to the residents. Due to the limitations

of the project framework, the quantitative information of health benefits and shortfalls of the Edible Landscapes Projects cannot be accounted for. In this respect, the involvement of medical researchers is crucial in building an evidence-based case for urban agriculture. Therefore, this already interdisciplinary approach to urban agriculture would greatly benefit from the active participation of the medical research community. We hope to attract ever more disciplines, such as social scientists and management experts, to contribute their expertise in creating healthy and sustainable communities regardless of their economic conditions.

Since the initial launch and completion of a good portion of these Edible Action Research Projects, enough time has elapsed to do longer term impact analyses of these initiatives. This study may include the economic impact for beneficiaries, indirect economic impacts for the city (reduction in landscape management costs, less criminality, reduction in waste management costs), social impacts (social ownership of open space), and health and environmental impacts. Such tracking could be time consuming, would require an interdisciplinary team and could be expensive. Currently, I am seeking able and interested partners and funding for this.

Note

The information about individual cities and communities described is based on the City Dossier received for Making the Edible Landscape Project (June 2004) as a part of the selection process when city partners were chosen for this action-research project.

Acknowledgement

My special thanks to Ms. Ksenia Kagner for her help with the graphics of the paper and her valuable comments and input regarding the overall impact of the Edible Landscape Project.

References

1 James P: Obesity prevention: the role of brain and society on individual behavior; in Dube L, Bechara A, Dagher A, Drewnoski A, Lebel J, James P, Yada RY, Laflamme-Sanders MCE (eds): Obesity Prevention: The Role of Brain and Society on Individual Behavior. San Diego, Elsevier, 2010.

2 Sinha K: Chronic disease to bleed India. Health Administrator 2009;12:46–47.

3 World Health Organization. The World Health Report 2002. Reducing Risks, Promoting Healthy Life. Geneva, WHO, 2002.

4 WHO: Why Urban Health Matters: 1000 Cities 1000 Lives. Geneva, WHO, 2010.

5 Pisarski A: Commuting in America III: The Third National Report on Commuting Patterns and Trends. Washington, Transportation Research Board, 2006.

6 Eden Prairie Department of Community Planning. Active Community Planning: Site Planning Guide. City of Eden Prairie, Minnesota, 2007.

7 Chu X: The Effects of Age on the Driving Habits of the Elderly. Tampa, University of South Florida Center for Urban Transportation Research, 1994.

8 Lister NM: Toronto's foodscape: from food desert to and edible landscape; in Borasi G, Zardini M (eds): Actions: What You Can Do with the City. Montreal, CCA, 2008, pp 168–179.

9 Shigley P: When Access Is the Issue. Washington, American Planning Association, 2009.

10 Bhatt V, Farah LM, Luka N, Wolfe JM, Ayalon R, Hautecoeur I, Rabinowicz J: Reinstating the roles and places of productive growing in cities. The sustainable city 2008. Wessex Institute of Technology, Skiathos, September 2008.

11 Bhatt V: Integrating urban agriculture with urban upgrading; in Zardini M, Borasi G (eds): Actions: What You Can Do with the City. Montreal, Canadian Centre for Architecture, 2008, pp 92–93.

12 Agropolis; in Luc J, Mougeot A (eds): The Social, Political and Environmental Dimensions of Urban Agriculture. London, Earthscan and IDRC, 2005.

13 Davis M: Planet of Slums. London, Verso, 2006.

14 MCHG. http://www.mcgill.ca/mchg/ (accessed 2010–07–09).

15 Dubbeling M, Bracalenti L, Lagorio L: Participatory design of public spaces for urban agriculture, Rosario, Argentina; Open House International, Vol. 34, No. 2. 2009, Ed. Rene and Joanna, Ottawa, Canada, pp 36–49.

16 Lattuca A, Terrile R, Bracalenti L, Lagorio L, Ramos G, Moreira F: Building Food Secure Neighbourhoods in Rosario; Urban Agriculture, RUAF, December 2005, pp 23–24.

17 Jayaratne KA: Urban agriculture as a mechanism for urban upgrading; in: Urban Agriculture. RUAF, 2005, pp 21–22.

Further Reading

Agriculture in Urban Planning: Generating Livelihoods and Food Security. London and Ottawa, Earthscan and IDRC, 2009.

Bhatt V, Farah LM, Luka N, Wolfe JM, Hautecoeur I, Rabinowicz J: Making the Edible Campus: a model for food secure urban regeneration. Special issue on 'Designing Edible Landscapes. Open House International 2009;34:81–90.

Bhatt V, Kongshaug R (eds): Edible Landscapes, A study of Urban Agriculture in Montreal. Minimum Cost Housing Group. Montreal, McGill University School of Architecture, 2005.

Dannenberg AL, Bhatia R, Cole BL, et al: Growing the field of health impact assessment in the United States: an agenda for research and practice. Am J Public Health 2006;96:262–270.

Dannenberg AL, Bhatia R, Cole BL, Heaton SK, Feldman JD, Rutt CD: Use of health impact assessment in the United States: 27 case studies, 1999–2007. Am J Prev Med 2008;34:241–256.

Dubbeling M, Bracalenti L, Lagorio L: Participatory design of public spaces for urban agriculture, Rosario, Argentina. Open House International, Designing Edible Landscapes, Vikram Bhatt and Leila Farah Eds., Vol. 34, No. 2, 2009, pp 36–49.

Edwards M, Haines A: Evaluating smart growth: implications for small communities. J Plan Educ Res 2007;27:49–64.

Farah L, Bhatt V: Cultiver des territoires squattés. International colloquium, Les agricultures périurbaines: un enjeu pour la ville. Vers des projets de territories, Nanterre, October 2007.

Lister NM: Placing food; in Knechtel J (ed): Food – Alphabet City No. 12. Cambridge, MIT Press, 2008, pp 148–185.

Wrigley N: 'Food deserts' in British cities: policy context and research priorities. Urban Studies 2002;39:2029–2040.

Wrigley N, Warm D; Margetts B, Whelan A: Assessing the impact of improved retail access on diet in a 'food desert': a preliminary report. Urban Studies 2002;39:2061–2082.

Vikram Bhatt
Professor School of Architecture, Director, Minimum Cost Housing Group, McGill University
815 Sherbrooke Street West
Montreal, QC, H3A 2K6 (Canada)
Tel. +1 514 398 6723, Fax +1 514 398 7372, E-Mail vikram.bhatt@mcgill.ca