

A CITY COMPILATION

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Traditional food specialties in Riga. Photo: Didzis Grodzs

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Solid Waste Recycling in Addis Ababa, Ethiopia: Making a business of waste management



IBH

Training crop production using soil mixed with bio compost

The major partners in this Solid Waste Management (Bio Recycling) project are: Bioeconomy Association (BEA) – Non-governmental organisation Addis Ababa City Administration (Clean, Beautification and Park Agency) – Governmental organisation Arada Sub City of Addis Ababa – Governmental organisation Birhane Clean and Environment Sanitation Association – Private business organisation.

Solid waste management is a major challenge facing the cities in the developing world. The commercial recycling of organic waste into a valuable organic fertiliser called “Bio-compost” is new in Addis Ababa and it is having a noticeable impact on improved organic waste management and urban agriculture.


Integrated Biofarm Enterprise (IBE), a private limited company in Ethiopia, began operations in Addis Ababa in 1998, based on a philosophy of working with nature to achieve high

quality, sustainable productivity and low levels of waste and environmental loss. Since then, IBE has served as a national model for waste management, environmental restoration, resources management and food production to benefit the surrounding community (Getachew Tikubet, 2002).

For the past eight years, IBE has also functioned as a training and demonstration centre. It now also operates field stations in different regions of the country (Assella, Mekele, Assossa and Gurage), which strengthen training and research opportunities has involved urban organic waste recycling and utilisation in collaboration with different partners.

The major objectives of this project are to increase awareness, set up the production of organic fertiliser from solid waste collected from residential areas and marketplaces and stimulate its use for urban and rural agriculture.

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ORGANIC SOLID WASTE

Organic solid waste is collected from the central fruit and vegetable marketplace in Addis Ababa and from residences and shops located around the market. Tackling this waste takes up a considerable part of the municipality's budget.

The *assembly* of wastes occurs at two levels. The first is at market and household level. The fruit and vegetable wholesalers and retailers at the market collect wastes in garbage tanks, while waste from residences and shops around the market area is collected by a private business organisation called Birhane Clean and Environment Sanitation Association. A fee is paid for this service to the association. The second level of assembly from the market area to the project area and other dumping areas is carried out by the municipality. About 40 m³ or 3500 kg organic waste is collected from this market area per day. But only 16 m³ or 1400 kg is used for this project because of capacity problems. The rest needs to be dumped outside the city by the municipality. IBE received about 534,000 kg of waste in 2006. Separation of organic wastes from non-organic wastes and sorting are done at both levels of collec-

tion. The non-organic wastes go to other industries, and the income generated by this is designated for Birhane Clean and Environment Sanitation Association.

The various participants in the waste management system all learn about proper handling, collection, sorting, transportation and loading. In addition, training is given to 100 youths employed by the Birhane Clean and Environment Sanitation Association, who participate in the solid waste management process with the assistance of the Bioeconomy Association (BEA).

The compost preparation area of IBE in Addis Ababa is located 6 km from the waste source area. The project uses an above-ground compost preparation method to recycle the organic waste. Each phase of the process takes about three months, and IBE completed three phases in the past year; hence it converted the 534,000 kg of waste into 265,800 kg of bio-compost, which was sold packed and unpacked.

BEA determined the nutrient content of the bio-compost through laboratory tests conducted by the International Livestock Research Institute (ILRI). These showed that it provides more than the average nutrient requirements for plant growth and by far more nutrients than the local soil prepared with the inorganic fertilisers DAP and Urea. The high percentage of organic matter in the bio-compost, which is not present in the inorganic fertilisers, also gives the soil better structure, water absorption capacity and aeration. In addition, bio-compost is applied usually only once every 2 to 3 years, making it less expensive to use than inorganic fertilisers, which are applied every year.



The bio-compost is packed in plastic bags that are sealed and labelled with

a bio-compost logo in two languages, English and Amharic (the local language), a list of ingredients, available nutrients, instructions for use and a contact address. The bags are prepared in three different weights, 2 kg, 4 kg and 25 kg, intended respectively for small and medium size compost beneficiaries and middlemen (super markets). In addition, 100 kg bags of bio-compost are packed without a seal or label. These are used by IBE or sold to direct customers. Certification is in progress and IBE has already been granted official support and recognition for this by the Ministry of Agriculture and Rural Development and the Environmental Protection Authority.

The standard instructions for use of bio-compost are to mix 3 to 4 kg of bio-compost with an equal part of local soil and apply this to each square metre of land. The price of bio-compost was 2 Birr/kg (about 0.235 USD/kg) in 2006 and 2.5 Birr/kg (about 0.294 USD/kg) in 2007. This is nearly half of the current market price of inorganic fertiliser.

IBE uses and markets the bio-compost in three ways.

- For internal use: IBE in Addis Ababa has about 5 ha of horticultural land and a nursery site. Here IBE applies about 185,000 kg of organic fertiliser (before packaging).
- To project-based trainees: IBE has given practical training and backstop-ping assistance to more than 21,000 trainees, most of whom have their own farms. All of these trainees bought bio-compost from IBE when they started farming. For example, 200 members of the former Fuel Wood Carrier Women's Association bought 10,450 kg for 26,100 Birr (about 3,071 USD) at a rate of 2.5 Birr/kg (about 0.294 USD/kg) for their horticultural farm at the City of Addis Ababa, Keranayo subcity in May 2007 (which is 1999 in the Ethiopian calendar).
- To shops and supermarkets: IBE sells the bio-compost from its main distribu-tion centre. Customers include Abader, Abrico and Adgemu supermarkets and agricultural input suppliers at Addis Ababa. It also promotes the product to different flower farms.

Nearly 70% of the bio-compost produced in 2006 was used by IBE itself. However, it is estimated that 80 to 90% of the

bio-compost produced in 2007 and 2008 will be sold. The majority of customers are urban dwellers, who use the bio-com-post on their homesteads, and periurban farmers, who use it for the production of horticultural crops. IBE also gives training courses to different groups and sells its products for project-level urban agricultural production. These groups are made up of youths, women cooperative members, fuel wood carriers, partially sited individuals, students, retired persons, orphans, nuns, etc. More than 90% of the bio-compost marketed is for use in urban agriculture, but the rural market for bio-compost will also grow as awareness of the product increases among rural farmers. IBE is the first and only entity in Addis Ababa engaged in the commercial collection and recycling of organic waste.

FINANCIAL ANALYSIS

The financial analysis below is based on incurred costs and revenues and estimated opportunity costs. IBE has incurred costs for labour, implements, soil nutrient analysis, packing, marketing, salary and administration, which are estimated to be 404,136 Ethiopian Birr (47,545 USD). This also includes the costs for assembling, loading, transporting and unloading wastes that are covered by the partners. Without these opportu-nity costs, the estimated total is 226,936 Ethiopian Birr (26,698 USD) (see table). The business has the capacity to earn 135,189 Birr (15,905 USD) and 312,389 Birr (36,752 USD) with and without consideration of opportunity costs, respectively.

Birhane Clean and Environment Sanitation Association has a training service and provides assistance on waste management. The city's waste dumping site is located 13 km from the waste source area, whereas IBE's waste recycling area is located 6 km from the source area. As a result, by dumping at the IBE site, the municipality saves the time and costs associated with transporting each truckload of waste the extra 14 km. Therefore, IBE is not expected to cover this opportunity cost. After evaluating the previous year's performance, the partners extended their agreement for the coming years and the Environmental Protection Authority of Ethiopia also approved the expansion in size and scale.

Table 1. Cost-benefit of IBE

Items	Revenue/ Cost	
	In Birr	In USD
Revenue (from sale of bio-compost)	539,325	63,450
Labour	49,746	5,852
Implements	15,000	1,765
Soil nutrient analysis	4,500	529
Packing costs	85,440	10,052
Marketing costs	12,000	1,412
Salary and administrative costs	48,000	5,647
Others	12,250	1,441
Opportunity costs	177,200	20,847
Assembling at the market	14,400	1,694
Loading	10,800	1,271
Transport to project area and unloading	144,000	16,941
Others	8,000	941
Total Cost (including opportunity costs)	404,136	47,545
Total Cost (not including opportunity costs)	226,936	26,698
Profit (including opportunity costs)	135,189	15,905
Profit (not including opportunity costs)	312,389	36,752

The business is financially feasible if the bio-compost is sold at a price that is not lower than the break even price of 1.52 Birr (0.18 USD) considering opportunity costs and 0.85 Birr (0.10 USD) per kg without consideration of opportunity costs. Since IBE is a private limited company, any profit earned is reinvested.

PROMOTION

IBE promotes bio-compost organic fertiliser and urban waste management recycling in general in the following ways:

- By managing bio-compost marketing centres.
- By inviting officials of different governmental and non-governmental organisations to visit the project.
- Through the media (advertisements) and publications including brochures, newsletters and posters.

The municipality also actively promotes urban agriculture and the use of bio-compost.

CONCLUSIONS

Waste management is a big issue in urban management, especially in mega cities like Addis Ababa. Land is scarce in these cities and it needs to be used productively and efficiently. Therefore, businesses that recycle organic wastes and produce standardised and packed organic fertilisers as described here are vital. They contribute to urban waste management but also indirectly to the promotion of safe agriculture in the city by providing organic fertiliser to urban farmers in small packs.

Agriculture is an important part (85%) of Ethiopia's economy and labour force. But, due to land degradation, agricultural production has become dependent on fertiliser application. As a result, Ethiopia imports vast amounts of inorganic fertiliser. Bio-compost thus has important potential in this country.

References

Getachew Tikubet 2006. The BioFarm: An Integrated Farming Approach to Restore, Create and Sustain Wealth. In: Resource Management for Poverty Reduction Approaches and Technologies, Assefa, A., Getachew, T. & Johann, B. (eds), Selected Contributions to Ethio-Forum 2002. The Regal Press Kenya Ltd, Nairobi.

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Partial view of Biofarm, Assela Branch

IBH



Tree seedling production using biocompost

agriculture projects and encourage local communities to produce and consume traditional crops.

The sharing of experiences and innovations between urban and rural farmers is important and efficient because rural farmers have knowledge that has been generated over many decades. For instance, the Msinga people have developed innovative ways to cook, process and mix indigenous vegetables in order to preserve them and balance nutrients in their diet (Njokwe, 2006). Rural areas have more wild varieties of indigenous vegetables than urban areas, which have fewer or no wild areas at all. On the other hand, urban farmers have invaluable experience on how to survive on very scarce resources with limited or no support, and they have access to markets. These and other lessons are being shared through the network of rural and urban farmers interacting through the FSG. The farmers' evaluation reports showed that the yield of exotic and indigenous vegetable cultivated in trench and raised plots is very high. Production costs are low compared to the conventional farming system.

Through various experiments conducted together with farmers and at Ukulinga farm, FSG will further strengthen the exposure of urban and rural farmers to innovative techniques. Eventually, a market development strategy will be adopted to allow the communities to raise income to meet some of their needs.

Notes

1) In Msunduzi, these institutions include CINDI Network, Institute of Natural Resources, Department of Health, Department of Social Welfare, Department of Agriculture, the Farmer Support Group (FSG) of the University of KwaZulu-Natal, and the School of Agricultural Science and Agribusiness of the same university.

References

Farmer Support Group, 2004. Promoting Agricultural Innovation in AIDS affected Rural Households. An Action Research in KwaZulu-Natal, South Africa. Progress Report for March 2004-December 2004.

Njokwe, B.J., 2006. Msinga Indigenous Vegetables that Could Provide People with Most Needed Micronutrients to mitigate HIV/AIDS and Food Insecurity. A Paper presented at PELUM South Africa Workshop on Food First on 28-29-September 2006, Ascott Inn, Pietermaritzburg.

Njokwe, B.J., and J. McCosh 2005. African Roots: Traditional Foods to address Nutrition in the Modern World. A Paper Presented to the Urban Micro-Farming and HIV/AIDS Workshop, Johannesburg and Cape Town, South Africa 15-26 August 2005

Van Diepen, I., 2004. "The Impact of HIV/AIDS on Rural Livelihoods of Farmer Households", An ethnographic study in Msinga sub-district. KwaZulu-Natal, South Africa

Innovative livestock-keeping in Ethiopian cities

As urbanisation increases in Ethiopia, city dwellers are responding in innovative ways to problems of high unemployment and opportunities of high market demand by growing crops and raising animals. Many people in poor families, especially women and youth, take these initiatives because they already knew farming before they migrated to town, or they learned it from others who were farming in town.

Wolfgang Bayer



A donkey can earn income through fetching water, flour and other goods

Irrigated vegetable farming in Addis Ababa, Ethiopia's capital, is now partly in the formal sector. Eleven marketing service cooperatives of urban farmers produced almost 12,000 tons of vegetables for the city market in 2006 (Addis Ababa City Government 2006). In contrast, livestock production is mainly in the informal sector. The forms of livestock-keeping differ depending on the space and initial capital available.

SPECIES FOR SPACES

Households with more living space keep dairy cows, sheep, goats, or oxen for fattening, sometimes combined with bees and poultry. Poorer households with less space – usually in rented rooms, with several people living in one room – keep only one or two sheep or goats, or a donkey or chickens.

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Poor urban families that have little to invest usually start with chickens, which need little space, find their feed almost anywhere and bring quick returns for immediate needs. A local chicken costs about 25 Ethiopian Birr (roughly 3 USD). Families with a bit more money for initial investment (about 50 USD) buy a donkey, which can earn income through fetching water, flour and other goods.

Livestock-keepers in the larger towns face problems in obtaining feed and water for their animals. Another problem is conflicts with neighbours because of the smell of the animals and the manure. Ruminants (cattle, sheep and goats) often have intestinal problems because, to supplement their daily rations, they scavenge in urban wastes and sometimes eat indigestible plastics.

INNOVATION BY NECESSITY

In many large regional towns and cities in Ethiopia, e.g. Mekelle in Tigray Region, the municipal governments are gaining interest in urban farming. As part of their poverty-reduction programmes, they

encourage urban dwellers, especially the poor and formally unemployed, to raise “fast-return” animals. In some cases, even some technical advice and veterinary services are provided for urban livestock-keepers.

Most of the urban farmers, however, still have to depend primarily on their own knowledge and ingenuity. Faced with many problems of keeping animals in the cities, they have been obliged to find innovative ways of obtaining animal feed, water and medicines.

Some urban farmers collect residues from local beer-making, flour-mill dust, grain residues etc to use as feed. Some collect grass or tree foliage from woody areas in and around the town. Others access feed by taking waste from vegetable markets; this also helps to keep the marketplaces clean.

Only better-off urban dwellers can afford to give tap water to their animals.

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Although the water of rivers and streams is often polluted, many poorer livestock-keepers use these sources, but they prefer to use springs. Some have innovated by feeding residues from local beer-making, which have high water content.

Most urban farmers of rural origin have traditional knowledge about treating animal diseases, e.g. chopping and mixing local plants to control lice in chickens; or using the flesh of Ire (an Aloe species) to treat bloat in cattle. Some farmers without traditional knowledge use modern (chemical) human medicines such as Ampicillin and Tetracycline as an immediate measure for sick sheep or goats.

People who keep large ruminants (especially cattle) sell the manure for use as fuel or compost, or use it at home to reduce their fuel expenses. Youth groups collect manure and other urban waste from city streets and compounds and make compost that they either use in gardening or sell to other growers of vegetables or flowers.

RURAL LEARNING FROM URBAN LIVESTOCK-KEEPERS

Innovations made by urban people are showing also rural people new possibilities. Grazing by unattended livestock is a problem in many parts of rural Ethiopia. Without extension support, urban livestock-keepers have developed systems of tethering and cut-and-carry feeding. Government extension agencies use these urban examples to show farmers living near towns the importance of controlled grazing. Also the innovative feedstuffs such as vegetable wastes provide examples to rural farmers.

In some cases, the women's and youth groups keeping livestock in towns, e.g. in Addis Ababa and in some municipalities in Tigray Region, have been successful in building up their animal numbers. Some youth have accumulated so many animals that they want to go back to rural areas to have easier access to feed and more space for the livestock. This illustrates the cycles of innovation and development in urban farming that can even lead to urban-to-rural migration.

Reference

Addis Ababa City Government. 2006. *Urban Agriculture Department Report*. Addis Ababa.

Yilma Getachew 1950-2007



Yilma Getachew, sharing experiences on vegetable farming in Addis Ababa, Ethiopia

It is with great sadness that we announce the loss of Yilma Getachew who passed away in 2007. For all those of us who were fortunate enough to have worked with such a dignified and knowledgeable practitioner, there is no questioning the prolific role that Yilma played in the development of urban agriculture, as an activist, researcher, teacher, innovator and pioneer of the urban field. With over thirty years of work experience as a researcher, lecturer, rural development practitioner and writer Yilma dedicated his life to food security issues and in particular the development of innovative grass root technologies in both the rural and urban settings. But his greatest passion was the small food-producing garden. Growing walls, container gardening, intercropping with legumes, basket composting, manure tea and organic waste recycling were some of the technologies that he promoted but always holistically and in one garden or on one plot. Yilma's greatest challenge was to develop gardens that could sustain poor families on the smallest possible plot size, using an approach that Yilma referred to as bio-intensive gardening. His own homegarden in Addis Ababa bore testament to this approach.

A. Adam-Bradford



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Allen, P. 2004. *Together at the table: Sustainability and sustenance in the American agrifood system*. Penn State Press.

DeLind, L. B. 2002. Place, work, and civic agriculture: Common fields for cultivation. *Agriculture and Human Values* 19, (3): 217-224.

Feagan, Robert. The place of food: Mapping out the 'local' in local food systems. *Progress in Human Geography* 31, (1) (2007/2/1): 23-42.

Feenstra, G. 2002. Creating space for sustainable food systems: Lessons from the field. *Agriculture and Human Values* 19: 99-106.

Hinrichs C.C. 2000. Embeddedness and local food systems: Notes on two types of direct agricultural market. *Journal of Rural Studies* 16, : 295-303.

Kloppenborg, J., J. Hendrickson, and GW Stevenson. 1996. Coming in to the foodshed. *Agriculture and Human Values* 13, (3): 33-42.

Lawson, L. J. 2005. *City Bountiful: A century of community gardening in America*. University of

California Press.

Lyson, T. A. 2004. *Civic agriculture: Reconnecting farm, food, and community*. Tufts University Press.

Munoz, S. S. 2007. For sale: Condo with chicken coop. *Wall Street Journal Online*. May 18, 2007.

Norberg-Hodge, H., T. Merrifield, and S. Gorelick. 2002. *Bringing the food economy home*. Kumarian Press Bloomfield, Conn.

Plas, Jeanne, and Susan Lewis. 1996. Environmental factors and sense of community in a planned town. *American Journal of Community Psychology* 24, (1) (02/12): 109-143.

Prairie Crossing Holdings Corporation. *Prairie Crossing - A conservation community in Prairie Holdings Corporation*. Grayslake, IL, 2007. <http://www.prairiecrossing.com/pc/site/index.html>.

Watson, JS. 2006. *Preservation of the environment and open space through free market housing incentives*. University of Illinois at Chicago.

Developing Value Chains in Amman, Jordan

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The city of Amman is the capital of the Hashemite Kingdom of Jordan and lies in the northern part of the Kingdom, covering an area of 1700 km² with an estimated population of 2,200,000 inhabitants. Annual average rainfall is 275 mm. The poverty rate in Amman reached 8.5 percent in 2008 (Directorate of Statistics, 2010); 25 percent of poor reside in the capital and the unemployment rate is 12.7 percent (ibid). In this context urban agriculture can play a crucial role in positively affecting the standard of living of farming families and individuals.

The total planted area in the city of Amman is almost 32 M dounoums* (or 3.2 M ha) representing 18.4 percent of total national production, while livestock raising in the city represents 19 percent of total production. Two types of urban crop production can be distinguished: (i) irrigated agriculture: mainly practiced in the centre of the city around the old flood path and the artesian wells and springs, Wadi El Sir and Al Mqabalain; and (ii) rain-fed agriculture: practiced in most parts of the city except in the eastern area where the larger plots range between 50 and 100 dnms* each (whereas the areas available for home gardens range between 200 and 1000 m² each). The main products produced are fruit (about 840,260 ha of fig, grape, pomegranate, stone and pome fruits), vegetables (197,776 ha of mainly tomato, cucumber, squash, okra and various leafy vegetables), and grains (351,452 ha of wheat, barley, chickpeas, and some other grains). Cucumber, tomato, strawberry, red and yellow sweet pepper and different varieties of lettuce are also exported. Livestock production comprises 390,500 head of sheep, goats and cows (Greater Amman Municipality, 2007).

*One dounoum (dnm) is 1000 square metres or 1/10 hectare



Women of the cooperative at the wholesale market (Photo: AUB-ESDU)



From Seed to Table project

The region selected for the "From Seed to Table" (FStT) project is an agricultural valley (Iraq el Amir) in Amman, where farmers are organised in extended families (which form the basis for community and tribal relations). The women in these families take care of agriculture and daily household duties and seek to earn additional income through a local not-for-profit cooperative called the Iraq el Amir Women's Association, established in 1993. The men are mostly civil servants or unskilled workers. Women have a strong interest and daily involvement in agriculture, but because of the type of funding available to them before the project began they had only developed their handicraft skills (weaving, pottery, paper making, ceramics, etc.) and had established a communal kitchen and a bed and breakfast facility through the cooperative. The members of the cooperative were struggling to keep these facilities operational and to find an income-generating activity that could sustain the cooperative in the long run.

Implementation

The project was planned and designed by the project team and a selected group of farmers (both men and women) representing the region. The team was composed of two coordinators and three members of the cooperative; and the group of farmers was composed of 10 women and 20 men. Together this team initiated an urban producer organisation (UPO) and built close relations with farmers in the area through Urban Producers Field Schools (UPFS) and other project activities.

For cultural reasons, initially only men registered to participate in the project. Therefore, disaggregated data were collected per task and activity to identify who would attend the Field Schools, and who needed to be contacted for the



Greenhouses in the Iraq el Amir valley in Amman (Photo: AUB-ESDU)

meetings etc. Eventually the project reached 72 families from two regions in the valley: Hay el Bassa and Hay el Karyat, and 75 percent of the project's direct recipients were women. The most significant step in the project was establishment of an urban producers' organisation (UPO) as a separate unit (with assigned and independent staff), within the women's cooperative. This UPO consists of one director, one treasurer, one secretary, and 42 members, all of whom are women. This unit manages the business, which consists of all operations related to the production and marketing of one selected type of produce (see box) together with the participating farmers. This unit manages the business through a team formed of the director, the treasurer, the secretary (all women) and 2 women for packaging and 2 others for marketing. This unit is responsible for the coordination of related activities, production and marketing, of the selected product (see box) for the business (42 farmers) and all the participating 72 families.

The FStT project coordinators initially assisted the UPO in making contacts with expert farmers, support institutions and with potential buyers and donors. The experience of the women who had already worked in the cooperative was a plus because they had already gained managerial skills and built trust with a number of institutions and with the families in the region.

The establishment of a group saving scheme to ensure financial self-sustainability was an important mechanism to enhance the role of the UPO. The terms and conditions were discussed with farmers, who agreed on an entrance fee of JD 5 to 10 (1 JD=1 Euro), depending on their capacity, and then a fee of JD 1 each month. They also pay marketing fees to the cooperative amounting to 14 percent of their gross revenue from sales, of which 6 percent goes to the UPO "revolving fund". This fund is intended to cover accident insurance, to pay for bad debts, to finance activities to improve skills, education and investment opportunities, and to build the fund. The other 8 percent covers marketing costs such as packaging, transportation and commission. Moreover, each farmer deposits 1 percent of their sales in "a reserve account" under his/her name to encourage the habit of saving, and to help control unnecessary consumption.

Results, impacts and challenges

Through the FStT project and activities of the UPO, the farmers' and the association's capacities have been strengthened with respect to management, marketing and networking. Improvements have been noted in:

- decision-making on the choice of marketing channels and contracts, and in building linkages and contacts with

marketing institutions and the ministry of trade and commerce;

- decision-making on money expenditure;
- linking with extension service providers, mainly the ministry of agriculture for the provision of training;
- linking with institutions that provide (free) training in management and administration;
- the organisation of regular meetings to follow-up on advancement of the project and proper implementation of activities, bookkeeping for main activities and registering of data on farmers;
- exploring potential marketing channels (including in the export market) and participation in national fairs and farmers' markets, as well as promotion of urban agriculture at these venues.

For example, the UPO managed to get a stand free of charge at the Friday market of Amman, and it has received training on proposal writing and bookkeeping from the Queen Nour Foundation. The members of the UPO team have learned how to stay updated on market prices and how to use this information both in the planning of production and to ensure a constant supply to the market. The latter requires good communication with the farmers. They have also acquired a better business-sense and have learned that everything has a cost and a return, especially the image and branding of the produce.

The team also implemented a project on food security as an initiative on healthy food production and healthy meals for children and teachers at a neighbouring school.

During the whole FStT project, men played a limited role, and only participated in specific activities such as meetings, the UPFS, and contacts with potential buyers in some cases. There is now a better recognition of the role women can play in society: not only are they leading a business that men are engaging in, but they are gaining new information and support for their role in farming, which is an activity normally led by men when practiced beyond the household level. The participants have also gained more knowledge of credit institutions and extension services.

Challenges included difficulty in building immediate trust between the new UPO and the other urban farmers in the region, especially since innovative management of agriculture was being propagated in an area dominated by traditional approaches. Also, getting the farmers to respect the conditions of planting and delivering on time took some



Participating women cleaning the green onions in the field before packaging (Photo: AUB-ESDU)



Distribution of onion seedlings trays to farmers (Photo: AUB-ESDU)

effort, especially since these conditions were set by a group of women. Additionally the buyers were not used to working with women, and building trust was not easy initially. Once the trust was there, the UPO struggled to sustain the image of the brand and to keep the farmers satisfied with the price offered to them compared to that offered by middlemen and other marketing channels. Management of the revolving fund is still a challenge for the new UPO, especially in dealing with the different expectations of the members, and in maintaining transparency.

Lessons learned and future perspectives

Based on the experiences in Amman, it is clear that efficiency could have been better if the programme had started with a smaller group of farmers: 20 or 30 farmers instead of the proposed 100. The project could then have started with one or two first crop cycles before adding on the next group of 20 to 30 farmers. In this way, the organisational and managerial skills and the relations and communication skills with farmers and the market could have been built gradually, and the process could have hence been less hectic and risky, especially since the newly formed team had no experience in managing such a large group.

Furthermore, creating a business plan and cost analysis were difficult for the UPO, which lacked the necessary knowledge to do this and to support the farmers. Adequate risk analysis had been done, but no alternatives in the event of failure of the business were in place. Another lesson is that working with more than one type of produce (the most promising option – see box) would allow a broader market approach and give more flexibility to the farmers.

In addition, several of the UPO meetings did not meet the farmers' expectations since they expected materialistic support rather than theoretical lectures, especially on how to get organised. They are used to working more individually. To improve the effectiveness of the approach in a context like Amman, we suggest that practical support be provided before working on organisational strengthening.

Despite these challenges, the UPO has developed well, and the farmers have established a large nursery to produce seedlings to be sold to other farmers at competitive prices. For this purpose, an existing and fully equipped greenhouse (1000 square metres) has been rented for one year. The UPO is also aiming to link with neighbouring schools to sell fresh and nutritious local produce, as part of efforts to broaden its market channels (and possible



Responsible production logo Amman (Photo: AUB-ESDU)

export channels).

The UPO will continue with more onion cycles and to apply the FStT approach to other crop/animal production chains, such as the production of figs and olives (which grow well in the region), production and drying of selected medicinal and aromatic plants and processing of goat cheese.

A key lesson for the farmers was the necessity to work along the various stages of the value chain rather than focusing on the production process alone. The UPA continues to create linkages with other support agencies, and it is applying for support for the further development of managerial and organisational skills as well as for funds to sustain its current activities and develop more value chains approaches.

Most promising option (MoPO) in Amman-Jordan: Fresh green onion

Innovations in Amman are:

- **New variety of spring onions suited to local conditions:** does not flower early (early flowering reduces the commercial value), long shelf life, larger size, uniform produce
- **Planting onion seedlings (from nursery) to accelerate production and reduce seedling loss**
- **Year round production:** three seasons per year for the new onion variety (vs. one or at most two for local variety)
- **New harvesting and post-harvesting techniques** (dry the soil before harvesting, first cleaning in the field, sorting at household level, branding and packaging at the cooperative level);
- **Drastic improvement in packaging and marketing:** 0.5 kg and 1 kg plastic bags ready to market; label indicating "geographic origin" and "healthy produce", bypassing the middlemen chain through targeted marketing, social recognition, etc.

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References

- Greater Amman Municipality. 2007. Towards the Promotion of Urban Agriculture in Amman: An Exploratory Study, Environment and Sustainable Development Unit of the American University of Beirut, Lebanon. 85 pages
- United Nations Development Programme (Amman, Jordan) and the Jordanian Ministry of Planning and International Cooperation. 2011. Jordan Human Development Report, Jordan Small Businesses and Human Development. 185 pages.
- Directorate of Statistics, Jordan. 2010. Report on Poverty in Jordan based on 2008 survey. 99 pages.

Municipal Policy Influencing: Experiences of Gardeners in Amsterdam

In 2001 the Amsterdam municipality started preparations for a new spatial plan, which became the basis for city planning development in the period 2002-2010. The plan, entitled "Choosing urbanism", aimed to place residential and economic functions within the city limits, while green areas were to be established on the city fringes. Among other steps, the plan involved sacrificing five allotment garden parks for housing construction and infrastructure developments. It compelled the tenant of the allotment garden parks, the Association of Allotment Gardens (or in Dutch: Bond van Volkstuinders, BvV), to choose an entirely new and different strategy for influencing policy, of which this article provides an account.

Joanna Wilbers



Allotment garden in Amsterdam

Allotment gardens in the Netherlands originated in the second half of the 18th century. Well-to-do citizens established a society in 1784 aimed at the intellectual growth of the 'average' people, such as workmen. One of the society's activities was to rent out plots for gardening to labourers so that they could grow their own food and increase their family incomes. Furthermore, gardening was seen as an activity to stimulate personal and societal development.

The development of allotment gardens increased rapidly towards the end of the 19th century when industrialisation took over in the Netherlands. The fast growth of the labour population and the poor living circumstances were reasons for many municipalities to rent out garden plots to cultivate potatoes and vegetables.

Currently, the Netherlands has around 250,000 recreational allotment gardeners, half of whom are members of gardeners' associations. A number of allotment gardeners' associations have united in a national union, the AVVN (*Algemeen Verbond van Volkstuindersverenigingen Nederland*), which represents around 25,000 gardeners²⁾.

AMSTERDAM

In 1909 the Committee for Allotment Gardens was established in Amsterdam. The members were primarily concerned

with advancing their health and life in general and not so much with increasing the gardeners' incomes. The first Amsterdam garden group was established in 1910. Nowadays, Amsterdam (the largest city of the Netherlands with 22,000 ha and 740,000 inhabitants) has 39 allotment garden parks (300 ha) on its territory encompassing 6,000 individual gardens. The land on which the garden parks are located is owned by the municipality. Most allotment gardens are no longer located where they originally started out, while some have disappeared all together due to urban planning and infrastructure developments.

Twenty-six garden parks have a so-called accommodation-recreational function, which means that each garden has a cottage in which one can stay overnight from April through September. There are four recreational parks where one cannot stay overnight. This also applies to the nine food garden parks where gardeners mainly grow vegetables, herbs and fruits. Most parks are on the urban fringe, but one park is located in the middle of a residential area and is part of a city park.

Twenty-four of the 39 parks in Amsterdam are rented to BvV (5,000 gardens), and the remaining 15 are rented to a total of 14 other associations (1,000 gardens).

BVV

The BvV has 6,000 members, which makes it the largest allotment gardening association in the Netherlands. In addition to the parks in Amsterdam, the association rents five more parks (1,000 gardens),

which are located outside the city limits due to changed boundaries or because the gardens had to be moved from city land that was no longer available. The BvV also maintains a list of 1,500 aspiring members, who are on a waiting list to begin their own gardens.

The BvV was established in 1917 as a non-profit organisation. Per garden park the members choose the representatives for the General Assembly, the highest authority in the association. This authority chooses the main board. The members also choose park boards to perform the management tasks for each garden park. All board activities are performed by members who receive a small compensation for costs made. The organisation has a small office with paid staff who provide membership administration and support to the board. The challenge for the BvV is to keep its structure and regulations as efficient, simple and cost-effective as possible for its members. Therefore these are revised periodically and the results of these revisions are incorporated in the association's policy plans. These plans describe the BvV's activities and strategies and are formulated by the General Assembly. The current plan covers the period 1998-2007³⁾, and the subsequent plan now being developed will be in effect until 2011.

Besides defending the interests of its members, the BvV's goal is to acquire land for the gardens and promote gardening as a form of active recreation and as a way to learn about the environment, flora and fauna as well as the cultivation

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of flowers, plants, vegetables and fruit in an environmentally friendly way. While the latter goals are mainly achieved by informing and educating both members and non-members through the BvV website, a newsletter and the organisation of courses, the first two goals are achieved by applying a policy influencing strategy.

INFLUENCING POLICY MAKING

A central pillar of this strategy is to point out to the local government the wide-ranging potential of the allotment gardens – which are located on land owned by the municipality. They should be considered a valuable instrument for the municipality with which it can develop the city further in many different ways. Through this lobbying, the BvV wants to create a new support base in society for the allotment gardens now and in the future.

The same strategy was also applied during the formulation process of the spatial plan organised by the municipality in 2001. From the beginning, the municipality involved the BvV as one of many civil society organisations in Amsterdam. The BvV opted for a pro-active, cooperative and non-activist approach as its members believed this strategy would be more fruitful than active resistance to any proposed change (see box). A special working group of knowledgeable and active members was formed to advise the board on the issue.

In dealings with the city administrators, the BvV chose a business-like but also cooperative approach, emphasising that it recognised the administrators'

responsibility to consider all of the interests at stake as well as its desire to create a healthy city. This approach was very fruitful as the association managed to create good, informal and even friendly working relationships with the local government officials. The good institutional as well as personal ties were emphasised when the BvV appointed one of the administrators as an honorary member in appreciation of her competence and involvement with regard to the Amsterdam allotment gardens, which she gladly accepted. The association's alliances with housing corporations and health care and welfare organisations also helped create a stronger base for policy negotiations.

The BvV's main goal in these negotiations was to receive acknowledgement of the value of the allotment garden parks for the city, as this would lead to the preservation of the garden parks in the short term – especially the five threatened parks – as well as the possible expansion of the number of parks in the longer term. A very important factor in this process was that the BvV emphasised its willingness to be flexible, while keeping in mind that this willingness could be withdrawn at any time if necessary.

Of course, the process caused internal turbulence within the BvV. The board initially underestimated the emotions of the gardeners with respect to the threatened parks and a consensus on the approach to be followed could not be achieved. Some park boards even decided to follow an individual approach, mobilising both gardeners as well as city district administrators, but hereby losing sight of the bigger picture of the entire organisation. To overcome this problem, the operation and structure of the organisation are now being reconsidered. The results of this process will be reflected in the new policy plan for 2007-2011.

RESULTS

As a result of this tumultuous process, the current garden parks can remain at their present locations until 2010. In addition, the city government acknowledged the current and potential meaning of the allotment gardens for the city of Amsterdam. The BvV followed this up by challenging the local govern-

ment in 2002 to develop a city-wide vision on the allotment gardens, in collaboration with the city districts and all allotment garden associations. Consequently, the municipality adopted the "Policy Note on Allotment Gardens in Amsterdam" in early 2006, as a reflection of its vision on the gardens for the city¹). Although the BvV was able to participate in the formulation of this vision, unconditional preservation of the current allotment gardens could not be enforced.

Currently, preparations are underway for the practical implementation of the vision, in consultation with the city districts and the BvV, among others. One bottleneck in this process is that the local government has not yet made the necessary extra financial means available. However, experiences in the western part of Amsterdam where allotment gardens have been made part of new spatial development plans provide the BvV with hope for the future⁵).

LESSONS LEARNT

A crucial part of the BvV's new strategy is that it has moved away from a demanding role and has placed itself more in a motivational role by stimulating the local government to put the allotment gardens to a productive and multi-functional use for the entire city. It pointed out the allotment gardens' varied potential to the municipality and challenged its administrators to take advantage of this potential. Because of this cooperative, and sometimes somewhat humble approach, the board met with resistance from its members, who expected that it would take a more forceful position. This resistance eased down somewhat when the members saw the local government's increasingly positive posture towards the allotment gardens. This in turn made it easier for the BvV to participate in the formulation of the policy note and to start lobbying for more municipal cooperation in achieving its objectives.

NOTES

- 1) Member of the board of the Association of Allotment Gardeners (BvV), www.bondvanvolkstuinders.nl
- 2) See the AVVN website www.avvn.nl.
- 3) See www.bondvanvolkstuinders.nl for an online copy of the policy plan called "Strong Together" (in Dutch: 'Samen Sterk').
- 4) In Dutch: 'Nota Volkstuinen Amsterdam', see www.dro.amsterdam.nl for a copy of the policy note.
- 5) See the report 'Tuinen van West' on the development plans on www.dro.amsterdam.nl.

Some tips on policy influencing (from BvV board members)

- a) Know what is politically wanted.
- b) Show respect for the administrators, also by expressing appreciation for their work and actions if this is deserved.
- c) Try to achieve a situation where politicians can flaunt and show off with what they have done for you.
- d) Never personalise the discussion.
- e) Use humour as an instrument.
- f) Try to build a network within the administrative organisations, the outside world and among (ex-) politicians and call upon their expertise and involvement.
- g) Make explicit that you are making a contribution to the entire society and not just to your own members.
- h) Build alliances with other civil society organisations allowing you to make a stronger case towards local administrators together.

Urban Agriculture Springs up in Greece

31

Nerea Morán

Jose Luis Fernández de Casadevante

In recent years, urban agriculture has spread remarkably in Greece, considering that there is no historic tradition for this activity. Diverse actors, such as community groups, agro-diversity networks and local governments, are developing projects with various aims and organisational patterns. They are all trying to deal with particular aspects of the multidimensional crisis that Greece is facing.

Greece has been one of the first European countries suffering from the present crisis. Financial crisis, bank rescue, public indebtedness and austerity policies have contributed to a situation of urban impoverishment, unemployment and cuts in public services (social, health and education). One million people in Greece are unable to pay for their basic diet. The growing difficulty with food access for the most vulnerable population (unemployed and retired people) has led to a bigger concern about the agri-food system. The “potato movement” began in the spring of 2012, when Greek farmers started to sell their potatoes directly to consumers

as a response to the low prices offered by intermediaries. This was the most visible event of a movement that is reconnecting farmers and consumers, through direct selling, local markets and community food groups.

In the last years, community and institutional urban agriculture initiatives have arisen in Greek cities, merging food production, urban ecology, food sovereignty, social links and new ways of thinking and inhabiting the cities. Community gardens are part of the social innovations developed by citizens’ projects involving self-protection, social care (migrants and homeless support, self-managed health centres, community kitchens, etc.) and alternative sociality (cooperativism, occupied factories, barter networks or time banks), developing diverse alternatives to build a transition strategy from the local level.

As well, municipal programs are addressing social vulnerability, developing social integration and food access strategies for people in need. In addition, there is the remarkable role of Peliti, a network for biodiversity and local seeds, which collaborates with most of the urban agriculture projects. Together, these initiatives represent interesting forms of



Agios Dimitrios allotment garden. Photo: N Morán and JL Fernández

Examples of Community gardens

Per.ka, an acronym for “periurban crops”, came to light in 2011, in order to cultivate an abandoned military site, occupied and transformed into a public park by the people of northern Thessaloniki. The first Per.ka group began to grow food organically. As more interested people arrived, new groups were formed, composed of 30-40 people who take care of part of the site, demarcating individual and common plots, and constructing resting and storing spaces. Presently there are 7 Per.ka groups, which makes about 200 people. This collective project is grounded in cooperation and ecology; they support public land property but also community management. All of the Per.ka groups join in a fortnightly assembly where common tasks and activities are decided upon. They also participate in the Movement of Direct Distribution of Products in Thessaloniki (Anoixto Diktio).

Ellenikó Community Garden. The former Athens airport, located on the southeast coastline of the city, was supposed to become a metropolitan park, but the crisis stopped this project. A community group conceived an alternative development that could deal with the environmental, economic, educational and social crisis. They worked with the university on their proposal, collected signatures in support of the project, and staged a symbolic olive-tree planting on the airport site. The municipality has lent them a 2,500 m² area contiguous to the airport, where they have begun a community garden, diffusion and training activities as well as traditional seed-giving, supporting garden projects in schools and sharing their products with municipal social kitchens.

social innovation in response to the multiple crises that Greek society is facing and which, increasingly, also is resulting in new forms of municipal policies to support urban agriculture and local food systems.

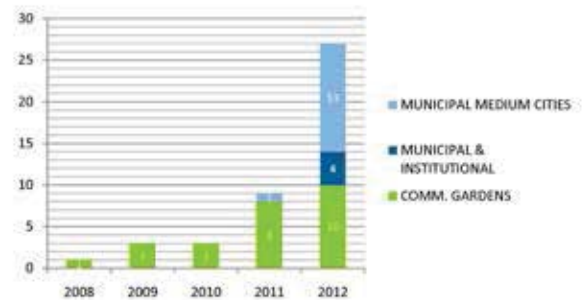


Table: Allotments and community gardens, evolution 2008 – 2013

Community gardens

Community gardens have appeared within a context of social protest movements. The first one, in December 2008, was due to the death of a 15-year-old boy shot by the police, in the Athens neighbourhood of Exarchia. This fact set off massive mobilisations throughout the country, and the biggest riots in its recent history (Stavrides, 2010). In Athens we can find examples of community gardens from this first wave, developed by left-wing militant groups in occupied public spaces and facilities: Navarino Park in Exarchia; Votanikos Social Centre, located in a closed municipal greenhouse; and Agros in Tritsi Park.

The Square's Movement in 2011, in response to the austerity policies, and making visible the political and confidence crisis, led to local assemblies that began several projects in the neighbourhoods. New community gardens appeared, sometimes launched by people directly involved or close to the movement, or simply inspired by a new way of coping with big problems. These gardens are created by more diverse and heterogeneous communities, and they have greater social support, but are not without conflict with the local governments. Two projects that illustrate the progress of the movement in different cities are Per.ka and Ellenikó Community Garden (see Box 1).



Maroussi allotment garden. Photo: N Morán and JL Fernández

The emergence of Municipal Garden Allotments in Greece in times of crisis

Currently, among the most popular paradigms of Urban Agriculture in Greece are the Municipal Garden Allotments (MGAs), which first appeared in 2011–12. The local municipal authorities announced these gardens primarily as social policy projects and a means to alleviate some of the problems urban dwellers faced due to the economic crisis and the collateral lack of public support to vulnerable groups. People have embraced the idea to be given, for free (or a symbolic price), a plot in order to grow their own food and support the daily diet for the whole family.

In 2013, during field research in two MGAs in Northern Greece (Alexandroupolis and Thermi-Raidestos), the motives of the stakeholders were disclosed. The economic crisis played an important role in the decision of the municipalities to establish vegetable gardens, given the alarming phenomena of neo-poverty and malnutrition in a growing portion of the urban population. At the same time, another motivation expressed by local authorities was to cultivate social responsibility and solidarity by requiring that the growers offer 10% of the crop in the social grocery of the municipalities. Environmental concerns are also at the forefront, through organic production, composting of urban food waste and greening the city. Among the urban farmers, the main motivations to participate in the MGA were, according to specific questionnaire responses (in order of importance): “to produce my own food”, in other words a social demand for food re-appropriation; “to have affordable quality food”, mean-

ing economic relief for households; and “to strengthen the community bond and for leisure”, especially at this time of crisis when people are also deprived of entertainment and fun. After the first harvest, during focus-group discussions, the growers highlighted conviviality, leisure and enhancing community bonds as the most precious functions of the garden, as well as re-connecting to their rural past. Obviously, in times of crisis and socioeconomic precariousness, a sense of social safety is imperative.

The crucial question facing the municipal allotments is about their sustainability and viability. The analysis of the case studies showed that the MGAs are still more a short-term action of social policy rather than institutional and long-term sustainable urban planning. In fact, urban agriculture initiatives face a set of constraints (bureaucracy delays, land use pressure and conflicts, financing difficulties, etc.). Moreover, even if farm land is provided by local authorities, it is used only on a temporary basis due to lack of a cadastre and of a proper institutional framework to legitimise urban agriculture as a specific land use. These issues are critical for the duration of the projects and can be strongly affected in the future by higher levels of real estate speculation. For the moment it seems that it is the economic crisis in relation to real estate collapse that “protects and maintains” the municipal garden allotments in the absence of other competitive land use.

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Community gardens have become central actors in the reflection on the urban model, the future of public spaces, and the role of abandoned or vacant plots within the city, by the reclamation of public land and the fight against its privatization. They are also bringing the food debate into the urban social movements, developing self-managed ways of meeting human needs, collaborating in the spreading of local seeds and learning about organic farming. Finally, they're linking the preservation and expansion of green urban areas with the development of an agro-ecological production model based on local resources. They're doing all this through the development of small-scale projects that can be seen as field trial spaces, where alternative answers to the crisis are being explored, and fragments of a new city are being tested.

Nevertheless, these initiatives suffer from marked precariousness: insecure access to land, scarcity of economic resources, lack of political support, and such limiting factors as availability of water. Furthermore, community gardens

have difficulty influencing public policies beyond the local scale. The coordination between the projects is weak, although there are informal networks and occasional collaborations. However, at least for the time being, they are proving the civil society's capacity to regain underused urban spaces and to bind local communities.

Municipal programs

In 2012 the first public policies promoting allotment gardens (the Municipal Garden Allotments see BOX 2) entered the picture, developing social gardens for self-consumption for vulnerable groups. Initially, medium-sized cities, such as Alexandroupolis, started these programs that spread quickly across the whole country: Thermi, Kalamata, Tripoli, Larissa, Veria, Edesa, Lesbos and Crete.

Metropolitan districts of Athens are carrying out allotment garden programs as well. Maroussi and Agios Dimitrios have been the first ones doing it. They have a similar procedure; the local government is responsible for preparing the land



Aristotle's university garden, Thessaloniki. Photo: N Morán and JL Fernández

and the watering system, which, in both cases, is made up of small tanks that are refilled by trucks. Individual plots (25–50 m²) are assigned to people living in the neighbourhood. There are special requirements for access to these plots: low income, unemployment, retirement, large families. Another selection criterion is proximity to the site, in order to make accessibility and daily control easier.

The plots are for free, although part of the products must be sent to municipal social services to be cooked in social kitchens. Organic production systems are compulsory, and there is technical support from municipal workers or from collaborating organisations such as the NGO Anodos, that works daily in the Agios Dimitrios allotments, helping the gardeners to design their plots, and supervising the tool and water distribution.

Social allotment gardens have triggered a new use for vacant public plots; besides, they are playing several social roles, providing neighbourhood meeting places, and improving gardeners' self-esteem when they enjoy the activity, although some people can also experience it as a sign of social failure.

Peliti

One of the central entities holding up the agro-ecological movement in Greece is the Peliti Alternative Community, a social network that works on biodiversity and local seeds. Peliti is the dialect name of the oak tree, which has traditionally been planted in the village squares, and around which local communities used to meet. In the shade of Peliti we can find professional farmers, amateur growers, allotments, school vegetable gardens or community gardens.

For almost 20 years, Peliti has been mobilising the preservation, collection, exchange and multiplication of Greek local varieties, through a network that has now reached more than 120.000 growers. Participants save seeds, and share and exchange them with others. Seeds are distributed freely by post or at local festivals. There are 12 local groups of Peliti throughout the country, organising exchange and training events. Since 1999 Peliti has been holding an annual national festival, every April, with seed exchanges, workshops and conferences.

In 2012 Peliti started a seed bank in Paranestiou, supported by the municipality; a database of local varieties has been created;



Community garden Per.Ka.3. Photo: N Morán and JL Fernández

and samples of them are being packaged and preserved.

Conclusion

Municipal allotments and community gardens are different yet complementary. The former can, through the assignment of individual plots, fulfil the basic food needs of families. Community gardens focus on agri-food learning and reflection through common work and cooperation; moreover, they show that public spaces that can no longer be maintained by the public administration can be recovered by community groups.

These social initiatives have shown by their small examples that urban agriculture projects have the potential to impact not only food access, but also social cohesion, education and employment, developing an alternative social, economic and environmental model, and making the most of public spaces and resources.

Still, much more can be done. All of these urban agriculture initiatives point to a wide range of opportunities; even though big investments and large projects are no longer possible, new ways of urban development can be explored through the agro-ecology and local development approach.

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References

- Anthopoulou, T. (ed), (2013). Urban Agriculture. Social Inclusion and Sustainable City. Case study of two municipal gardens in Northern Greece. Athens: Panteion University.
- Stavrides, S. (2010). Towards the City of Thresholds. Trento: Professional dreamers.
- For more information
- Athens Community Gardens blogs.
- Per.Ka. <http://perka.org>
- Peliti: www.peliti.gr
- Anoixto Diktio: <http://open-works.org/pages/anoixto-diktyo-ypostirixis>
- City Farmer Greece: <http://cityfarmer.gr>

Coping with Flooding in Bangkok

37

Piyapong Boossabong

From late 2011 to early 2012 many areas in Bangkok, the capital and the biggest city in Thailand, faced the most terrible flooding in roughly 70 years. Even though flooding is common in some areas in the city, this time more than half of the city was flooded with water levels reaching up to more than 2 metres. Food shortages occurred as a result of this disaster. Policy networks on urban agriculture played an important role in dealing with the urban food problems that emerged during the floods.

Floods and food shortages in Bangkok

Bangkok's inhabitants mainly depend on food transports from outside the city, especially dominated by a few monopoly food corporations. Such corporations own discount and convenience stores, which can be found everywhere. A survey by Rapijun Phoorisumboon (2012) found that these stores control food production and distribution, shape consumer food culture, and also contribute to a reduction of local food variety.

When flooding converted the main road into a river, transportation of goods was interrupted. Many food industries and distribution stores were flooded as well. As a result, consumer demand for food could no longer be met, and food prices increased. On average, food prices increased by 3-4 times, while in the case of vegetables, prices were even ten times higher.

As a consequence, about 41,500 households could not access enough food, while others lacked specific types of food (mainly fresh products) (surveyed by Bangkok Metropolitan Administration in 15 October 2011). Certainly, the urban poor and marginalised people were the most vulnerable and affected.

The mainstream food aid system and its problems

The mainstream aid system responded to the food crisis by providing food through public agencies with the support of many corporations and international organisations. Mainly dried and processed food items such as instant noodles and canned fish were provided, while fresh food was rarely available. Because of the centralised allocation units, "one-size-fits-all" approach and political bias of food allocation, food aids did not reach and meet the need of many vulnerable groups.



Food distribution during the flooding in Bangkok

Photo: Health-Me Organic Delivery

Urban agriculture: an alternative strategy for dealing with the urban food agenda during floods

Small-scale farming in the city is one of the cultural identities of Bangkok. Not only are there still 13,774 full-time farming households out of a total population of 5.7 million, who cultivate over 70,000 acres located in Bangkok's periurban fringe (Policy and Planning Division, 2012); there are also many communities, organisations and households growing vegetables in the inner city. The awareness on city farming has clearly developed since 1997, when Thailand faced a harsh economic crisis known as the 'Tom Yum Kung' crisis. At that time, the King, who is generally respected by Thai people as a father of the country, made a speech about growing food in limited areas by low-input methods and for self-reliance. His speech promoted Thai people to grow food everywhere. Even though inner city farming is of small scale and only contributes to a minor extent to an alternative food system, in many respects it is able to play an important role, specifically for the urban poor and marginalised groups. City farming has been supported by many actors, especially since 2010 when the City Farm programme was endorsed by the National Health Promotion Foundation, the Prime Minister's Office. The various actions implemented by different actors under the umbrella of the City Farm programme are defined here as *policy networks on urban agriculture* (for more on the concept of policy networks see Marsh, 1998, p.8).

The City Farm programme was funded under the food and nutrition programme of the National Health Promotion Foundation and managed by many non-governmental bodies led by the Thailand Sustainable Agriculture Foundation, Centre of Media for Development, Working Group on Food for Change and the City Farm Association (a cooperation of different social enterprises). The programme involved a variety of actors, such as the District Administration offices (local government), Green Market Networks, Slum Dwellers Networks and Informal Labour Networks, green food corporations, social enterprises, social activists and community based organisations.

Policies should adequately respond to the urban food agenda that is at stake during extreme climate events

At the beginning of the programme the policy networks promoted urban agriculture as an activity to enhance city dwellers' livelihoods. However, the extreme flooding led the policy networks to rethink and reshape their strategies. During the floods, the policy networks worked intensively and collectively to respond to the urban food shortages that had occurred. They realised that urban agriculture not only contributes to enhancing livelihoods, but can also be promoted as a strategy for climate change mitigation and adaptation.

In dealing with the food agenda during floods, the policy networks filled the gap that was left by the mainstream food

aid system. They did so by mobilising local actor networks and by utilising the capacity of the local food system. The following are some examples of the interventions supported by the policy networks during the floods.

Providing food for the most vulnerable people during the disaster

While the most vulnerable households, such as the urban poor and the marginalised groups, did not receive specific attention from the mainstream food aid system, the policy networks on urban agriculture prioritised support to them. As vegetables were rare and very expensive during the flood period, the policy networks mainly provided vegetables collected from local sources and the urban agriculture projects developed by them.

Providing materials and training on producing emergency food

The proverb "to teach somebody to fish is better than to give him fish" became one of the principles of the work of the policy networks. Next to food distribution, the policy networks provided a set of materials, training and assistance to the flood victims on simple and short-period food production, such as sprouts and mushrooms. Each household could produce 3 kilogrammes of sprouts every 3 days, while they could produce 20 kilogrammes of mushrooms from 20 chunks provided to them. To cook food without electricity, victims were provided a solar power cooking box.

Developing food innovations for living with water

Once the floods were forecasted to persist longer, many of the policy networks organised meetings and focus groups for sharing experiences and to develop food innovations for living with water. They established the temporary movement named "GOD": "Growing Out Disaster". They tried to



Training on growing sprouts at Kehatungsonghong-Samsoonhok Photo: Centre of Media for Development



Illustrating how to produce mushrooms during flooding

Photo: Nardsiri Gomonpun, City Farm programme coordinator

teach and share food innovations for living with water and promoted these amongst the city dwellers. Some of the innovations include rooftop gardening, vertical gardening, growing food in containers, hanging gardens, floating gardens, and applying a farming technique called “EM ball” (an effective microorganism ball for flood water decontamination).

Supporting mutual aid during floods

Another contribution of the policy networks was the support to mutual flood aid between city farm consumers and producers who had joined the Community Supported Agriculture (CSA) programme facilitated by the policy networks. For example, the green restaurant called “Health-Me Organic Delivery”, in cooperation with the Green Market Network and the Working Group on Food for Change, established free cafeteria nodes located near the places of the farmers that were flooded. The temporary cafeterias became a space for daily cooking and eating food from these producers. The green restaurant provides information that these cafeterias could feed roughly 2,100 victims from 5 different areas. The policy networks also mobilised collective actions to share seeds with the involved city farmers and to support the farmers to re-establish and habilitate their plots and farms.

Moreover, the policy networks also played an important role in criticising the priorities of the government, under which farm areas were poorly protected, and the role of monopolised and centralised food distribution in the mainstream food system. They played a role in raising awareness on urban food security, food sovereignty, environmental sustainability, and adaptation to climate change.

Discussion

The possibility of urban agriculture to enhance the adaptive capacity of the city to respond to the urban food agenda during an extreme climate event has now been demonstrated in a country that always considered itself to be a land where food is abundant. Nevertheless, the policy networks on urban agriculture in Bangkok are still insufficiently recognised as alternative food governance mechanisms and can only contribute on a small scale, mainly as a result of continued government priorities to support the industrial food system, and the absence of international recognition for urban agriculture as a disaster risk reduction strategy. Apart from that, the policy networks on urban agriculture are hindered by contradictory roles of the national and regional governments. For example, while they agree with the development of food innovations such as floating gardens, they do not allow any objects that may obstruct the water flow in the river. The policy networks are also challenged by the problem of accessing land for farming in the city and securing the land rights of the city farms. The policy networks are not able to respond to such challenges alone as this requires a transformation of the formal land ownership structure in Bangkok.

A positive outcome however is that city dwellers have become more aware of the issues of food insecurity and the right to food. The number of requests for training is increasing. The policy networks are also expanding, as many new actors become engaged. An important question that remains is how to further enhance the collaborative governance of the policy networks on urban agriculture to respond adequately to urban food agendas that are at stake during possible future extreme climate events.

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Note

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References

- Boossabong, P., 2012, *Growing Cities for Growing Life: Ideas and Practices of Urban Agriculture*, Bangkok: National Health Promotion Foundation and Thailand Sustainable Agriculture Foundation.
- Hutapate, K., 2011, Green Life Bag, *Natural Agriculture Magazine*, Vol.14, No.10, pp.5-7.
- Marsh, D. (ed.), 1998, *Comparing Policy Networks*. Buckingham and Philadelphia: Open University Press.
- Phoorisumboon, R., 2012, The centralisation of food distribution and its impacts on food security during Thai floods. *The national conference on seed freedom, food sovereignty and food security*, Kasetsart University, 16-17th May 2012.
- Policy and Planning Division, 2012, *Agriculture in Bangkok*, Research Report, Department of City Planning, Bangkok Metropolitan Administration.

The Beijing Urban Agriculture Policy Guidelines: A milestone

This paper presents the main points of the draft policy guidelines for development of urban agriculture in Beijing. These guidelines are currently awaiting final approval by the Beijing People's Congress and will be an important milestone in the development of urban and periurban agriculture in the city of Beijing in the coming decades.

Covering an area of 16,808 sq. km, the municipality of Beijing is divided into 16 districts and 2 counties. In 2004, the registered population numbered over 14.5 million, of which 3.2 million were living in the periurban areas. Millions of people have migrated to Beijing in search of jobs and economic security. At present there are more than 4 million migrants in the city (who lack the status of a registered citizen of Beijing).

Liu Junping

New and expanding businesses and residential areas have pushed the urban boundaries far into the areas surrounding the city, leading to a large loss of farmland in the periurban areas (about 40,600 hectares in the period 1986-1995 alone).

CHANGING VIEWS ON THE FUNCTIONS OF (PERI)URBAN AGRICULTURE IN BEIJING

Until recently, the Beijing policy on agricultural land use was focused entirely on the production of grains (especially rice). In the late eighties and early nineties various measures were adopted to slow down the loss of farmland (especially prime agricultural land) in the Beijing municipal area, including the "Regulations on the protection of Basic Farmland" issued in 1994 and the establishment of the Bureau of Land Management in 1995. Tree growing (e.g. along highways) and the creation of urban and periurban zones with an



Awards handed out at the "village for folklore" tours in Beijing

ecological function also received more attention.

The Beijing municipal government adopted sustainable development as its main strategy after 1995. It also unofficially included (multi-functional) urban agriculture in its land use policy, since all land in Beijing was zoned and given a specific function, such as grain production, agro-tourism, ecological protection, food processing, and so on. The 1995 Land Use Policy is based on the conviction that agricultural land in and

Other functions of the periurban areas of Beijing have also become important

around the city cannot be effectively protected by the local government, unless its economic return is comparable and competitive to other types of urban land use. The enhancement of the value of agricultural land use in urban and periurban Beijing, therefore, became a key objective of the municipal and district governments of Beijing, both by stimulating changes in the agricultural production structure as well as by promoting other functions of periurban

agriculture like agro-tourism and ecological management.

A key element in the city's efforts to develop periurban agriculture is the "2-2-1 Action Programme on Urban Agriculture", a comprehensive programme initiated by the Beijing municipal government in April 2004 that:

- analyses market demand
- strengthens development and management of agricultural resources
- mobilises investment in agriculture and credit provision to farmers
- strengthens cooperation among farmers
- stimulates agricultural technology development and maintains an information centre as a platform for sharing agro-technologies and experiences
- supports key agro-enterprises and builds up agro-product brands, marketing and certification
- supports greenhouse agriculture and introduces new seeds.

As a result, the productivity of agricultural land in periurban Beijing has increased and traditional farming (mainly grains) has gradually given way to more intensive production systems often linked with agro-enterprises that

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undertake the processing and marketing (herbs, vegetables, animal products, flowers, tree seedlings, pot plants, etc.).

Other functions of the periurban areas of Beijing have also become more important. For instance, agro-tourism in periurban Beijing has made great progress in the last decade and generates new income opportunities for the farmers. Agriculture also increasingly plays a role in environmental improvement (urban greening, dust and heat reduction by tree growing, water management, recycling of organic wastes, etc.). More recently, the role of periurban agriculture in enhancing social security and income /employment generation, especially for the poor migrants, has also received increasing attention.

The RUAF programme, through its regional partner IGSNRR, supported the design and implementation of the *2-2-1 programme*, through training, a situation analysis, multi-stakeholder action planning and monitoring activities. A number of lessons have been learned through this programme in the past two years:

- Urban agriculture needs to be fully integrated into city planning.
- Public participation is important and needs to be enhanced. Many decisions require public involvement, because so far the farmers' interests alone are not considered enough.
- There is a lack of investment in urban agriculture. This is the most common complaint from the urban agricultural stakeholders.
- More research is needed on the impacts of urban agriculture and its development needs to be more closely monitored.

There is too much duplication of projects, e.g. redundancy of agro-tourism facilities in the same area.

Collaboration between agro-based enterprises and farmers (including migrants) needs to be stimulated.

THE (DRAFT) BEIJING URBAN AGRICULTURE POLICY GUIDELINES (2006)

Based on the experiences gained in the *2-2-1 programme*, the Beijing Agricultural Bureau, assisted by the international RUAF-programme through its regional partner IGSNRR and the Beijing Agro-

Tourism Association, drafted the Beijing Urban Agriculture Policy Guidelines, which were recently submitted for approval as a Municipal Bye law. These guidelines contain the views of the

Urban agriculture has proven to be a powerful development force in Beijing

Beijing municipal government on the comprehensive development of agriculture in the periurban areas of Beijing, addressing its multi-functional character. Through the development of urban agriculture, the policy seeks to enhance the urban and periurban economy, improve urban farmers' income, generate employment, enhance social security and improve the environment. All of these factors will contribute to the goal of creating a sustainable city.

The municipal government is proposing a two-step plan. The first step is to modernise local agriculture in the coming 3-5 years, by diversifying different types of specialised production, modernising facilities, improving production processes, and modernising management (and labelling of products). The second step, in the subsequent 5-10 years, is to strive for an urban agriculture system that is integrated in the city's sustainable development.

BASIC PRINCIPLES

The principles of the new urban agriculture development policy can be summarised as follows:

- **Linking local conditions to the Beijing master plan.** The development of urban agriculture in each district or county of Beijing should comply with the requirements of the Beijing master plan as well as take the specific characteristics of the local situation into consideration.
- **Market orientation.** Agricultural production and management and agro-industry production will more strongly follow market demand for agricultural products and other services (regional, national and international markets).
- **Efficient use of resources.** Introduction and use of new agricultural technologies will be oriented towards a more efficient use of available resources, particularly land and water.

- **Integration of agricultural production with ecological and social services.** The social and ecological benefits of urban agriculture are just as valuable as the economic gains of urban agriculture for sustainable city development. The development of the agricultural production function has to be combined with the development of the ecological and social functions of urban agriculture for Beijing city development.

- **Cooperation and diversity at different levels.** Cooperation is needed and will be facilitated at district, city and regional level, and differences in agricultural assets and social economic conditions between the various locations will be taken into account.

Implementation of the policy guidelines on urban agriculture will mainly focus on three aspects: spatial allocation, implementation of support programmes and financing for urban agriculture.



Lu Mingwei

Cherry picking in Sijiqing gardens, Haidian district, Beijing

SPATIAL ALLOCATION

The spatial structure of Beijing has a concentric configuration. Various belts (i.e. the *inner city belt*, the *inner suburban belt*, the *outer suburban belt*, the *mountainous area*, and surrounding rural areas) have different agricultural assets, such as land and water, which has led to the development of different types of agriculture and other activities. The Beijing Urban Agricultural Policy identifies a specific strategy for the development of urban agriculture in each zone.

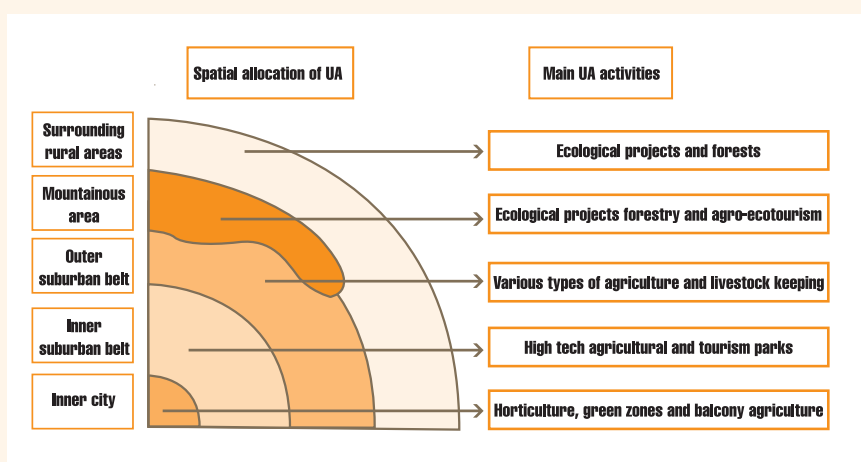
IMPLEMENTATION PROGRAMMES

Furthermore, a number of programmes will be undertaken in each belt (see table) that link the development of urban agriculture with the various objectives of integrated city development.

The modernisation of the agricultural sector will be stimulated by improving the basic infrastructure, building agricultural facilities, and human capacity building, including building greenhouses, irrigation systems and promoting new types of energy, such as wind and bio-energy. The presence of the city's infrastructure and markets are important and the urban agricultural enterprises in Beijing will be stimulated to fully exploit the existing and future markets, establish agro-logistic systems, and add output value by using new agricultural technologies.

Key sectors will be given priority, like seed production and distribution, the production of local specialised products, agro-processing and agro-ecotourism.

The multiple functions of urban agriculture will be fully exploited. Activities to enhance the ecological functions include tree planting in the inner city, construction of green zones in the inner suburban areas, recovery of



Spatial allocation of urban agriculture activities in Beijing

FINANCING

Beijing will adopt the following policies for financing the development of urban agriculture:

- Various sources of possible investment will be explored and stimulated, like fiscal budgets of municipal and local governments, enterprise investments, various types of bank loans, and foreign investment.
- Local governments will facilitate the

- A facilitative environment will be created for further development of urban agriculture, involving farmers and consumers in the planning process by applying a multi-stakeholder approach to project planning and implementation.
- Local governments will strengthen monitoring and management of the implementation of these activities and an impact evaluation system will be established. Participatory and self-evaluation is a necessary part of this system.

Objective level	Programmes
Agricultural growth	Adjusting the agricultural industrial structure
	Construction of agricultural facilities
	Improvement of food security
	Improvement of industrial management and operation of agriculture
	Broadening the agricultural market
Rural construction	Establishing an agro-technology service system and improving public services in periurban areas
	Improving the ICT infrastructure in periurban areas
City development	Enhancing the social functions of urban agriculture
	Strengthening the ecological function of urban agriculture

Table 1 Implementation programmes and related policy objectives

degraded and waste lands, reduction of agricultural contamination, and preservation of vegetation in the mountainous areas. The development of regulations for environmental protection of vulnerable areas should protect areas that are of special ecological importance.

Social functions will be stimulated by providing training and mutual learning in periurban communities and participation of citizens in decision making. Agricultural associations are seen as an important means to enhance the inclusion of migrants and small farmers in this process and to link them with agro-enterprises, NGOs and local governments.

availability and implementation of critical and advanced agricultural technologies.

- Governments should guarantee basic infrastructure and agro-facilities, such as water, electricity and transport.

PLANNING AND MONITORING

In order to implement and monitor these policy guidelines the following measures will be taken:

- Acceleration of the planning process on urban agriculture will be the main task for governmental agencies. In order to achieve this aim, close collaboration and coordination between various departments and officials will be necessary.

CONCLUSIONS

Urban agriculture has proven to be a powerful development force in Beijing. It has improved the living standards of its inhabitants by generating employment and income for resident and migrant urban farmers. It promotes social cohesion by engaging citizens in the urban-planning process. It maintains urban green spaces and limits urban sprawl. It encourages proper management and recycling of urban water resources.

The new policy guidelines will foster the further development of urban and periurban agriculture in Beijing as an integral part of its sustainable city development strategy. Approval of these guidelines will be an important milestone in the development of urban agriculture in Beijing.

References

- Beijing Bureau of Land and Housing Management, 1997, Land resources in Beijing
- Beijing Municipal Bureau of Statistics, 2004, Beijing Statistical Yearbook 2004, China Statistics Press
- Beijing Urban Agriculture Development Policy Guidelines (Draft), 2006
- Yang Zhenshan, 2005, Enterprise-based urban agriculture development in Peri-urban Beijing (master's thesis), Institute of Geographical Sciences and Natural Resources Research
- Research Team, 2005, Study on Land use Strategy in Beijing, Institute of Geographical Sciences and Natural Resources Research

Different types of Agricultural Cooperatives with Periurban Farmers in China: two cases

In 1978, China started to dismantle the commune system and the so-called “eating from the same big pot” that existed for decades, i.e. absolute egalitarianism whereby everyone gets the same benefits irrespective of his/her performance. Village land began to be contracted to peasant families on a 30-year basis in most cases and a system of “household contract responsibility” was introduced that set farm output quotas for each household and linked remuneration to output.

This mobilised the peasants’ enthusiasm for agricultural production. But as the market economy developed, the “household contract responsibility” system became less adequate, since it did not sufficiently stimulate modernisation of the farming systems and left small-scale farmers in a weak position on the markets. Hence, agricultural cooperatives were created that facilitate capacity building and joint marketing, often closely linked to (party-led) village-level management. There are currently about 150,000 farmer cooperatives in the country, 1,000 of which are located in periurban Beijing.

Privately owned land does not exist in China; all land is owned by the state (in urban areas) or by village collectives (in rural areas). This fact determines the way cooperatives are organised. Two main forms of agricultural cooperatives can be distinguished:

Bottom-up cooperatives (in which farmers themselves play a key role): In

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Cooperative chairperson Ms. Zan explains the history of the cooperative to visitors

some villages (like in the outer parts of the periurban region of Beijing), land is allocated according to land-use rights and managed by the villagers individually. In this situation farmer cooperatives can be built from the bottom up with the small-scale farmers. In this type of cooperative the small farmers establish a contract with the cooperative to which they supply their products and from which they receive training, marketing and other services. Such cooperatives are often relatively loosely organised and their formation might be hampered by the scattered location of the small farmers in the village area. In addition, the bottom-up cooperatives often lack sufficient capital, technology and management skills.

Top-down cooperatives (in which governmental organisations and/or large agro-enterprises play a dominant role): In some villages, villagers hold land-use rights, but the land is managed collectively rather than individually, and the village committee will periodically allot dividends to the villagers according to their land-use rights. This situation can often be encountered closer to the cities where land prices are rising quickly as well as new production, processing and marketing opportunities. Since the land is not distributed, the

village management may make arrangements for large-scale production (or other land use e.g. agritourism parks) in cooperation with one or more agro-enterprises and/or a (local, district, provincial) government, if the villagers holding land-use rights agree to participate.

In such a top-down cooperative, the villagers may become shareholders by contributing their land use rights while the external partners bring in capital and/or technology.

Below we present two cases, one of a top-down cooperative and one of a bottom-up cooperative of periurban farmers, to illustrate the strengths and weaknesses of both models in the actual Chinese context.

THE DINGXIANG COUNTY GREEN FOOD ASSOCIATION IN DINGXIANG: A TOP-DOWN PROCESS

*With a contribution by Mr Xishan Gong,
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Bureau*

Dingxiang is a county located in the periurban area of Xinzhou, a small city of about 150,000 inhabitants in Shanxi province. Dingxiang county used to be

called a “National Commodity Grains Production Base”. However, due to booming industrial development, many farmers started to spend most of their time on non-agricultural activities, since this brings them much more money. They consequently paid less attention to their farmland, which – despite good natural conditions – has a low level of productivity due in part to outdated agricultural technologies and lack of adequate marketing.

To promote agricultural development in this area and meet the urban residents’ demand for healthy food, Xinzhou municipality together with some agro-enterprises in Dingxiang County (e.g. Huarun Steam Meat Company, Wutai Mountain Seeds Company), the Agricultural Techniques Promotion Center (ATPC), and farmers, jointly established the Green Food Association (GFA) in 1994. This was the first agricultural cooperative in Dingxiang county. In that year, 432 small-scale farmers joined the association; membership increased to 1,216 in 2003. GFA’s main products were millet, corn, sorghum, and all kinds of vegetables, mainly capsicums.

The bottom-up farmer cooperative has broken new ground

INTERNAL STRUCTURE OF GFA

The highest authority in the GFA was the members’ representative assembly (46 elected members), which approved the annual report and development plan prepared by the GFA council, the executive agency of the GFA. The chairman of the council was nominated by ATPC (and usually was an ATPC official) after approval by the representative assembly. The ten members of the council (including ATPC-staff and farmers) were appointed by the chairman. The monitoring committee had five members (all farmers), selected by the representative assembly.

GFA had six departments. The Administrative Office, Financial Department and Sales Department were operated by the GFA council, and the Information Department, Technical Department and Agricultural Inputs Department were operated by the ATPC. The operational costs of these departments were entirely covered by the government.

The Dingxiang Green Food Association was sub-divided into three professional branch organisations: capsicum association, vegetable association and miscellaneous association. Members were also organised into fifteen groups according to the distances between the villages in the county and the number of members per village, in order to facilitate the collection of the agriculture products, provision of agricultural inputs and the dissemination of information and techniques.

OPERATION AND MANAGEMENT OF GFA

ATPC, enterprises and small-scale farmers were required to sign contracts with the association and each had to fulfill the corresponding obligations and rights.

The agro-enterprises were contracted to supply the farmers with the required agricultural inputs (seed, fertilisers, etc.) and to take care of the processing and marketing. Their contract included a condition that they carry the market risks (quantity and the minimum price of the products to be sold that year).

Once these contracts were established, the GFA contracted ATPC to provide technical guidance and supervise farmers’ planting (the contract contained the condition that ATPC had to compensate the farmers’ loss if their products did not meet the technical requirements of the agro-enterprises) and the interested farmers had to deliver certain amounts of agricultural produce (and they carry the natural risks).

In this way, the farmers could pay full attention to planting without worrying about the marketing of the products.

BREAK UP OF GFA; NEW FUTURE FOR THE COOPERATIVES IN DINGXIANG

Agriculture in Dingxiang was greatly stimulated by the establishment of the GFA, which proved that the establishment of agricultural cooperatives is important and that difficulties experienced by farmers in gaining access to information, technology, capital and markets can be solved in this way. The establishment of such an association also enhanced the scale of production and reduced the risk for both enterprises and farmers.

Unfortunately, the association broke up in March 2006 when ATPC had to

withdraw from the association because a new provincial policy determined that a government organisation cannot be part of any commercial organisation. The new policy seeks to reduce the fiscal burden of the provincial government and to encourage farmers to pay for the technical services they receive.

The new policy led to the breakdown of GFA. Without financial support from the government and technical support from ATPC, the farmers’ production process could not be supervised and subsequently the association could no longer guarantee the quality of products when signing contracts with agro-enterprises. Obviously, GFA depended too much on the government and ATPC to sustain itself without them.

Thanks to the farmers’ experiences in the period between 1994 and 2006, which demonstrated to them the important role an agricultural cooperative plays in the development of agriculture and in increasing farmers’ incomes, various agriculture cooperatives have been established since GFA broke down (e.g. a Vegetables Cooperative and a Corn Seeds Corporation). However, so far the experiences of these cooperatives have not been very satisfactory, due in part to the low technical credibility of their leaders (compared to the ATPC officials). Many farmers still hope that GFA will be re-established, since they believe such a top-down organisation will function better in this less-developed region than a self-managed organisation.

In any case, a more appropriate type of agricultural cooperative has to be developed in which farmers and agro-enterprises play a more important role than governmental departments. That is why Dingxiang authorities are interested in exchanging information on bottom-up approaches to the organisation of urban and periurban farmers with other RUAF partners.

HUAIROU GRAPE COOPERATIVE

With a contribution by Ms Xiaojing Zan, Chairperson of Huairou Grape Cooperative

The Huairou Grape Cooperative is located in Huairou district, a mountainous periurban region of greater Beijing with an agreeable climate for certain crops and attractive scenery for urban tourists.



René van Veenhuizen

Improved rainwater harvesting for grape production by migrants in Huairou

HISTORY OF THE COOPERATIVE

After completing a two-year study programme organised by the China Grape Association Beijing Branch, Mr Qingzhong Zhao, together with his wife Ms Xiaojing Zan, rented in 1998 a piece of land of 20 mu¹⁾ from the Angezhuang village commission and built up 5 greenhouses to grow 17 new varieties of grapes. The business was so successful that in 2000 they rented another 50 mu of land from Liyuanzhuang village to expand their activities.

The success of their grape farm stimulated local farmers to start initiatives of their own. They came to the couple asking for planting materials (which were initially given for free), technical guidance and marketing support. When more and more producers started to consult the young couple, it became too much of a burden and they could no longer afford to give away seedlings for free.

By then, the couple had begun considering the idea of establishing a supply-production-marketing cooperative. The cooperative would take care of the marketing of their products, including cold storage facilities to store grapes that cannot be sold directly to the markets.

The initial phase of setting up this cooperative was not easy due to the lack of launching capital. Ms Zan persuaded her family to sell their home and gathered in this way 20,000 YUAN to initiate the cooperative with a dozen farm households as members. Standards for growing grapes and regulations for operating the cooperative were defined. By 2004, the cooperative was officially registered as “Huairou Fruit and Vegetable Production and Marketing Cooperative”, although currently its production is still focused

only on grape growing. Ms Zan was elected as chairperson for the first term of five years, mainly because she had demonstrated her skills as a marketing manager for the cooperative.

After two years of operation, the cooperative proved to be quite successful and the number of members increased to 1,108 households. In 2006, the gross output of grapes reached 3.1 million kg, with average income per mu up to 15,000 yuan (more than 40 times that of traditional grape growing). It is obvious that the members of the cooperative have increased their incomes substantially.

TRAINING SERVICES SUPPLIED BY THE COOPERATIVE

The cooperative not only supplies high-quality young plants at low prices to its members, but also provides training and technical advice. Mr. Zhao provides technical assistance to farmers under the condition that they buy their young plants from him. Every Monday is consultation day for grape farmers. Since 2002, the cooperative has been gathering information about grape production, including the latest developments about grape growing from the internet, and makes this information available to the farmers. Technicians from the China Agricultural University, Beijing Agricultural College and China Grape Society are invited (and paid) by the cooperative to provide advice when more complicated problems are encountered and to provide training on the latest grape growing technologies. So far, the cooperative has organised 8 training workshops for more than 3,800 participants, and more than 20 domestic and foreign grape varieties have been introduced in this way.

The cooperative has also adopted a programme of “learning new things by going outside” and has organised ten study trips to Hebei, Shandong and Tianjin for a total of 640 participants. This activity broadens not only the farmers’ knowledge but also their production and marketing channels.

MARKETING SERVICES

The cooperative applies three main marketing strategies. The first is to establish contracts with supermarkets. Subsequently the cooperative makes contracts with its members to pre-book the growers’ products. Members sell about 30% of their grapes in this way. The

second strategy is to sell grapes to tourists (“pick your own fruits”). Since Huairou is located in a scenic mountainous area, thousands of tourists from Beijing visit the region each year, many of whom enjoy picking grapes at local farms. Members sell some 20% of their products in this way. The third strategy is to sell cold-stored grapes in the off season for much higher prices. The cooperative was able to build a 100 m² low-temperature storage facility thanks to a 100,000 yuan grant from the Huairou scientific commission. This prolonged the selling period by eight months and allowed the cooperative to obtain the trust required for long-term relationships with big traders.

CHALLENGES AND FUTURE PERSPECTIVES

This bottom-up farmer cooperative has broken new ground. Its success demonstrates the effectiveness of this new type of organisation. However, based on the experience of Huairou Grape Cooperative, some challenges can still be identified:

- The cooperative is still highly dependent on its founders, Ms Zan, the chairperson and able marketing manager, and her husband Mr Zhao, who is very skilled in grape growing. This couple still does an excellent job and they complement each other very well. However, the cooperative needs to train more persons to take on various specialised technical and management tasks and to take over from the actual leaders when the need arises.
- Small bottom-up cooperatives like the Huairou Grape Cooperative encounter problems in obtaining sufficient government support and generating the capital needed for required investments (cold storage, drip irrigation).
- The most urgent task of the cooperative is to register and advertise its own brand and develop its own high-level green food certificate for its supermarket channel.
- Agritourism (sightseeing, fruit picking) is a good approach for raising the value of the agricultural products, since urban tourists show a strong interest in eating or buying local food and experiencing the production and harvesting process. More research on agritourism and the taste preferences of urban citizens is needed.

NOTE

1) 1 mu equals about 667 m².

Migration to cities has increased rapidly since reforms took place in China. It has been estimated that over the past 30 years, more than 300 million people have successfully transferred their residence and have found a job in one of the rapidly growing cities of China; and it is expected that this trend will continue in the coming 15-20 years (Feng, 1996). Quite a number of migrants stay in the periurban areas and turn to urban agriculture for their livelihoods.



Migrant children may grow up confused

Emerging Migrant Farmer Communities in Periurban Beijing

As the capital and one of the biggest cities in China, Beijing is one of the most favoured destinations for migrants. A one percent sampling population survey in 2005 found that there were nearly 3.6 million migrants in Beijing, 80,000 of whom were directly involved in agricultural activities, and up to 524,000 of whom were engaged in related activities.

Research was undertaken in four villages in Chaoyang and Shunyi district as part of the RUAF Cities Farming for the Future programme. Chaoyang district is close to the built-up areas in Beijing, and has various types of land use. Shunyi district is located about 40 km away from the city centre. It is the area's traditional bread basket, with relatively stable land use. The number of migrant farmers is higher in Chaoyang than in Shunyi.

Livelihoods

Migrant farmers encounter a number of difficulties after they arrive, for example in building a dwelling and in finding their place in the production chain. The first and most important problem they

encounter is access to land. Farmland in Beijing is owned by village committees. The only way for a migrant farmer to get access to land is to rent it directly from the local village committee or through one of the local farmers. Since June 2004, the Beijing government has been promoting "the transfer of the contractual right of land" to make it easier for migrants to lease land. In reality, though, migrant farmers' right to land is not clear, and most often control remains with the land owner. Also irregularities in contracts create problems. This limits the flexibility of migrant farmers in planning and thus in their development (competition capacity). Also, irrigation water is still provided by canals, which is not efficient and highly wasteful.

Access to financing is also difficult for migrant farmers. Most farmers rely on informal private loans, which have been affected by the reform of the rural banking system in China (which has further weakened the uncertain position of migrant farmers). Both in buying inputs and in selling their products, migrant farmers are almost always at a disadvantage, because of their lack of money and information. Initially, the city had a restrictive registration policy for migrants, but this situation has improved considerably.

Other major problems migrant farmers (and other migrants) now face include the high cost of education and the relatively low quality of schools. The living condi-

tions of migrant farmers are also poor. They usually build their humble dwellings beside the rented farmland or green-houses. Their homes are small, usually only 20-40 square metres, and barely furnished. Kitchens and toilets are very simple and usually located outside. The homes have no heating devices, and many residents use firewood and coal (out of tradition or because of low costs). The survey revealed that one of the reasons for these poor living conditions is that many migrant farmers initially do not see this "city lifestyle" as a long-term situation. But as their incomes improve, they start investing in their homes (for example, by adding LPG and electricity).

Agricultural cooperatives

Migrant farmers sell their grains, vegetables and fruits in the following ways: (A) door-to-door, which is the most popular way; (B) directly at wholesale markets; (C) to re-sellers or restaurants; (D) through farmers' organisations; and (E) through agro-tourism arrangements (field picking). For instance, migrant farmers in Dongjiangying in Shunyi sell their grains directly to the nearby grain storehouse. In some cases, migrant farmers organise themselves in a cooperative, as in Xiaodian, in Chaoyang, where the migrant farmers jointly acquired access to farmland and distributed it among themselves. Such cooperatives also organise their production and seek marketing channels.

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There is a noticeable trend among migrant farmers to develop and organise themselves from the first stage of selling their products directly to the consumers, through the next step of using intermediaries and finally to selling through cooperatives, thereby consistently increasing their profits and saving time. In this way migrant farmers are connected to the city and contribute to the building of communities.

Migrant farmers' social network

Though they work and live in the city, migrant farmers do not have formal connections to the city. The ties with their home towns are quite close and most of the migrant farmers go back home one to two times each year, have regular contact with their relatives, and send home remittances. Because of the high education costs in the city, some children attend school at home and are taken care of by their grandparents.

The incomes of most migrant farmers are higher after migration to the city (increasing on average from 350 to 500 euros per person per year), but still lower than the average of local farmers (800 euro). The cost of living in the city is higher than in the rural areas, and in addition migrant farmers are responsible for houses and land both in their new city and in their home towns. The average "daily-life" expenditure per year is about 400 euros, which is substantially lower than the average expenditures on production (1,500 euros) and savings/remittances (1,000 euros).

Usually migrant farmers send a big part of their earnings back home (and are thus able to save very little for their own expenses in the city). The resulting lack of funds makes it difficult for them to buy inputs in the growing season. Migrant farmers have three main sources from which to borrow money:

- People living in Beijing who come from the same region. This is very common since migrant farmers' social networks (as defined by Chinese rural tradition) are based on and strengthened by familial and local ties.
- Other migrant farmers. This is possible because the farmers live in close communities (and are often rather isolated from the local community).
- Local farmers. This is only an option if the borrower and lender know each

other well and trust each other, i.e. after the migrant farmer has been in Beijing for several years (and is thus more integrated).

Migrant farmers have strong links to their home towns and only gradually develop connections to other migrants and to local communities in the new city. Some older migrant farmers go back home, but young people mentioned in the survey that they would like to continue farming in the city. Migrant farmers develop a relationship with local communities initially only through the market, as it is difficult to develop new social contacts. Although the migrants share some of the same needs as other residents, the sometimes hostile environment keeps them isolated from the local community. It can also be difficult to build relationships among each other, as they may quarrel over such things as the order of watering land. However, the farmers often sell products jointly and generally collaborate to a high degree.

BUILDING NEW COMMUNITIES

After coming to the city, migrant farmers face the challenge of building a new social network. They are often prepared to take up agriculture, while the local farmers increasingly find new jobs in the city. This relieves the tension between local and migrant farmers to some extent. Migrant farmers gradually adapt to the new city. Most of them come to Beijing through relatives or countrymen who have been in Beijing for a period of time. After arriving in the city, new migrant farmers need to build a network to protect themselves and strive to earn profits in an unknown environment. This includes uniting with other migrant farmers from different provinces, compromising to satisfy local stakeholders and strengthen their original networks.

Education is an important issue for migrants. Migrant farmers acquire a higher income in the city, but suffer from a lower quality of life. Some of them do not stay very long, but the children of those who do remain grow up in the city and their feeling of community and identity is based there. However, it is difficult for these children to get access to high-quality education. They risk disappointment in life and subsequent psychological problems or negative attitudes are relatively high for this group.

The role of urban agriculture

Since the mid-1980s, township and village enterprises have developed rapidly in Beijing, as local farmers in periurban Beijing turn more and more to non-agricultural activities. This leads in turn to a lack of agricultural labour and deterioration of urban farmland. Villages in periurban Beijing have therefore gradually imported migrant farmers from Hebei, Henan, Shandong provinces, etc., who are introduced to the area by their relatives and friends. At present Beijing periurban agriculture is undertaken mainly by migrant farmers. This benefits both migrants and the local population.

So gradually the living and production style and experiences of migrant farmers change, that is, from rural agriculture to urban agriculture. This not only improves their own incomes, but also guarantees productive use of periurban areas, supplies of niche products to the city market, the development of other land use functions (recreation and leisure), and the building of new communities. Developing multi-functional urban agriculture could be a way of developing periurban land, maintaining green spaces, developing recreation and providing education for children. If migrant farmers fulfil these needs through organising themselves in a cooperative, they will acquire a stronger position in bargaining with policy makers and integrating in the community.

Increasingly migrant farmers play valuable roles in the development of urban and periurban agriculture, and new migrant farmer communities continue to emerge. Under current government policy, it is possible for innovative migrant farmers, in cooperation with local existing farmers' cooperatives, to develop the relatively weak ties among migrant farmers into strong cooperatives to strengthen the process of integration and as such facilitate the migration of more farmers to Beijing.

References

- Feng Xiaoying. 1996. Investigation and analysis of farmer issues among Beijing's migrants. *Economy Research Reference*.
- Zhang, F. Wang, G. and Cai, J. 2007. Migrants' Access to Land in Periurban Beijing. *Urban Agriculture Magazine* No.11:6-8.
- Website of Beijing rural work committee: the investigation on the transfer of the contractual right of land. http://www.bjnw.gov.cn/jqdt/tzggjzcx/ncjtjj-cqzd/200607/t20060706_27816.html

Innovations in Greenhouse Rainwater Harvesting System in Beijing, China

Beijing is a city faced with a shortage of water. Less than 600 mm of rain falls per year; but this figure is highly variable and actual rainfall has been lower than average in the past eight years. Less than 300 cubic metres of water is available per person per year; this is one eighth of the average volume per person available in the country as a whole and one thirtieth of the world average. Because of the downward trend in rainfall, surface water is gradually drying up and the level of ground water is declining.

The agricultural sector consumes a large volume of water, 90% of which is groundwater. Excessive use of water for agriculture threatens Beijing's ecology and the availability of water for consumption. The lack of a sufficient water supply also influences glass-house agriculture around Beijing since it is increasingly difficult to get access to groundwater. Thus, saving water in agriculture has become an urgent task and a common goal for the whole society.

In April 2007 the Beijing municipal government started to charge a fee for agricultural water use exceeding a particular quota (depending on the production type, e.g. paddy rice, wheat, aquaculture, vegetable gardening, fruit trees, or livestock). Now if farmers exceed their quota, they have to pay 0.08 Yuan per extra cubic metre of water used for grain crops and 0.16 Yuan per cubic metre used for other crops. Most farmers are able to limit their use to stay within the quota, but with decreasing rainfall, it is becoming more important to save water and find other sources, like rainwater. Farmers' water use for home consumption is not limited by a quota (a separate system has been implemented for this type of water use).

A NEW TECHNOLOGY

The Department of Water Saving, of the Water Authority, has undertaken a series of projects on saving water in agricul-

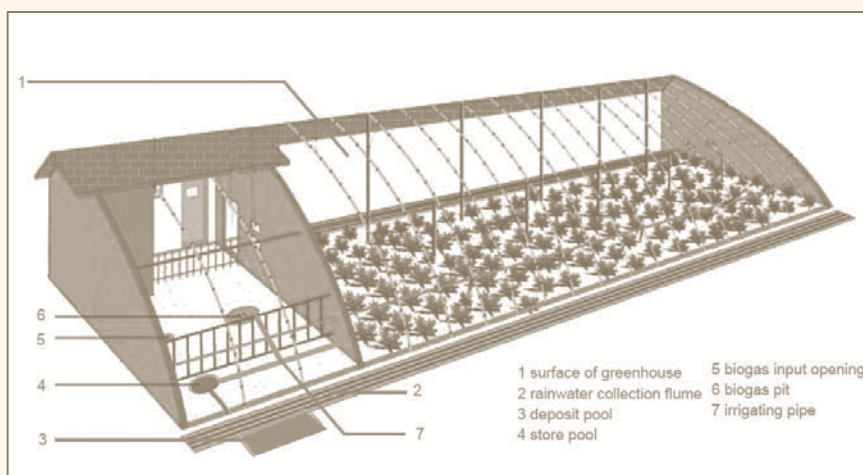
ture under the motto "tap new sources of supply, reduce consumption and prevent pollution". Rainwater harvesting is one of these projects. The technology of using the surface of greenhouses to collect rainwater was developed in China in 2005 by the Beijing Agricultural Technology Dissemination Station and the Soil & Compost Work Station. Both authorities fall under the Beijing Bureau of Agriculture. The construction of this type of greenhouse is subsidised and farmers are supported by exhibitions, training, farmer to farmer exchanges and websites.

The capturing of rainwater is combined with efficient irrigation techniques (drip irrigation). The farmers are further stimulated to include a reuse component by composting and producing biogas (see figure).

The technology consists of a greenhouse (see figure) with a special roof that collects

rainwater. Water is guided through the rainwater collection flume at the bottom of the greenhouse into a deposit pool and pumped into an underground storage pool, where the temperature of the water increases and it is mixed with micro-compost. The water is then again pumped into a basin and through gravity it enters the micro-irrigation system. An average greenhouse of this type is about 85 metres long and 8 metres wide. The plastic roof measures about 900 square metres, while the cultivable area under the roof is about 500 square metres.

This technology has a number of advantages. Firstly, it taps a new source of water – rainwater – thereby reducing the pressure on groundwater. In areas that are suitable for agriculture, but have limited access to water, the technology allows agricultural production and increases livelihood options. The rainwater is of good quality for irrigation and suitable for micro-irrigation. The chemical composition of rainwater is such that it rarely jams micro-irrigation pipes. The technology provides a reliable supply of water (especially important under erratic rainfall), and thus stimulates the production of several harvests of a wider diversity of crops. This increases the benefits for farmers, and subsequently stimulates the



Structure of rainwater harvesting system (one greenhouse)

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local economy. After the structure is built by local builders, it is relatively simple to use and maintain.

HUAIROU

Supported by the city of Beijing and implemented by the Bureau of Agriculture and the Beijing Water Company, two pilot projects have been started in Huairou district (one of the 10 districts in Beijing). It costs 80,000 Yuan (8,000 euros) to build a small tank system, but these projects are being fully subsidised by the Beijing government. This technology is now being used for the production of about 10,000 ha in Huairou, and accounts for 85.3% of all land under irrigation. In 2007, twenty new rainwater greenhouses were built.

Each greenhouse can collect up to about 200 cubic metres of rainwater per year (capturing water from May to October). However, in the past years this amount has never been reached due to erratic rainfall. For one cropping cycle, grapes need 85-100 m³/mu, Chinese cabbage needs around 100 m³/mu, cucumber needs 60-80m³/mu, and tomato needs 80 m³/mu (1 mu is approximately 670 square metres; the standard greenhouse would have 500 square meters or about 0.75 mu).

Capturing 200 cubic meters of rainwater would allow for 2-3 cropping cycles per year. But due to the scarcity of rainfall and land to store the water, in practice most farmers using this technology still need to add groundwater.

IMPROVING THE SYSTEMS

Huairou Fruit and Vegetable Cooperative is one of the government's pilot projects (see UA-Magazine no. 18). The cooperative specialises in the production of grapes and Chinese dates. The cooperative currently encompasses 1108 households and it has built five greenhouses in its contracted farmland. But according to the cooperative's leaders, the potential of this system has not been fully explored. In light of the opportunities offered by the growing market in Beijing and the multiple functions urban agriculture can offer (see earlier papers on this in UA-Magazine), the cooperative plans to extend the single production units into an integrated system by combining the five greenhouses that do not include a rainwater harvesting system. The rainwater from five greenhouses will be collected in a big pond of about 500 cubic metres (20 m long, 10 m wide,

2.5 m high). In the rainy season, the big pond cannot contain all of the collected rainwater, so excess water will then be used for aquifer recharge. The cost of constructing a big pond is estimated to be 200,000 Yuan (20,000 Euro) (which is cheaper than constructing three smaller ponds).

By using a rainwater harvesting system and drop irrigation in Grapes production in a greenhouse, less money needs to be spent on labour, pesticides and electricity for pumping water, thereby reducing costs to about 950 Euro per greenhouse per year. This system is currently being tested.

The structure of a rainwater harvesting system under construction in Huairou

The RUAF-CFF programme supports the organisational development of the cooperative to improve its functioning and the support it provides to its members. This involves the establishment of a multi-functional rainwater harvesting system and development of the agri-tourism component. The SWITCH programme supports this endeavour by conducting research into water flows and water quality.

The proposed system will be composed of:

- five rainwater harvesting greenhouses that will support the activities of individual farmers in the greenhouse, additional farming on land outside the greenhouse, other activities and aquifer recharge;
- reuse of household grey and black water and organic waste for composting and a biogas installation (for light bulbs in greenhouses; compost dissolved in irrigation water);
- a pond system designed as an ecological landscape (with reed, duckweed and fish) and recreational facility;
- tourism/leisure infrastructure (fishing, houses, regional food and products).

The development of this project is based on the following arguments:

- It is easier to build a big pond than five small tanks (in terms of space available and design), although the initial cost may be higher.
- It could be used to promote agri-tourism activities, such as fishing, and lodging.
- A wider impact on the community is sought by developing the multiple functions of agriculture, by involving

other farmers in vegetable and fruit production, aquaculture, fishing and other leisure activities.

- Due to the enormous pull of the labour market in Beijing, more and more farmers are getting jobs in urban areas, and as a result, only elders and women are engaged in agriculture. The potentially higher income of urban agriculture may keep labour in the area.
- It will improve the regional food system and development direct linkages between farmers and urban consumers of organic produce;
- It is important to improve the regional food system and develop direct linkages between farmers and urban consumers of organic produce;
- It provides an experience with participative/bottom-up development of cooperatives and farmers' organisations.

A number of challenges remain, which are the focus of current research. A first challenge is the technical design of the pond, considering the distance over which water has to be pumped back to the greenhouses and for other uses. Another challenge concerns the amount of land needed for this system. Research will have to look into the supply of water and whether this pond could meet the needs of agricultural production every year. One of the main aims and challenges for the cooperative is to reduce the use of groundwater while at the same time improving the farmers' incomes.

In addition work needs to be done in demonstrating the potential of this pilot project to cooperative members and related institutions. Therefore, not only the technical aspects, but also the whole development process in Huairou, will be recorded for use elsewhere and for showing that the system can improve the quality of water, and provide benefits to various stakeholders. This approach is also still being researched by the cooperative.



Growing a wider diversity of crops in the greenhouse

René van Veenhuizen

Adapting to Water Scarcity: Improving water sources and use in urban agriculture in Beijing

11

Ji Wenhua
Cai Jianming

Beijing is facing a shortage of water. Because of a downward trend in rainfall, surface water is gradually drying up and the level of groundwater is declining. This decline in availability of water is affecting urban agriculture in the city. Innovations are being sought by both the government and farmers focusing on the use of new water sources, like reuse of wastewater and rainwater harvesting, and improved water management.

Although groundwater is still the main water source for urban agriculture in Beijing (90 percent in 2003), in some areas groundwater is not accessible anymore. In April 2007 the Beijing municipal government started to charge a fee for agricultural use exceeding a certain quota. Thus farmers are confronted with a rising cost of agricultural production. On the other hand, water use efficiency in agriculture is still comparatively very low.

The available surface water in Beijing decreased from 1.743 billion m³ in 1980 to 0.447 billion m³ in 1995 and to 0.142 billion m³ in 2003. The average water table of groundwater is more than 20 metres deep, and in some places more than 30, making it impossible for the farmers to use it.

The SWITCH programme supports the demonstration of multiple uses of rainwater, including an agro-tourism component, and by conducting research into water flows, water quality and the cost-benefit ratio of collecting rainwater (see UA-Magazine 19 for more details). This article puts the SWITCH activity in Beijing into a broader context.

Wastewater use

The use of wastewater has a long history in China. But not until 2000 did farmers around Beijing start to use treated water from the central wastewater treatment plants, which was initiated by the municipal government in an attempt to reduce depletion of groundwater. In 2004, only 70 million m³ of treated water was used for urban agriculture in Beijing. This amount increased to



SWITCH supports Huairou Cooperative in improving rainwater use
Photo: René van Veenhuizen

In a SWITCH visioning workshop in Beijing in 2008, the Water Vision 2030 for Beijing was summarised by the SWITCH team as:

By 2030, the city of Beijing will have reached a higher level of sustainable urban water management. Balanced availability, supply and consumption of water will avoid depletion of groundwater levels, which will be restored to 1960s levels, and pollution will be minimised. Rivers and lakes will be protected or rehabilitated to meet Surface Water Quality Standards grade III and above, and rivers will flow all year round. Water quality at the tap will meet international drinking water standards.

There will be a high degree of equity and efficiency in water use, and different quality water will be used in different sectors as appropriate. Harmonised regional water use will be achieved through fair spatial allocation of water resources; conflicts between upstream and downstream areas will be avoided through negotiation and appropriate compensation. Good water governance, open public access to information, and participation of stakeholders in decision making will ensure a water-conscious society; and adequate planning will mitigate disaster damage.

230 million m³ in 2007 and accounted for about 20 percent of total water used for irrigation. The 11th five-year plan states that 400 million m³ treated water will be available for more than 0.66 million ha of croplands in Beijing in 2010, which is less than one quarter of agricultural land in Beijing municipality. Almost all kinds of crops and fruit trees are suitable for the use of treated wastewater. However, not all the farmers can access treated wastewater because they are located too far from the wastewater treatment plants.

Rainwater harvesting

In addition to the use of (treated) wastewater, the use of rainwater is an important (potential) source for the water needs of parks, gardens and agriculture in Beijing municipality. Rainwater harvesting systems are currently being promoted in residential areas in Beijing and in periurban agriculture.

Wastewater in Beijing usually receives up to the secondary level of treatment. The primary level removes the floating and suspended material, and the secondary level neutralises and disposes the wastes using biological matter. After the secondary treatment, the water can be used for agricultural purposes. Beijing discharges about 1.35 billion m³ of wastewater every year. One billion m³ of this is treated, of which 0.23 billion is used by agriculture, 0.1 billion by industry, and 0.05 by urban public utilities; whatever is not used is discharged. Clearly there is a big potential for using more treated wastewater for agricultural purposes. This is now promoted by all levels of government, and is reflected in the 11th five-year plan.

Capturing rainwater in residential areas of the city has been promoted since 2000. This includes techniques like porous pavement and roadside gutter collection of stormwater (rainwater from the roof and road) and storage in local deposit pools, after which this water is transferred to larger water-saving ponds for primary treatment (sedimentation). This water can be used for many purposes, such as irrigation of parks and gardens, aquifer recharge, maintaining water levels at small ponds and lakes in the city, and other uses like car washing (after some simple treat-



A wider diversity of crops can be grown in the greenhouse
Photo: René van Veenhuizen

ments). The number of projects introducing these uses has been increasing in Beijing, especially in the last two years. For example, in the Beijing National Stadium for the Olympics captured rainwater will be used for toilet cleaning, cooling towers, fire fighting, and irrigation of green areas (Scholes and Shutes, 2008). In 2006 more than 300 rainwater-collecting projects were implemented, and the capacity for collecting water in Beijing has consequently increased to 40 million cubic metres.

Rainwater harvesting using roofs of houses in rural China has been practiced for thousands of years. Using the roofs of greenhouses to capture rainwater for irrigation of crops has been promoted since June 2005. Experiences with this were reported in UA-Magazine no. 19. These projects became popular because they are relatively simple to use and maintain, and because they are subsidised by the government. So far, twenty of these rainwater harvesting systems have been installed. On average, 200-300 m³ of rainwater can be collected per greenhouse (with a roof of 667 m²) each year, which can irrigate 2-3 times the same area with efficient irrigation (drip irrigation). The demonstration project of SWITCH in Beijing supports this work by analysing water flows, adding the use of wastewater, by conducting cost/benefit analyses of typical farming systems, and by linking other productive activities, like mushroom production and agro-tourism.

Challenges remain in terms of financial sustainability

So the potential of this technique is high, and given that there were some 20,000 ha of agriculture land under glasshouses in 2005 in Beijing, the current proportion of irrigation using rainwater harvesting is very low, accounting for less than 1 percent.

Improving water management

The Beijing Municipal Water Authority was founded in 2004, illustrating the beginning of reforms in the water management system of urban and periurban Beijing. Integrated urban-rural water management is being developed at four levels: municipality, districts and counties, water stations and at user (farmer) level. At the latter level, the Beijing Water Authority has village water managers and stimulates the organisation of farmers' water use associations or cooperatives. These village level associations manage issues such as access to water (and developing alternatives, like using wastewater and building rainwater harvesting structures), water pricing, irrigation practices, and quota management. By the end of 2006, Beijing had established more than 3,339 of these farmers' water use associations. Every villager (except the village leaders in order to prevent power from becoming too concentrated in the hands of few people) has the right to apply for the position of water manager, and selected villagers will receive capacity building training from the Water Authority. In December 2006, 10,800 farmers were appointed as water managers of their villages in Beijing (the total number of periurban villages in Beijing is 3,954).

Future perspective

Integrated reuse of wastewater, rainwater harvesting, and more



In December 2006, 10,800 farmers were appointed as water managers of their villages in Beijing
Photo: IGSNRR

efficient water use (e.g. by village water managers and farmers' water use cooperatives) are important technological and institutional innovations in Beijing. Challenges remain, especially in terms of financial sustainability. Farmers in Beijing municipality are used to having free access to all kinds of water for agricultural purposes. If a fee is charged, higher returns will also need to be established. But this also opens new opportunities to improve current farming systems. The SWITCH programme in Beijing, together with the RUAF-CFF programme, seeks to demonstrate a model of urban agriculture which incorporates multiple sources and efficient use of water and delivers higher returns by diversifying production and services. These higher returns not only compensate for water fees, but also enable farmers to pay for the relatively high investment in rainwater harvesting facilities.

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An example is the Caijiandian farmers' water use association, located in Xincheng Town of Miyun County. The association has 233 households. Its director, vice director and secretary were elected by members. Each household has an account number for its drinking water quota, which is published regularly. Farmers who want to use this water need to apply to the association 3 days in advance. The cost of drinking water is 1.48 RMB Yuan per ton, but farmers only pay 1 Yuan if their consumption quantity is within the quota. The Caijiadian farmers produce apples. By using more efficient methods and rational water distribution as promoted by the association, the farmers have substantially improved their quality and quantity of apples without consuming extra water. In addition, each household earned 1,800 Yuan (180 USD), which was higher than the previous year's average (Jinhui Yang and Cailin Cui, 2005).

References

- Scholes, L. and B. Shutes. 2008, Catalogue of Options for the Reuse of Stormwater. SWITCH.
- Jinhui Yang, Cailin Cui. 2005. Reforming mechanism: new models for farmers managing country water. Beijing Water.

The SWITCH programme collaborates with the Huairou Fruit and Vegetable Cooperative. The cooperative is located in An ge zhuang village, Beifang town, in Huairou district of Beijing, and was initiated in March 2004. The cooperative specialises in the production of vegetables, grapes and Chinese dates. At present, there are 1108 households in the cooperative who participate voluntarily. In an interview, the cooperative's chairperson, Ms Zan, discussed the importance of rainwater harvesting: (..) The farmers of the cooperative used to use groundwater for irrigation, but in recent years, the water table has been drying up very quickly, and some wells cannot be used anymore. Digging deeper and pumping up water increases cost. (..)

Rainwater harvesting is therefore very important to the cooperative. A problem is the funding for the building of the rain harvesting systems. Despite the subsidies, not all farmers have access to it. SWITCH helps us improve the rain harvesting system. (..)

We are now using the underground space to plant mushrooms. The environment of the basement by the side of the water storage pool is quite good for growing mushrooms in terms of temperature and humidity conditions. Using the ground space can save us lots of money by making it easier to control growth conditions and it allow us to gain more benefits. (..) Agro-tourism is another opportunity to raise the value of our products. (..) In addition, opportunities and constraints experienced by our cooperative as a result of rapid urbanisation need to be tackled by involving several institutions and stakeholders in the development of our cooperative and our search for sustainable use of the water. We are collaborating with RUAF on this. (..)



Resilient Chinese Cities: Examples from Beijing and Shanghai

Resilience is a dynamic process. City resilience refers to the ability of a city to adapt or adjust to changing situations or recover from economic, social or ecological disturbances. The current high rate of urbanisation in China creates many such disturbances. Urban agriculture plays a role in enhancing the resilience of China's growing cities.

China is urbanising rapidly. By 2006, 44 per cent of the Chinese population lived in cities, and this level will rapidly reach 60 per cent in the next 20 years (Department of Development Strategy and Regional Economy). Many changes will take place in this period, during which China will continue along its current path of industrialisation and transformation into an information society. A number of disturbances can be expected to occur during this process of rapid urbanisation. These can be economic disturbances (worsened by the current financial crisis), such as increased food prices and the growing income gap between rural and urban inhabitants; social disturbances, especially for emerging vulnerable groups such as youth, migrants or the elderly in Chinese cities; or ecological disturbances, like ecological deterioration and water shortages.

Increasing vulnerability

Urbanisation results in a growing disparity between urban and rural areas. According to a report of the National Statistics Bureau (2009), the available income of urban and rural citizens in 2007 was respectively 2020 and 727 US dollars. And this gap continues to increase (Population and Labour, 2008).

As elsewhere, the prices of food have been increasing rapidly in China in the past few years. General food prices increased by 14.3 per cent in 2008 (according to the National Statistics Bureau, 2009). The price of meat increased by 21.7 per cent, oil by 25.7 per cent, vegetables by 10.7 per cent and fruit by 9 per cent.

Many migrants move to the city from smaller cities or from rural areas to find a better job. As many of them cannot find a job directly in the city, they stay in periurban areas and practice agriculture (see UA-Magazine no. 18). According to Zhang (2006), around 62 per cent of migrants stayed in periurban areas in the period 1996-2000. There is also a gender difference, since most urban migrants are men; women are often left behind in the rural areas with the double task of looking after and supporting their families.

Urban sprawl endangers the environment; and without proper legislation or zoning, farmland, green spaces, forest

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Village farming in Minhang district
Photo: René van Veenhuizen

areas and water bodies are rapidly taken over by construction. The statistics from the Ministry of Land and Resources show that the area of farmland in China decreased by 218,666 ha in 2008. This decrease of green areas threatens ecological biodiversity. For example, fewer than 10 types of natural plants can be found in the densely built areas in Beijing, and fewer than 50 types of plants grow in urban parks, while in parks in the periurban areas 287 types of plants can be found (Li, 2005).

As density in urban areas increases, urban open spaces become more scarce. This increases the vulnerability of people because a disease in a high-density urban area, for example, will spread rapidly if there are no buffer areas to contain it.

The role of urban agriculture

Urban agriculture plays a role in enhancing the resilience of Chinese cities. This will be illustrated by selected examples from Beijing and Shanghai.

Periurban agriculture plays a crucial role in the supply of fresh food to Beijing citizens. In 2002, the self-sufficiency rate with respect to vegetables was 55 per cent in Beijing and 50 per cent in Shanghai. As a consequence, the transport distances are kept short, which also reduces the cost of food. The prices of vegetables transported to Beijing from the southern part of China are high due to the high oil price. In addition, the reduction of transport reduces the CO₂ emission.

When disasters occur, this self-sufficiency of supply in fresh food can be very important. In addition, urban open spaces like farmland can be used in emergencies as temporary settlement sites. For instance, during the SARS epidemic in Beijing, in 2003, hospitals were temporarily located in peri-urban areas, where the patients were provided with fresh and safe food. Similarly, after the Sichuan earthquake in 2008, most large-scale temporary tents were located in peri-urban farmlands.

Mushroom products produced in the Fangshan (urban) district of Beijing account for 56 per cent of the city's total output. The production process includes agricultural waste recycling, and brings profit to the farmers. For example, in 2007, in Miaoergang village, the net profit earned by mushroom producers in one year was RMB10.44 million, and the net income per capita in that district reached RMB10,595, or USD 1,552, while the average annual income per capita in periurban Beijing is RMB 9,559 or USD 1,400.

In 2005, there were about 3.6 million migrants in Beijing. Of these migrants, over 600,000 (17 per cent) were engaged in activities directly related to urban agriculture. These agriculture-related jobs are attractive since many migrants are experienced farmers, and by using improved techniques, such as greenhouses, these migrant farmers can earn more than they could have at home. This allows them to still contribute to rural family income (Zhang, 2006). In Manzu town in Huairou district, women are involved in strawberry, vegetable and mushroom farming and agro-tourism activities, which are all practised close to their homes, so that they can combine these activities with other tasks. Women in Manzu town generated RMB 7,000 (USD 1,025) per year in this way.

In Shanghai, Minhang district, the Pengdu Water Museum has been developed at a water conservation area of the Huangpu River. This area is a water intake, contributing 70 per cent of Shanghai's water supply. The museum covers 140 ha. Before 2003, the location was used as a waste dump, there were some pig and duck farms, and the water was seriously polluted. As from 2003, the village farmers redeveloped the area into an ecological park and water museum, while at the same time protecting the river. The amount of solid waste and pollution discharged to the Huangpu River has substantially been reduced and the water quality of the Huangpu River has regained its grade three status (which means that it can be directly used as a drinkwater source). In addition, it attracts people from Shanghai and other cities (about 300,000 visitors per year, according to an interview with the manager of the park), who buy produce from the farmers. The Museum, has become a new model of multi-functional (and eco-friendly) agricultural production.

A new urban development approach

These examples from Beijing and Shanghai show that urban agriculture already plays an important role in building resilient cities in China, and these practices are integrated in urban development. For instance, Chongming Island in Shanghai, which covers an area of 1,400 km² and has a popu-



Pengdu Water Museum Park, Shanghai

Photo: Wang Yan

lation of 700,000, is the district with the most forest cover area in Shanghai (18 per cent). Unlike in other periurban areas, which are still heavily industrialised, urban agriculture dominates the economic structure of the island. As the backyard of the Shanghai metropolis, the island has been developed as an eco-island with agriculture, green tourism and ecological housing. In 2004, the number of tourists reached around 772,000 (Tourism statistics report, 2005).

This is a successful example of periurban town development, and this approach is being replicated in other cities in China, such as in mountainous areas in Beijing and in island reclamations along the Songhua River in Harbin.

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References

- Tourism statistics report, Chongming County, 2005
- Li Junsheng, Gao J.X., 2005. Effects of urbanisation on biodiversity: A Review, Chinese Journal of Ecology, Vol.24, No.8, P953-957
- Zhang Feifei, Cai J., 2007. Emerging migrant farmer communities in periurban Beijing, Urban agriculture magazine, No.18, P25-26
- Zhang Feifei, 2006. Livelihood of Migrant farmer in periurban Beijing CASS. 2009. Population and Labour in 2008. Zhou Ying, Studies on the practice modes of circular agriculture in Fangshan district, Journal of Beijing Agricultural Vocation College, Vol.23, 2009, P26-29

Other information from the following websites

- Beijing Statistics Bureau: www.stats.gov.cn
- Shanghai Chongming travel: www.cmtravel.com.cn
- Ministry of Agriculture P.R.C. www.agri.gov.cn / http://www.agri.gov.cn/Dfxxlb/bjxxlb/t20090227_1226686.htm
- Ministry of Land and Resources P.R.C., www.mlr.gov.cn
- http://www.stdaily.com/gb/stdaily/2007-08/23/content_711202.htm



Using urban waste as mulch,
Photo: Ivana C. Lovo

The Productive Garden: An experience in the city of Belo Horizonte, Brazil

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As part of the RUAF's Cities Farming for the Future programme⁽¹⁾, a project called the Jardim Produtivo (Productive Garden) was initiated to transform a vacant plot⁽²⁾ of 3,500 m² into a multifunctional urban space.

The process started in January 2008, with awareness-raising and organisation and training of the gardeners. The garden's development over a nine-month period was continuously monitored, with a specific focus on production, food and nutrition, socio-economic factors and gender. Currently, seven households are farming at the *Jardim Produtivo*.

Recycling organic materials

At the start of the project, each participating family received a bucket with the capacity to hold 5 kg of household waste (including leftover prepared foods, peels and inedible parts of fruits and vegetables). Each household consists of two or three members. Throughout the project period, five of these families were able to collect a bucketful of household waste every eight to ten days. In the period March 25 to September 25, the total organic household waste collected for the community garden was 84 buckets, or 420 kg. The organic material was used for the collective production of compost, which was distributed to all members of the *Jardim* (which is shared by seven households).

In addition, the gardeners obtained organic material through a number of other channels. An interesting partnership was formed between the farmers and two small poultry production enterprises, located in the surrounding area. Poultry manure⁽³⁾ is the primary source of nitrogen used in the manufacturing of compost. On average, the two partner enterprises produce 400 kg of chicken litter every two weeks. The gardeners also used pruning material from parks and gardens, like residual cut grass. This is very useful for the production of compost and for protecting the soil and planting beds, since it controls the waste of water and protects crops planted directly in the beds. Three truckloads of this type of organic waste were delivered to the production area during the project period (the exact amount was not quantified). It was provided by the Parks and Gardens office of the municipality only on request (it is not routinely provided). Cattle and horse manure was donated by rural farmers or collected from roaming animals near the *Jardim*. Leaves of plants growing in and around the garden were also collected. In addition to the above, the households purchased cattle manure from local suppliers (bag of 50x80cm of dry cattle manure is sold for R\$5.00 = USD2.8). The estimated demand for the cattle manure for the current production levels in the garden is 12m³/year, or approximately six tonnes.

It was not possible to obtain more information from the authorities on the costs of litter collection and maintenance of public areas, plazas and gardens comparable in size to the *Jardim Produtivo*. This information would be needed to estimate the savings that could be gained with this type of

organic garden through reduced expenditure on maintenance of public areas and disposal of the mentioned volume of organic wastes.

Inorganic material

In addition to the recycling of organic material and nutrients, over 2,700 PET bottles were collected and used in the garden to create two irrigation circles and 20 horseshoe-shaped and rectangular planting beds, covering an area of approximately 980 m². The gardeners and neighbouring residents separated and collected these bottles. Burlap sacks (40x80 cm) were also used together with Tetrapac milk containers to build a shed to store the tools used in the garden. The burlap sacks were used to increase the adherence of the cement mass to the iron structures of the walls of the shed and the milk containers were used to waterproof its roof. These materials were also collected by the beneficiary families themselves and donated by local merchants and neighbours.

The table summarises the recycled materials used during the monitoring period.

Table		
Recycled material	Use	
PET bottles/containers	2,789 units	Containment of planting beds
Household waste	420 kg (monitored from 25 March to 29 Sept. 2008)	Composting
Pruning material from gardens and parks	Volume was not measured	Composting and protection of soil and plantlets in the beds
Poultry manure	400 kg every 2 weeks	Composting
Cattle and horse manure	Volume was not measured	Preparation of natural fertilisers and defenses
Plant leaves	Volume was not measured	Preparation of natural fertilisers and defenses
Burlap sacks (used to transport potatoes)	25 sacks measuring 40x80 cm	Construction of tool shed (to enhance adherence of cement to walls)
Tetrapac containers	60 long-life milk containers	Construction of tool shed (to waterproof the roof)

The area in Belo Horizonte, before the work started

Photo: Marcos Jota



Preparation of biofertiliser

Photo: Marcos Jota

Water recycling

In 2009, together with the SWITCH Project in Belo Horizonte, two cisterns (ASA model⁽⁴⁾) were installed to capture rainwater. The cisterns have a capacity of 18 l each and are set up to catch water on the grounds of the church property located next to the production area (See photo). With the cisterns and an appropriate irrigation system in place it will be possible to supply 80 per cent of the water needed for the gardens, thereby reducing monthly expenditures (the average cost of water during the seven months of monitoring was R\$566 (USD 321)/month).

Improved nutrition

Nutrition indicators were collected before the implementation of the *Jardim Produtivo* (in April 2008) and after 5 months (in September 2008), using a food frequency survey and a 24-hour food log. The results showed an increase in the average number of vegetable portions⁽⁵⁾ consumed (0.5 portions/day vs. 1.8 portions/day, respectively). The frequency of consumption of each type of vegetable also increased between April and September. Initially participants consumed lettuce an average of 2 times per week and this increased to 5 times per week. Tomato consumption increased from approximately 3 times per week to 7 times per week. Consumption of other leafy vegetables (cabbage, *almeirão* and *acelga*) also rose from 4 to 6 times per week. It appeared that the availability of vegetables, and the assurance of safe production – free of contamination from agrotoxins and chemical fertilisers – and the strong involvement of local consumers in all the stages of production, favoured this increase in consumption.

and after: the Productive Garden

Photo: Ivana C. Lovo



Integration and upscaling

The local government played an important role by making resources available free of charge, such as cut grass and water, and by contributing to the construction of the garden.

A community garden like the *Jardim* can be an important factor in municipal solid waste management, allowing decentralised collection and recycling, eliminating costs and reducing transport. Decentralised recycling and composting integrated with food production thus reduces waste management costs, protects the environment and promotes health and a better quality of life. However, there is still a long way to go in scaling up these experiences and incorporating such productive areas in municipal solid waste management systems. To increase the scale to the territorial and environmental management of Belo Horizonte as a whole, regional policies and regulations need to be altered. This requires the involvement and commitment of other actors.

A productive garden can be a space that integrates citizens and nature. It further promotes the health of the local community through the use of medicinal plants; maintains traditional ecological knowledge passed down from generation to generation; creates opportunities for recreation activities; and (re)affirms the cultural identity of rural emigrants living in cities. Urban agriculture furthermore transforms vacant lots – considered to be focal points for the propagation of disease vectors – into productive green areas, increasing their visual impact on the urban landscape. It improves the permeability of the soil, thus increasing the city's capacity to recharge the water table and reducing flooding. It also strengthens social relationships between neighbours and communities.

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Compost management

Photo: Marcos Jota

Notes

- 1) For more information on CCF in BH see: http://www.ipes.org/index.php?option=com_content&view=article&id=101&Itemid=112
- 2) Term used by the Urban Planning Office for unused urban areas and for which no plans exist.
- 3) "Chama de galinha", or chicken litter, a mixture of sawdust and chicken manure.
- 4) ASA is a Social Training and Mobilisation Programme to Familiarise with a Semi-Arid Climate, under which one million rural cisterns have been installed.
- 5) The concept of portion is that provided by the Ministry of Health of Brazil (2005). A portion of vegetables is the quantity capable of providing 15 calories, and a portion of fruit is that which provides 70 calories.

References

Brazilian Ministry of Health. Secretariat of Health Care. General Coordinator of Food and Nutrition Policy. Food guide for the Brazilian population: Promoting healthy eating. 236pp. Brasília: Ministry of Health, 2005.

Jota, M. L. C. Implantação de Hortas Comunitária e Formação de Multiplicadores(as) em Agricultura Urbana com enfoque de Gênero. Apostila para oficinas formativas – A Matéria Orgânica. Ministry of Social Development and Combating Hunger: Prefecture of Lagoa Santa and Jota Consultants. 2008. 9p.

WHO - World Health Organization. Global strategy on diet, physical activity and health. Food Nutr Bull. 25:292-302p; 2004.

References page 20 - 21

Dulac N. (2001): The organic waste flow in integrated sustainable waste management. Tools for decision-makers – experiences from the Urban Waste Expertise Programme (1995-2001). A. Scheinberg. Nieuwehaven, WASTE.

Drechsel P. and Kunze D. (2001): Waste composting for urban and peri-urban agriculture: closing the rural-urban nutrient cycle in Sub-Saharan Africa. CABI publishing, ISBN 0 85 199 548 9.

Linzner R. and Wassermann G. (2006): Factors constraining and promoting the implementation of small-scale composting in West African Countries. ORBIT 2006: Biological Waste Management. From Local to Global; Proceedings of the International Conference / Eckhard Kraft [ed.]. Weimar: Verlag ORBIT e.V.; ISBN 3-935974-09-4. Weimar, 2006.

Linzner R., Binner E., Mentler A., Smidt E., Salhofer S.P. and Soumah M. (2007): LPCC-Guinée: Recirculation of Local Organic Waste in Urban and Rural Agriculture - the Impact on Soil Functions in Guinea / West Africa. Final report on behalf of the Commission for Development Studies at the Austrian Academy of Sciences: Link: http://www.kef-online.at/images/stories/downloads/Projektberichte/P139_Endbericht_Guinea.pdf (Last access: 07.09.2009).

Rouse J., Rothenberger S. and Zurbrügg C. (2008): Marketing Compost - A Guide for Compost Producers in Low and Middle-Income Countries. Swiss Federal Institute of Aquatic Science and Technology (EAWAG) - Department of Water and Sanitation in Developing Countries (SANDEC), ISBN 978-3-906484-46-4, Dübendorf, 2008.

UNOWA (2007): Urbanisation and Insecurity in West Africa Population Movements - Mega Cities and Regional Stability. United Nations Office for West Africa (UNOWA) Issue Papers, October 2007.

Creating the Urban Agriculture Forum in Belo Horizonte: a multi-stakeholder experience

21

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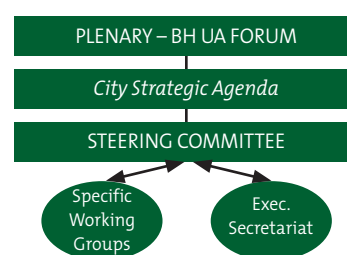
This paper summarises work attempting to answer two apparently simple questions: Can urban agriculture reduce urban poverty? And, if it can, in what ways can poverty be reduced? It also explores the role of value chain analysis in understanding better the role of urban agriculture.

Since the election of the first democratic and popular administration in Belo Horizonte (BH), Brazil, in 1993, urban agriculture has steadily increased in this metropolitan area¹. In 2005, the NGO REDE and the municipality of Belo Horizonte (PBH) worked together in creating the conditions for the RUAF Cities Farming for the Future Programme (CFF). The main result of the CCF Programme in BH was the development of a planning and management instrument, the City Strategic Agenda (or Action Plan) on urban agriculture, which encouraged a dialogue between the public sector and civil society and created space for dialogue and management (implementing, reviewing and monitoring the impacts of the agreed activities).

The multi-stakeholder Forum on urban agriculture in Belo Horizonte was created during CFF and officially inaugurated during the seminar entitled *"Belo Horizonte Farming for the Future: Urban Agriculture as an Instrument for Managing the City"*, on June 2, 2008. It currently consists of 49 institutions.

Management of the Forum is illustrated in figure 1. The **Plenary** is the highest-level decision-making institution, made up of all those interested in working with the Forum. The Plenary approves, monitors and evaluates the Action Plan (or City Strategic Agenda); it further defines the priorities for each biennium, and also elects the Steering Committee and the Working Groups. The **Steering Committee** (*Grupo Gestor*) is made up of institutions selected by the Plenary, together with the Executive Secretariat. It coordinates the Working Groups, implementation of the Action Plan and the various government sectors and civil society groups whose work is related to urban agriculture, whether they are participants in the Forum or not. The Steering Committee is currently made up of the municipality of Belo Horizonte (PBH), represented by the Deputy Municipal Secretariat of Nutritional Food Security (SMASAN) and the Municipal Park Foundation, IPES-

Brazil and the Network for the Interchange of Alternative Technologies (REDE). The **Executive Secretariat** has the role of leading the deliberations of the Plenary and the Steering Committee and mobilising the different institutions to carry out the planned activities and to implement outreach/dissemination efforts. Finally, **Working Groups** are executive and operational bodies related to the strategic objectives of the Action Plan. SMASAN has been serving as the Executive Secretariat since May 2010.



The Urban Agriculture Action Plan

The Action Plan has six strategic objectives to be reached through operational objectives and strategic actions in the short, medium and long term. It covers a period of 10 years – from 2008 to 2018. The Action Plan requires constant dialogue and planning of actions, so that all those involved can agree on the short-term objectives and seek alternatives as needed.

The Action Plan itself has no specific budget, but consists of actions proposed by the stakeholders of the Forum, which can be already-planned activities or new projects. In the 2009-2010 period, the Forum implemented actions at a total cost of USD 800,000 (see table 1). In addition to the resources listed in the table, the Action Plan is also supported through the efforts and resources of other actors, like the participating organisations of the Metropolitan Urban Agriculture Organization (AMAU), the University of Minas Gerais, other NGOs and departments of the PBH, and through the work done and hours spent by the farmers participating in the productive groups.

Table 1 - Investments in the Belo Horizonte Urban Agriculture Forum– (USD) 2009-2010

Items/ Institutions / Projects	SMASAN (SMAAB)	FPM	Reg. Barreiro Admin.	SWITCH Project	From Seed to Table Project (FStT)	CAAUP-RMBH	REDE	TOTAL
Training	0.00	0.00	0.00	0.00	22941.18	81236.71	74411.76	178589.64
Technical Assistance	128573.60	137031.80	0.00	0.00	48676.47	51550.03	115270.58	481102.48
Monitoring	0.00	0.00	0.00	0.00	20588.24	44673.70	5294.12	70556.06
Inputs and equipment	3716.47	0.00	0.00	0.00	33088.24	0.00	0	36804.71
Infrastructure	0.00	0.00	2328.82	7058.82	0.00	0.00	0	9387.65
Water	4129.41	13764.71	3352.94	0.00	0.00	0.00	0	21247.06
Electric power	3730.24	3867.88	0.00	0.00	0.00	0.00	0	7598.12
TOTAL	140149.72	154664.39	5681.76	7058.82	125294.12	177460.44	194976.46	805285.71

Exchange rate used: USD 1.00 = R\$1.70

Biannual plans include a prioritised list of activities for each period, and a division of responsibilities among the members of the Steering Committee and other stakeholders participating in the Forum. Each local stakeholder has implemented some activities in the Plan, in line with their own institutional priorities.

In the period 2008-2010, 25 percent of the strategic actions were implemented and 33 percent were in the process of being implemented. Particular progress had been made related to **institutionalising a policy on urban agriculture in Belo Horizonte**. In the period 2009-2010 three proposed laws related to urban agriculture were discussed by the City Council. Law No. 9.959/10, related to the City Conference, a participatory process in city planning, was approved and included a review of the Master Land Use Plan, which recognises urban agriculture as an accepted form of non-residential land use. Law No. 274/2009, on establishing a municipal urban agriculture policy, was discussed in 2009 and 2010 within meetings of the Steering Committee of the Forum, and in an expanded meeting held in the City Council, which led to substantive changes in the proposed law; the revised version was approved on 9 June 2011. Other noteworthy achievements in the area of institutionalisation are the initiative of the Northeast Administrative Regional Office to hold a series of debates about urban agriculture activities in 2010, and the Let Onça Drink Clean Water Movement, which incorporated urban agriculture concepts as one of its main elements for planning land use to revitalise the Baixo Onça stream and to transform the local reality.

Among efforts to **strengthen the organisation of farmers**, AMAU's activities are worth mentioning. Throughout 2010 AMAU had a well-diversified representation, especially among community groups and grassroots organisations, housing movements, land and agrarian reform movements, feminist groups, and permaculture and food collectives acting in eight municipalities in the region. The RUAF From Seed to Table Project (FStT) was able to strengthen production and commercialisation by organising three groups (Jardim Produtivo, Vila Pinho and the Grupo Macaubas/CEVAE Capitão Eduardo) to grow vegetables for municipal public schools. The work was done along with the municipality of Belo Horizonte (PBH), which offered technical assistance, water, electricity and inputs for the groups of urban farmers. The farmers were

registered as micro-entrepreneurs, which provided them with official documentation that made it possible for the public schools to buy their products. This commercial initiative was unprecedented in Belo Horizonte.

With the objective of **training** farmers, public officials, community agents, and the university community in **urban agriculture, agro-ecology and economic solidarity**, the Rede-MG carried out a number of activities under the auspices of the CAAUP-RMBH – Urban and Periurban Agriculture Support Centre of the Belo Horizonte Metropolitan Region. These activities became part of a broad-based and ongoing training programme.

The FStT Project and the CAAUP-RMBH were monitored through the Federal University of Minas Gerais (UFMG), based on the pioneering initiative of the Cities Farming for the Future Programme (CFF). The preliminary dissemination of the impacts of urban agriculture led to the production of academic publications (articles, monographs, master and doctor theses) and specialised journals. The next evaluation of the implementation of the Action Plan on urban agriculture is scheduled to take place by mid-2011, with a municipal seminar, during which participants will evaluate what was done during the previous two-year period (2011-2012) and select a new Steering Committee.

Lessons Learned

Developing and agreeing on an Action Plan with a variety of stakeholders was an important step in realising collective action that involves civil society and the public sector. The joint definition of priority objectives and actions was important to avoid duplication of efforts and the defence of isolated institutional and organisational interests. In addition, as Lovo (2011) states, the effectiveness of a certain strategic action depends on the interests and priorities of each institution. Therefore, the Action Plan focused not only on collective investments and actions, but also on the activities and priorities of each individual institution. Each organisation incorporated and committed itself to the strategic objectives agreed on within the context of the Forum, thereby maximising the potential of the points of convergence among the different participants, creating synergies, and not emphasising the differences between them. Furthermore, including actions in the short, medium and

long term made it possible to engage in ongoing dialogue and planning, and to focus on the agreed objectives.

The Forum also provided an opportunity to experiment with new ways of relating, primarily through the work of its Steering Committee and the creation of the Working Groups. Especially important is the work of institutions which have historically promoted urban agriculture in Belo Horizonte, but that did not communicate or enter into dialogue with other institutions about their work. However, experiences with the Forum also showed that there are limits in connecting civil society and government, such as those caused by differences in political priorities and expectations in terms of the timelines of project and programme execution. On several occasions, habitual reactions prevailed, such as the authoritarian postures of the government, or civil society merely making demands.

Initially the role of facilitator under the CFF programme (and as continued under FStT) was important, but increasingly the participating institutions themselves became interested in continuation of the forum, and now see it as an important platform for dialogue and planning, as supported by Article 07 in Law 274/2009. However, Implementation of actions and spending is still done in an isolated manner in most cases. Each institution applies resources in their area of responsibility, without discussing how to do this within the Steering Committee or the plenary meetings of the Forum. Achieving

a more holistic discussion about the set of activities that each stakeholder carries out could be one way to improve, integrate and maximise the available resources within implementation of the Action Plan for urban agriculture.

One challenge in expanding urban agriculture in Belo Horizonte is to emphasise mechanisms that encourage the involvement of the productive groups, so that they take ownership of the Action Plan and prioritise their participation in its planning, monitoring and execution.

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Notes

1) It was also around that time that the School and Community Garden Programmes and Pro-Pomar (a programme on fruit trees), all coordinated by the Deputy Municipal Secretariat for Food Supply, were created. Another initiative that stood out at that time (and lasted until 2001) was establishment of the Agro-Ecological Experience Centers (CEVAE), which addressed the challenge of preparing and implementing the local Agenda 21. The CEVAEs received international recognition.

References

Lovo, Ivana Cristina. *Agricultura Urbana: um elo entre o ambiente e a cidadania*. 2011. 230f (Dissertation for a Doctorate in Human Sciences)– Interdisciplinary Programme in Human Sciences, Faculty of

Philosophy and Human Sciences, Universidade Federal de Santa Catarina, Florianópolis, 2011.

Lovo, Ivana Cristina. *Report on the Urban Agriculture Seminar: Belo Horizonte farming for the future*. Belo Horizonte: Ipes. 2008. 19p. Relatório.

Municipality Of Belo Horizonte and the Alternative Technology Exchange Network. *Agricultura urbana: Belo Horizonte cultivando o futuro*. Ângela Christina Ferreira Lara e Daniela Almeida (org.). Belo Horizonte: Rede de Intercâmbio de Tecnologias Alternativas, 2008. 36p.

Municipality Of Belo Horizonte and the Municipal Parks Foundation. 2008–1018 *Belo Horizonte Cultivando Agricultura Urbana: Plan of Action for Urban Agriculture in Belo Horizonte*. Belo Horizonte: PBH & FPM, 2009. 21p.

National Urban Agriculture Policy and Programmes in Brazil

Alain Santandreu, Gunther Merzthal

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Urban and periurban agriculture is not new to Brazil. A study carried out in 2007 by IPES/RUAF and REDE for the MDS/SESAN in the 11 Metropolitan Regions in Brazil identified more than 600 experiences, some of them functioning for more than 20 years (Santandreu and Lovo. 2007) and practiced in all the regions in Brazil, in a wide range of contexts. The study also demonstrated that urban agriculture is important at the local level improving food security and nutrition as well as generating employment and income.

Brazilian urban farmers are conventional family farmers – even though many of them are in the process of transitioning to agro-ecological and organic farming (including certification) – located in periurban areas, indigenous and quilombolo groups, poor urban residents located in inner and periurban areas, and especially female heads of household and older adults between 30 and 50 years of age. In Brazil, the government (local, state and federal) is important in financing urban and periurban agriculture experiences, implemented by both municipal governments and by civil society. Community organizations and social movements, who implement urban and periurban agriculture activities by mobilizing their own resources, is also a characteristic of the Brazilian experience.

The urban and periurban agriculture policy in Brazil

Of the 12 million families attended to by the *Bolsa Família* Programme, more than 7 million live in urban areas, and it is for this reason that its efforts are focused in the cities and metropolitan regions of Brazil. Within this programme and as part of its Zero Hunger strategy, the Ministry for Social Development and Combating Hunger (MDS) implements the *National Urban and Periurban Agriculture Policy* focusing its actions on the urban and periurban population, linking them to its Social Protection Network and its Network of Public Food and Nutrition Establishments, which involves Soup Kitchens, Food Banks, Community Kitchens, Food Fairs and Popular Markets.

The national policy for urban and periurban agriculture is based on the principles of the Food and Nutritional Security Law (LOSAN) and forms part of the recently passed National Policy for Food and Nutritional Security (PNSAN) which promotes the “*development of sustainable and de-centralized food production, extraction, processing and distribution systems based on agro-ecological systems*” in order to strengthen “*family agricultural processes and urban and periurban food production*”

The policy is based on a set of policy principles and guidelines that include: i) promoting the production, processing and commercialization of urban and periurban products; ii) strengthening urban and periurban farmer’s social organizations; iii) high quality training and technical assistance for urban and periurban farmers; iv) training for those that implement policy; v) support for agro-ecology techniques and economic solidarity; and vi) the formation of the Public Services Network.

As from 2006, IPES and RUAF have been in contact with the MDS and have supported the processes of forming and implementing policy together with other national and regional stakeholders, like the NGO Network for the Exchange of Alternative Technologies (REDE) and the FAO’s Regional Office.

The MDS created an office of the General Coordinator of Urban Agriculture, and since 2004 has been funding public tenders which, as of 2009, had resulted in the spending of over US\$34 million on promoting gardens in municipalities (from 2004), implementing Support Centres for Urban and Periurban Agriculture in Metropolitan Regions (from 2008), support for the development of urban agriculture economic solidarity projects with the Technological Incubators of Popular Cooperatives (16 Brazilian Universities) (from 2007), direct local commercialization through Popular Market Fairs (from 2007) and various actions to improve food security in areas that have experienced agrarian reform (from 2005).

The Urban and Periurban Agriculture Centres (UPAC) are important in the implementation of a *decentralized* operational system that supplies services to urban farmers, coordinating initiatives and social stakeholders interested in supporting urban agriculture. A large part of the funds for the UPACs have been used to provide high-quality, free public services for urban farmers, emphasising the social and public nature of the policy, and helping to reinforce the role of the State in policy implementation. The UPACs seek to



Patches of unused land were used for the productive gardens in Belo Horizonte (photo: Ivana C. Lovo)

coordinate the actions of other stakeholders who carry out interventions at the local level – such as NGOs, universities, research institutes, municipalities and states, among others – who are considered to be policy implementers.

Virtual and on-site training courses have been offered in partnership with IPES/RUAF and the FAO/RLC, designed to improve the capacities of experts and managers who work for the Support Centres and the MDS team.

The *National UPA Group* is a forum for participation and consultation, strategy planning, monitoring and evaluation of policy implementation. It operates in close coordination with the Office of the Urban Agriculture Coordinator and is made up of representatives from the Centres.

Since 2006, the promotion of urban and periurban agriculture has also been part of south-south cooperation. The MDS has been part of the RUAF and IPES Regional Advisory Council for Latin America and the Caribbean, and as part of its outreach activities has participated in International UPA Seminars organized by the FAO, IPES, RUAF and various national and local governments held in La Paz (2007) and Medellín (2009). The MDS presented its experience at the 2008 World Urban Forum in China and co-organized a special event for the 2010 World Urban Forum in Rio de Janeiro in conjunction with the RUAF Foundation, IPES, the World Bank and the FAO. Finally it has carried out technical support actions in the cities of Rosario (Argentina) and Lima (Peru), as well as providing support for the urban agriculture cooperation agreements with the Cuban and Ecuadorian governments.

The design and implementation of Brazil’s urban and periurban agriculture policy demonstrates the importance of developing specific policies, which can contribute to policies already in place, like food and nutritional security policies.

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References

- FAO, IICA. 2009. *Construcción del Sistema y de la Política de Seguridad Alimentaria y Nutricional: la experiencia brasileña*. FAO and IICA, Brasília, Brazil.
- SANTANDREU, Alain and Ivana LOVO. 2007. *Panorama de la agricultura urbana y periurbana en Brasil y directrices políticas para su promoción*. Urban Agriculture Notebook N° 4, IPES, RUAF Foundation, REDE, FAO and MDS, Lima, Peru.
- SANTANDREU, Alain and Gunther MERZTHAL. 2011. *Agricultura Urbana e sua Integração em Programas e Políticas Públicas: A Experiência do Brasil*, Em : Fome Zero: Uma história brasileira, Vol III, MDS, Banco do Brasil e FAO, Brasília, Brasil.

Introducing Rooftop Greenhouses to the City of Berlin

55

Kathrin Specht
Rosemarie Siebert

What solutions are available to connect food production and buildings? Policy makers, planners, activists, homeowners, architects and other relevant stakeholders were brought together in order to explore these options in a series of workshops held between 2011 and 2013.

The aim was to identify possible farming models and describe their implementation in or on urban buildings for the metropolitan area of Berlin. This resulted in the development of a stakeholder network called “ZFarm – Urban agriculture of the future” (www.zfarm.de) and a manual to enable the government, politicians, citizens and future operators to deal with rooftop greenhouses in Berlin.

Food production in and on buildings in Berlin

The city of Berlin (Germany) has a long tradition of inner-city gardening. Family-home gardens, school gardens and garden plots (so-called *Schrebergärten*) can be found all over the city. These facilities have been used mainly to grow fruit and vegetables in wartime and in times of limited food availability. But in recent years a new momentum has developed,

and new types of urban food producers are focusing on urban farming activities that are taking place around, but also in and on urban buildings.

The term “Zero-acreage farming” (ZFarming) is used by the authors to describe all types of urban agriculture that do not use farmland or open spaces: rooftop gardens, rooftop greenhouses and edible green walls, as well as innovations such as indoor farms or vertical greenhouses (Specht et al. 2014). In recent years, ZFarming has become a topic of interest among a variety of local stakeholders in Berlin, even though it still faces several uncertainties.

As in many other cities worldwide, Berlin has seen an increase in recent years in rooftop gardens, rooftop greenhouses and indoor farms. These have been planned or set up by both activists and non-profit associations or private initiatives for social as well as commercial purposes. According to its proponents, ZFarming promises to fulfil multiple functions and produce a range of goods, all of which may have a positive impact on the urban setting. It promises environmental benefits, such as reducing the environmental impact of architecture, reducing food miles, and improving resource and energy efficiency. The social benefits include improving



A photomontage of strawberries in a rooftop greenhouse overlooking the Potsdamer Platz in Berlin. Credit: Jōichi Itō (Wikimedia commons), photomontage by Axel Dierich



Prototype of container farm tested by Efficient City Farming (ECF) with aquaculture in container and hydroponics in greenhouse.
Photo: ECF Farmsystems Berlin

community food security, providing educational facilities, linking consumers to food production, and serving as a design inspiration. In economic terms, it provides potential public benefits and commodity outputs (Specht et al. 2014).

At the same time, because this is a very new concept for food production and is thus at an early stage of research and development, it involves some limitations and difficulties. For some applications, the various individual technologies are known, but they have never been used together as required for ZFarming. Other applications require entirely new building materials or cultivation techniques (especially for indoor farming) that have not yet been developed. As well as technical constraints, other critical aspects pose problems, namely the high investment costs; the exclusionary effects (due to restricted accessibility, exclusive products and customers); and the lack of acceptance of soilless growing techniques (Specht et al. 2014, Thomaier et al. 2014).

Designing urban innovations together

A participatory approach called “Regional Open Innovation Roadmapping” (ROIR) was chosen to investigate the potential and problems involved in implementing ZFarming projects in Berlin. ROIR is an instrument for participatory decision-making and the implementation of innovations. It depicts in advance the entire development, implementation

and launch of a project in detail, and includes from the outset the expertise and opinions of all relevant stakeholders (Phaal et al. 2004, Schwerdtner et al. 2010).

The ROIR process started with the identification of the relevant stakeholder groups. To achieve a balanced and comprehensive group, a variety of experts relevant to ZFarming were approached and invited to participate in the ROIR process. We invited stakeholders in each of the key expert groups:

- Activists & projects – NGOs, project groups and initiatives currently planning or actually setting up ZFarming-related projects
- Lobby groups, associations and unions – e.g., horticulture, real estate, landscape architecture, green roofs and farmers’ associations
- Planning and construction – e.g., architecture, recycling and greenhouse planning
- Politics and administration – e.g., departments of environment, health, consumer protection, urban development, climate
- Researchers from fields associated with ZFarming – e.g., energy and building, aquaponics, urban planning, plant physiology, agriculture
- Sales and distribution – stakeholders likely to grow, sell or distribute ZFarming produce, e.g., supermarkets, restaurants and university refectories.

Representatives of the various stakeholder groups met in a series of workshops held between 2011 and 2013. Initially, the stakeholders focused on all ZFarming types, including rooftop gardens, rooftop greenhouses, vertical fruit and vegetable gardens, and even technologically complex multistory indoor farms. But as early as the first phase, the participants decided to focus on rooftop greenhouses as the most promising type for the city of Berlin. First, the stakeholders defined a list of sustainability aims that any ZFarming project should fulfil (e.g. improvement of water efficiency, energy efficiency or employment). For indoor farms the stakeholders saw the required amount of energy as a major disadvantage, while for rooftop gardens the climatic conditions in Berlin only allow a very short growing season. Based on a comprehensive analysis of the expected economic, ecological and socio-cultural effects of the various innovative proposals, a joint decision was made by the stakeholders in the second workshop in favour of rooftop greenhouses as having the most development potential.

In the following steps and meetings, the topic of rooftop greenhouses was examined in detail. Due regard was paid to the technical, social, economic, environmental, administrative and political framework conditions required to ensure their successful implementation, and how these conditions can be established.

During the roadmapping workshops, the stakeholder network (of around 50 participants) called “ZFarming urban agriculture of the future” (www.zfarm.de) was established in Berlin; jointly, this network created a practical guide¹ to enable the government, politicians, citizens, and future

operators to deal with rooftop greenhouses in Berlin (Freisinger et al. 2013). The topics covered include all of the steps involved, from initial brainstorming to the finished rooftop greenhouse. Among other things, checklists for site analysis, production planning, financial planning, and public relations are provided.

The way forward

As became evident during the ROIR process, rooftop greenhouses have some potential to contribute to the sustainable development of the city of Berlin. According to the members of the ZFarm network, rooftop greenhouses can help improve resource efficiency, increasing social capital and enhancing Berlin's economic strength in the medium to long term. The establishment of rooftop greenhouses offers opportunities for new partnerships and networks and requires interdisciplinary exchange among actors who have not cooperated before. Considering their aims, market orientation and transformative potential, rooftop greenhouses have been classified in five categories (Thomaier et al. 2014):

- 1.) Commercial: the main purpose of the greenhouse is to run an economically viable farming business;
- 2.) Image-oriented: the greenhouse is not the main source of revenue but serves as an add-on to another food business, such as a restaurant, that processes and sells the produce;
- 3.) Social and educational: the main purpose is to communicate social and educational values, such as greenhouses on schools, universities or hospitals;
- 4.) Urban living quality: the greenhouse serves as a recreational space on residential or commercial buildings, where residents or employees can grow their own food and enjoy a green oasis;
- 5.) Innovation incubator: the greenhouse serves the purpose of promoting new food-production concepts; these greenhouses are often pioneer or demonstration projects operated by NGOs or research institutions.

Most stakeholders specified that the main project's aims should be to educate people, create social interaction and demonstrate alternative forms of food production and resource recycling, and that they should explicitly but not solely focus on "profitability". Most of the stakeholders involved in Berlin emphasised that while projects should, of course, be economically self-sufficient, their real value lies in the production of non-market goods. In keeping with this notion, they therefore reject purely consumption-driven models. Some even see it as a risk that large companies could seize upon the idea of ZFarming and turn it into an exclusively profit-oriented and unsustainable business in which ZFarming would be reduced to an urban version of industrialised rural production. In the case of Berlin, the participants of the ZFarm network largely agreed that operators need to use the positive potential meaningfully, by focusing on local resources and energy-efficient production, building new market structures, and including social and educational aspects.

In order to successfully realise the sustainability of rooftop greenhouses, the various disciplines and stakeholders need



Front-page practical guide "Something is growing on the roof"

to continue to work hand-in-hand to establish pilot projects, whether on residential buildings, supermarkets or schools. From there, one can start to investigate the social, economic and environmental effects of the rooftop greenhouse and gain experience about what needs to be endorsed or adapted to enable rooftop greenhouses to make a valuable contribution to sustainable urban development.

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- 1) The manual "Es wächst etwas auf dem Dach. Dachgewächshäuser. Idee, Planung, Umsetzung" is available as a free download pdf at www.zfarm.de. The English version "Something is growing on the roof. Rooftop greenhouses. Idea, planning, implementation" will be available in January 2015.

References

- Freisinger, U. B., Specht, K., Sawicka, M., Busse, M., Siebert, R., Werner, A., Thomaier, S., Henckel, D., Galda, A., Dierich, A., Wurbs, S., Grosse-Heitmeyer, J., Schön, S., Walk, H. (2013): Es wächst etwas auf dem Dach. Dachgewächshäuser. Idee, Planung, Umsetzung. (Something is growing on the roof. Rooftop greenhouses. Idea, planning, implementation). Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg.
- Phaal, R., Farrukh, C.J.P. & D.R. Probert (2004): Technology roadmapping – A planning framework for evolution and revolution. *Technological Forecasting and Social Change*, 71, 5-26.
- Schwerdtner, W., Freisinger, U.B., Siebert, R. & A. Werner (2010): Regional Open Innovation Roadmapping for sustainable regional development. Practical Guide. Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg.
- Specht, K., Siebert, R., Hartmann, I., Freisinger, U. B., Sawicka, M., Werner, A., Thomaier, S., Henckel, D., Walk, H., Dierich, A. (2014): Urban agriculture of the future: an overview of sustainability aspects of food production in and on buildings. *Agriculture and Human Values* 31, 1, 33-51.
- Thomaier, S., Specht, K., Henckel, D., Dierich, A., Siebert, R., Freisinger, U. B., Sawicka, M. (2014): Farming in and on urban buildings: Present practice and specific novelties of Zero-Acreage Farming (ZFarming). *Renewable Agriculture and Food Systems*, 1-12

Just like other cities in the country and around the world, Bogotá, the capital of Colombia, is undergoing rapid population growth leading to more pronounced social inequalities. In 2005, this city of approximately 6.8 million people had a poverty rate of 38.5 percent, and most of the poor were suffering from significant nutritional deficiencies due to the lack of access to food in the necessary quantities and quality.



Jardín Botánico de Bogotá

There is always space for plants

Promoting a City without Hunger and Indifference: urban agriculture in Bogotá, Colombia

In an effort to improve the population's standard of living, and as part of its social policies, the current municipal administration – led by Mayor Luis Eduardo Garzon – implemented a district development plan called “Bogotá without indifference – A social commitment against poverty and exclusion”. This plan encompasses a number of programmes, including Bogotá Without Hunger, which involves a number of activities intended to improve the nutritional status of vulnerable groups in the district. One of its main initiatives is the urban agriculture project led by the Jose Celestino Mutis Botanic Garden.

This initiative recognises the practices of the residents and encourages growing crops in urban areas as an alternative source of food for self-consumption, in addition to promoting environmental conservation, the strengthening of the social fabric and the appropriation of land through citizen participation.


In general terms, the project's activities are aimed at:

- complementing basic biological research with applied research in an urban context, for the sustainable use of some native plant species with high nutritional value;
- carrying out exchanges of agricultural knowledge and know-how using clean technologies in spaces called Educational Nuclei with the communities of the city of Bogotá;
- promoting environmental education initiatives to improve awareness and healthy habits and encourage the consumption of food with high nutritional value;
- promoting participatory community alliances that can strengthen urban agricultural activities and neighbourhood ties, and thereby contribute to a better quality of life.

Bogotá is one of the pilot cities of the Cities Farming for the Future Programme (CFF) of the RUAF Foundation, and implemented in Latin America and the Caribbean by IPES – Promotion of Sustainable Development. As part of its activities, a local team made up of the Botanic Garden and the University of Rosario is developing a participatory diagnostic assessment of urban agriculture in order to identify and analyse the stakeholders, describe the legal and regulatory framework, identify available spaces and prepare a situational analysis of urban agriculture and agriculturalists. The study area encompasses the Bosa Central area, located in Bosa, one of the poorest districts of Bogotá. By the end of 2007, it is hoped that there will be a multi-stakeholder alliance made up of various institutions and civil society organisations interested in urban agriculture along with policy guidelines that promote urban farming as a permanent activity in the Capital District.

URBAN AGRICULTURE IN BOGOTÁ

The urban agriculture project in Bogotá began at the end of 2004 and has made it possible to implement a wide variety of activities in applied research, thereby promoting local know-how and

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improving the quality of life of the vulnerable communities of the district.

Applied Research. This is one of the central activities of the Botanical Garden, which carries out basic research and transforms it into applied research, focusing both on native species (quinua, amaranth, cubios, hibias, chugas, etc.) with high nutritional value which are being reintroduced to people's diet, as well as traditionally consumed exotic species (lettuce, spinach, carrots, gooseberry, etc.). Research includes the use of different containers and alternative substrates, which is very necessary in the urban context. Currently, 60 edible species are being studied.

Nuclei of education and knowledge exchange. The techniques of raising crops in containers and in the ground that come out of the research are transferred to the project's target group through the educational nuclei that exist throughout the city. It is important to highlight that in addition to training, a rich exchange of know-how takes place with the participants, who have a vast amount of knowledge about traditional agriculture, often stemming from their rural origins. To date, there are 124 educational nuclei operating throughout Bogotá, and more than 31,000 people have been trained, including over 1,000 urban farmers in the city and many people with great potential and interest in getting involved in the activity.

The nuclei also work, both theoretically and practically, on various issues related to agronomic management, the application of clean technologies (organic waste management, the collection of rainwater, the use of alternative energies like solar), citizen participation and the construction of networks. The latter are built through exchanges of know-how among neighbours and people from other neighbourhoods and distant parts of our city, as well as through visits to other interesting urban farmers, who offer them new ideas on how to improve production or local exchange. To date, more than 50 neighbourhood and local exchanges and tours have taken place, which have been very helpful and useful to the beneficiaries.

WHO ARE THE BENEFICIARIES?

A vulnerable existence is one characterised by one or more of the following

factors: a high level of economic dependence, a lack of housing, malnutrition, a lack of education and training, impossible access to health care and living in settlements that are environmentally at risk. Vulnerability quickly leads to poverty, and for that reason, the project's activities seek to influence the causes of poverty and not its effects. As a medium-term strategy, urban agriculture training is planned and carried out in vulnerable communities. Included in this vulnerable population are, among many other groups, women heads of household, prisoners in various penitentiaries in the city, people with HIV, the displaced¹ and the reincorporated², and students.

Despite the low levels of participation registered in many sector-specific programmes and projects, the urban agriculture project is one which enjoys relatively high levels of permanence and replication of the activities learned about during the trainings. The methodology of intervention is simple. Initially, the project identifies the local resources possessed by the population, and then encourages the adoption of innovative strategies which seek to solve or complement existing nutritional needs. The project's activities promote the alternative production of quality food by linking traditional and scientific knowledge, which is a key aspect of the project's approach. This allows the community to gain recognition in the city, and for its knowledge to be valued.

Among the different experiences with specific population groups, one that stands out is the work done by NGOs that trained people with slight mental retardation, deaf-mutes and people with Tourette syndrome aged 26 to 61. With this group, training efforts included the planting of different kinds of produce to create a large salad. The intention was also for the participants to forge relationships through the activities without forgetting what has been learned, which proved to be a difficult and challenging task.

At Buen Pastor – a prison facility of the National Institute of Penitentiaries of Colombia (INPEC) – work was done with different groups of women, including maximum security inmates and others soon to be released. In working with them, it was possible to lower their anxiety and the levels of aggression and conflict that exist among those living together in a

penitentiary. In some cases, it was even possible to arrange it so that the time spent working counted towards a reduction in the sentence. Many of the women expressed their desire to replicate the experience in their homes once they are released. Urban agriculture practices offered them the option to reflect on their lives, and on what they can do when they are out of prison. Similar experiences took place in the La Picota and La Modelo penitentiaries.

Work with older adults (people over 60) has also taken place at most of the locations, and has led to better health thanks to the participants' improved outlook and feeling of being useful and recognised for their knowledge of agriculture, *"....working in the garden made me feel alive and worth something...."* said one of the urban farmers.

Another group the urban agriculture project in Bogotá focuses on is people who are HIV-positive. Under traditional protocols, they only receive care, and are treated as passive objects rather than as subjects of their own growth and change. However, through Participatory Action and city farming practices, they are able to develop their potentials as protagonists in their own lives, where co-responsibility and the joint completion of tasks are very important achievements.

"A friend from the group of HIV-infected invited me to participate in the urban agriculture course, and I liked it. My sister helps me take care of the plants; she has a physical limitation and this work is a distraction for her. When the family earns income, we all decide what will be done with it; there is no discrimination here. I am from Tunja (a small city); I always lived in the city and never had anything to do with agriculture. I was a hairdresser but currently the salon is closed. I don't belong to any other groups in the area, because there are complications and I prefer to live my life peacefully."

**Manuel, urban farmer –
person living with HIV/Aids.**

The reincorporated population, people who have participated as combatants in the internal armed conflict, has had a special place in the project. The work done with young people from 12 to 19 years old, who have experienced the

horrors of war first hand, has been one of the most difficult undertakings so far in the project. Their memories of their places of origin – mostly rural – are brought to the surface through practicing urban agriculture. The person leading them has to modify the design of the trainings to fit their specific needs. The participants now live in the big city and are being trained together with people from the community rather than separately, which provides them with more support as they reintegrate themselves into civilian life.

The large displaced population resulting from the internal conflict and the migrations caused by the poverty gripping many areas of the country possesses a wealth of agricultural knowledge and know-how which is often put into practice when they get to the city. This provides them with a link to their place of origin. For this reason, many of the people who have been farming in the city for years feel affirmed when project specialists talk to them about an issue they know a lot about. This affirmation leads them to reconsider their ideas about the area in the city where they live (often in very

difficult conditions), where rural is not seen as backwards, but rather as a way to improve their living conditions. Urban agriculture thus promotes greater urban-rural linkages.

"Urban agriculture is very satisfying for me. They have taught us a lot. We were not doing anything, I was very bored and this farming makes us happy. When I didn't have anything to do, I would get nostalgic.... because I was used to working. Now, with my co-workers, we plan what we are going to do on our little plot. I think that with this, I can move forward and teach more people what I have learned.... it seems like a great idea to me to farm in the city, because the crops are in the house or very close. I wish everyone would grow crops because a lot of food would be produced.... I, at least, have made a lot of products like compost and earthworms, which I can sell and with that income buy things that we need in the house. I am happy to be farming with a group; one works better as part of a team."

**Ruben, urban farmer –
displaced since 2002**



From page 15

Investment in natural capital such as soil fertility is also minimal – so the low inherent soil fertility presents a major challenge for gardeners. Soil fertility analyses revealed that within the garden plots, soil fertility was strongly influenced by the resourcefulness of the individual users; some gardeners were severely depleting soil minerals, whereas others were maintaining or in a few cases even improving soil fertility. The analyses also revealed that certain parameters, such as pH and phosphorus were strongly influenced by the initial liming and fertilisation performed by the Department of Agriculture upon garden establishment. The general decline in soil fertility which was evident demonstrated the community's lack of knowledge on soil fertility maintenance and its inability to carry out larger investments/operations.

How can the community gardens be sustained? The most sustainable community gardens were those with more resourceful members in a position to ensure the functioning of the gardens. Therefore, if the community gardens are

to offer services to vulnerable groups, external support is vital. This was evidenced, for example, in analyses on the fertility of soils, in which signs of initial intervention (traces of phosphorous and liming) could still be detected years later. Furthermore, crop diversity was much higher in irrigated gardens, demonstrating the importance of and need for infrastructure and formalisation. Formalisation in particular is important for recognition of tenure security and to ensure that both gardeners as well as public institutions are interested in investing resources in the gardens.

Gardening generally loses its prime importance when other livelihood opportunities arise; hence the creation of a productive, self-sufficient, economically viable vegetable garden is difficult to achieve – in addition to the fact that competition with supermarkets is fierce. The success criteria of community gardens should therefore also include facets of community building and community services – elements which are not readily on offer in a struggling community. The creation

One of the outcomes of the programme is that the population has begun to apply the knowledge shared through the education nuclei. The fruits of their actions have begun to influence their way of seeing the city, of building it and living in it, despite the difficult economic conditions they endure.

ENDNOTES

¹ A displaced person is any person who has been forced to move within the national territory, abandoning his or her residence and/or habitual economic activities, because their lives, their physical safety, security or personal liberties have been harmed mainly due to internal conflict and violence. The project also works with people who have been economically displaced from their region.

² Reincorporated people are those men and women who have demobilised in the framework of agreements with armed groups operating outside of the law (paramilitaries and guerrillas) with whom the national government has engaged in a peace process and who are willing to rejoin civilian life.



Jardín Botánico de Bogotá

During a training, an alternative use of egg shells is demonstrated

of a self-confident, skilled and motivated group of producers is needed in order to realise the potential of the community gardens. The NGO that helped initiate the gardens continues to be an important resource with regard to support and training. Considering the current institutional setting, support from local NGOs is imperative. Unfortunately, as evidenced here, the reliance of weaker groups on NGOs is not in itself a viable path to ensuring the sustainability of community gardens.

ENDNOTE

1. See for example article by Marshall Smith (2005), which describes community gardening in Umlazi Township south of Durban.

References

- Auerbach, R. 1999. Design for participation in ecologically sound management of South Africa's Mlazi River catchment, PhD Thesis. Wageningen Agricultural University, The Netherlands.
- Marshall Smith, P., Yusuf M.J., Bob U., & de Neergaard A. 2005. Urban farming in the south Durban Basin. Urban Agriculture Magazine, Issue 15. Leusden: RUAF
- Mosoetsa, S. 2004. The legacies of apartheid and implications of economic liberalisation: A post-apartheid township, Working Paper No. 49. Crisis States Programme Development Research Centre.

Technologies for the Production of Edible Plants in Bogota, Colombia

The population of the Bogota Capital District is increasing rapidly. A major reason for this is internal migration.

The need for housing for these displaced people has contributed to the accelerated use of periurban and urban areas for construction of houses, affecting the availability of land suitable for urban agriculture. Meanwhile, there is an increase in the demand for arable land and for food that contributes to a balanced diet.

Rob Small



Cultivation in beds Botanical Garden of Bogota

Given their serious social and environmental impacts, the District Administration has developed different alternatives for overcoming poverty and exclusion, which affect approximately 55.3% of the population of the Capital District (Dane, 2003).

CHANGE-ORIENTED RESEARCH

As a contribution to this search for alternatives, the José Celestino Mutis Botanical Garden of Bogota – a municipal centre for scientific research and development – is conducting various urban agriculture research projects. The aim is to generate alternative technologies that can improve urban production systems.

The Bogota Capital District is located at 4° 35' north longitude and 74° 4' west latitude at an altitude of 2640 metres above sea level. Its annual temperature varies between 4 and 14 °C (46 °F – 68 °F), with averages of 12-13 °C. It is home to a population of close to 7 million people (6,824,510), who live on a surface area of nearly 400 square kilometres.

The new urban residents quickly adapt to urban cultural practices, but at the same time they are in danger of slowly losing traditional knowledge on the production, consumption and use of autochthonous resources such as native plant species. The Botanical Garden's research therefore promotes the use of cold-weather Andean and exotic plant species as an alternative crop for household food production and to help improve the nutrition and diversify the food patterns of the community. The Botanical Garden promotes the cultivation and consumption of promising native species that have been shown to have high nutritional value, and potential food, medicinal and industrial uses, and which also require knowledge about how to grow and use them. Some of these species are the amaranth

(*Amaranthus caudatus*), cold-weather chilli pepper (*Capsicum pubescens*) cubios (or mashua, *Tropaeolum tuberosum*) guasca (*Galinsoga parvifolia*), passion fruit (*Passiflora cumbalensis*), oca (*Oxalis tuberosa*), llantén (*Plantago australis*), mountain papaya (*Carica cundinamarcensis*), melon pear (*Solanum muricatum*) and quinoa (*Chenopodium quinoa*).

The search for new technologies is focused on adaptability and potential acceptance by the community (based on indicators like low implementation cost, easy replication in the urban spaces and adaptability for use in limited spaces that are not ideal for agriculture).

In order to develop technologies suitable for the many different conditions of the urban environment in Bogota (which includes very limited availability of agriculturally suitable land, reduced physical space and differences in terms of bio-climatic areas, ranging from wet areas to dry areas with irregular rainfall and high levels of solar radiation), an experimental scheme was designed. Experiments at the Botanical Garden and with urban farmers were set up, which

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included the cultivation of urban crops on hard surfaces (flat roofs and terraces) in built-up areas, using plastic containers (like tubes, cushions, bottles, beds and trash bins) and five types of substrates based on compost in different proportions.

The containers were selected based on their suitability for the crop to be produced, keeping in mind the characteristics of the plant such as its size, architecture (tree, bush, grass), the shape and size of the useable part (leaves, fruits, flowers, tubercles or bulbs), the growing cycle (short, medium or long) and its depth and type of root growth (vertical and deep or lateral and on the surface). In addition, the size of the container had to be sufficient to hold the amount of substrate necessary to permit the adequate growth and development of the plant. The type of material was also taken into account in selecting the container, with a preference given to inert materials like plastic, for example trash bags, soft drink bottle etc., in order to avoid the interaction of undesirable substances with the nutrients. For this reason, metal pails or barrels were not used, nor containers which had contained paint or other chemical products.

In terms of the mixes of substrates used to grow crops in the containers, an effort was made to define the characteristics of the “ideal” substrate, including the availability of nutrients for the plants, good water retention capacity, and good aeration. The substrate also needed to be easy to produce or be available at a low cost.

Compost offers a high organic content, can retain water and is relatively easy to produce, since in many communities it is produced in order to reduce solid organic household wastes (for example, food scraps). In an effort to improve the supply of air and reduce the weight of the substrate that the container would have to support, burnt rice husks were added to some mixes. Solid organic household wastes are readily available and, with a good procedure, can be processed into compost in just five months.

In this way, the researchers of the Botanical Garden could study the influence of the type of container, the type of substrate and the different bio-climatic conditions of the Capital District on agronomical behaviour in terms of

planting, maintenance, harvest and productivity of Andean and exotic cold-weather plant species, when cultivated as an alternative crop for household consumption.

MAIN RESULTS

Based on the results obtained in the study, Table 1 presents the different systems of production recommended for growing urban crops in containers in built-up areas under the climatic conditions of Bogota.

VERTICAL TUBES



Black plastic bags with the necessary amount of substratum and an irrigation system. For various small fruit and vegetables.

Tubes can hang free, or can be placed vertically against walls, terraces, or cement yards, where they receive maximum sunlight.

Vertical tubes make optimal use of horizontal growing surfaces as more crops can be grown per unit of area. They also reduce the time needed for weeding, and the plastic cover prevents possible damage or diseases.

- Area required per tube: 0.09 m²
- Number of plants per tube: chard (16), celery (12), coriander (16), spinach (16), strawberry (12), lettuce (16), mint (16), parsley (16), spearmint (16), thyme (16), lemon balm (16)
- Compost-husk ratio of 2:1

HORIZONTAL CUSHIONS



Black plastic bags with the necessary amount of substratum and an irrigation system. For various bulb plants.

This type allows for the efficient use of water and for a better use of space and easy harvesting. The use of this container is recommended for planting bulbs. It also reduces the time needed for weeding, and the plastic cover prevents possible damage or diseases.

- Area required per cushion: 0.3 m²
- Number of plants per cushion: garlic (10), red onion (10), radish (16), beet (10), carrot (12)
- Compost-husk ratio of 2:1

BOTTLES



A bottle, preferably painted on the outside in a dark colour for growing different vegetables and medicinal herbs. Cut off the top of the plastic bottle, and use the resulting part that is 20 cm deep and 10 cm in diameter. Holes should be made in the base in order to facilitate drainage during watering.

This type of container is one of the most accessible and low-cost receptacles. The individual containers prevent possible contamination at the roots.

- Area required per bottle: 0.014 m²
- One plant per bottle of for instance chard, garlic, peas, marigold, red onion, coriander, cauliflower, spinach, lettuce, herbs (like mint, parsley, thyme etc.), radish, beet, carrot.
- Compost-soil-husk ratio of 2:1:1

PLASTIC WASTEBASKETS



In order to plant bulb plants or tubercles, the depth of the container should be a minimum of 20-30 cm, in this case a plastic wastebasket. Drainage holes should be made in the bottom.

- Area required per wastebasket: 0.11 m²
- Number of plants per wastebasket: amaranth (1), broccoli (3), cubios (4), lima beans (1), ibias (4), potato (1), native potato (2), quinoa (1), cabbage (3), uchuva or Inca berry (1).
- Compost-soil-husk ratio of 2:1:

BEDS



Beds are one of the most commonly used containers for growing urban crops. One needs to have a horizontal space that allows the plants to absorb maximum sunlight. The beds can be built with used or new boards.

- The dimensions of the beds vary in width and length, depending on the available space and depth needed. There should be a minimum depth of 10-12 cm for chard (*Acelga*), cilantro, lettuce, parsley, and other leafy vegetables; and 20 cm for beets, radishes or carrots in order to allow for the proper development of the roots. Recommended dimensions for the beds are: 2m long and 1.2m wide (depending on the space).
- Suitable plants: chard, garlic, pea, marigold, red onion, coriander, cauliflower, spinach, lettuce, herbs (mint, parsley, thyme etc.), radish, beet, carrot.
- Compost-soil-husk ratio of 2:1:1

Production

Tubular and bottle containers turned out to be the most favourable for the growth and development of most of the species, in all of the ecological strata analysed. The type of container clearly influences plant growth (measured by weight in grams) and productivity (quantity of biomass produced per unit of volume and area of substrate). The tubular containers have a vertical orientation, which makes optimal use of the limited horizontal space (in one tube occupying 0.09 m² of horizontal space, 16 chard or spinach plants can be grown easily [1]). For example, a bed container covering 0.76 m² of horizontal space allows for the cultivation of 20 plants; thus, on one square metre it is possible to plant approximately 190 plants distributed among 12 tubular containers, or just 25 plants if using bed containers (see figure 1).

Species

The species that are recommended for planting in tubes have morphological characteristics (fairly shallow roots and thin stems) that make them able to easily grow and develop in tubular containers. Among these are chard (*Beta vulgaris* var. *vulgaris*), celery (*Apium graveolens*), cilantro (*Coriandrum sativum*), spinach (*Spinacia oleracea*), strawberry (*Fragaria vesca*), lettuce (*Lactuca sativa*), mint (*Mentha piperita*), parsley (*Petroselinum crispum*), thyme (*tymus vulgaris*), grapefruit (*Melissa officinalis*) and spearmint (*Mentha spicata*).

In addition, for garlic (*Allium sativum*), pea (*Pisum sativum*), pot marigold (*Calendula officinalis*), onion (*Allium cepa*), cedron (*Lippia triphylla*), flowering kale (*Brassica oleracea* var. *acephala*), chamomile (*Matricaria chamomilla*), nettle (*Urtica urens*), radish (*Raphanus sativus*), red beet (*Beta vulgaris* var. *conditiva*), rue (*Ruta graveolens*) and carrot (*Daucus carota*), better productivity was reported in bottle containers, since although this container produced plants with less weight than those in the beds or cushions, for example, the space occupied by the bottle is 0.014 m² and the reduced amount of substrate required meant that more bottles and thus more plants could be located in one square metre.

Substrata

In terms of the evaluation of the different substrata, it was found that the different

mixes affected the adaptability, growth and development of the different plants. The substrates made up of two or more materials mixed together demonstrated superior properties to those that only contained one element. For example, a mixture of rice husks, dirt and compost had superior characteristics in terms of moisture retention, capillarity and nutritional content than any of these substrate components individually, thus allowing for superior development of the plants studied.

CHANGING THE QUALITY OF LIFE OF THE POOREST

The research showed that extremely poor and excluded groups can grow vegetables effectively in an urban environment like that of Bogota, by optimising the use of spaces in built-up areas using containers. Based on the research results, recommendations can be made on the use of substrates containing compost and husks, which can reduce the (environmentally unsustainable) use of dirt from natural ecosystems in cultivating produce.

The research results have been shared with more than 2000 urban farmers in Bogota who, with the help of technical assistance provided by the Bogota Botanical Garden, have replicated the alternative technologies and are further adapting their vegetable production systems in built-up areas like patios or flat roofs of homes, including the design of their household productive units. By using containers, tubes, bottles, cushions and beds, they have been able to take better advantage of the scarce amount of space available, and to plant a wider variety of species for their own consumption and for sale, which allows them, through their own efforts, to improve their family's diet, diversify food patterns, and generate complementary income.

NOTES

1) In calculating the number of plants of leafy vegetables like spinach or chard, an average was taken because the number may vary depending on the plant's characteristics.

References

CID Nacional Household Survey. DANE, July 2003. In: Por un compromiso social contra la pobreza en Bogotá. December 2003. Ediciones Antropos Ltda.

Commercial Substrates for Urban Agriculture in Bogotá

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Blanca Arce
Andrés Peña

There is a need for low-cost, locally produced substrates for urban agricultural production in Bogotá, Colombia. The Colombian Agricultural Research Corporation (CORPOICA) coordinates participatory research on substrate mixtures using a wide variety of low-cost organic materials.

Urban agriculture is increasingly common in Bogotá, the capital of Colombia. Especially due to rural-to-urban migration, the percentage of Colombians living in cities rose from 40 per cent in 1951 to 75 per cent in 2005 (DANE, 2009). The poverty rate in many of the country's cities is increasing and a growing proportion of urban residents encounter difficulties in securing access to food. In addition, there is an increase in demand for organically produced food and many inhabitants are prepared to pay more for the quality and safety that these products offer. Urban farmers are well positioned to take advantage of this lucrative market.

There are an estimated 4000 agricultural producers in Bogotá. In the periurban areas there are more than 300 hectares of highly productive vegetable gardens both in open fields and in greenhouses. In the city itself, though, mostly containers are used in open or closed spaces (backyards). These containers need substrate capable of maintaining continuous harvests, especially if they are used for the production of vegetables.

Peat is one of the most frequently used substrates in Bogotá, particularly for growing tomatoes and other vegetables. It is a natural product, containing 80 per cent organic matter that has many positive qualities including good water retention. It is free of pathogens and thus need not be disinfected. However, peat is imported from Canada and is very expensive (approximately USD 2/kg). It is more affordable for commercial producers who have extensive areas of production (10-30 ha) than for small producers who cultivate only small areas (0.5-2 ha). Small producers are more interested in cheaper, local substrates of high quality such as lime, compost, raw husk, scum (residue of burnt charcoal), burnt husk, charcoal-sand, solid humus, sawdust and urban waste compost.

Due to the high price of available substrates, mainly peat, there is a need for cheaper, locally produced, substrates (of the same high quality). In addition, recycling of locally available material reduces pollution and the cost of (urban) waste management. For instance, in warmer regions where sugar production dominates (Cachaza and Vinaza), the contamination of rivers and soils has been diminished by almost 60



Fresh vegetables produced on substrate
Photo: Blanca Arce, Urban Agriculture Project-Corpoica, Colombia

per cent through the composting of industrial waste. This waste is utilised as substrate in vegetable production. And in Cajica City, under the organic waste recycling programme initiated in 2008, organic waste from all 11,000 households (50,000 citizens) is collected and converted into organic fertiliser for agricultural use. Local high school students teach households how to make the compost at home. Materials are provided by Cajica City, and the collected waste compost is used for organic fertiliser and animal feed.

A study was undertaken in 2009 to evaluate these locally available substrates, using mixtures from a wide variety of low-cost organic materials that could be used in urban agriculture.

The project

The urban agriculture project CORPOICA worked with three schools and households in three municipalities of the Department of Cundinamarca West Savannah of Bogotá: Funza, Facatativa and El Rosal. This involved 60 teachers, 90 students (from elementary school to high school) and 21 households. The project aimed at strengthening technological innovation and skills, by involving researchers, teachers, students and households in participatory planning and research (Photo 1).

The project involved the following steps.

- Working groups were organized comprising of researchers, teachers, students and farmers.
- A programme of technical-pedagogical training (with theory and practice) was created, based on agro-ecological guidelines and good agricultural practices.
- Urban and periurban horticultural spaces were designed in a participatory way (separately for each group in its own

environment) and in accordance with local, educational and socio-economic conditions.

- Vegetables were identified and agricultural techniques were discussed, adjusted and validated.
- Participants monitored the technological innovations.
- Didactic support material for technology transference was created, and urban agriculture was included in the curriculum of the elementary and the high school.
- Outreach activities were undertaken in ten cities around Bogotá, to disseminate the results achieved.

Six locally available substrates were evaluated (in PVC guttering): treated soil (lime, compost, raw husk), scum (residue of burnt charcoal), burnt husk, charcoal (together with sand at a ratio of 2:1), and solid humus (mixture of soil, solid humus and raw husk at a ratio of 2:1:1). The system of PVC gutters is ideal for use with crops that have a long growing cycle, as they provide a good accommodation for the roots, are low cost and save water and electricity.

The project looked at the performance of lettuce plants in different containers. Similar tests were done in the research centre, in three urban school gardens and in six urban home kitchen gardens. The substrates made up of two or more materials mixed together demonstrated better properties than those that only contained one element. Different techniques were also applied: rainwater harvesting, the use of various substrates including solid and liquid (only water and with nutrient solutions). It is important to have the right substrate mixture, and specific mixtures are needed for different vegetables. The nutrient solutions were composed of minor and major elements (chloride, sodium, sulphur, magnesium, calcium, potassium, iron, copper, bromine, zinc). These nutrient solutions when used in substrates are specially formulated to nurture the development of the plants, which have different needs depending on their stage of growth. They are easy to obtain and handle and they are cheaper than imported alternatives.

Main results

Through this project vegetable production in vessels and containers and in conventional organic gardens has improved in Bogotá. Various systems of production have been developed and recommended for growing urban crops in containers. For both containers and organic gardens, a training module has also been developed. The module for conventional organic gardens emphasises the efficient use of natural resources (soil, water) and environmental conservation (Photo 2). The module for vessels or containers includes a variety of different materials, such as PVC guttering, prefabricated roof material, fibre cement boards, black plastic bags, recycled soft drink bottles, wood; and in different set up: pyramidal, stepped and netted structures (see González Rojas, 2007: UAM no 19).

The substrates of raw husk and burnt husk were the least efficient because of their low moisture retention capacity and the difficulty of achieving homogeneous humidity. Rice husk is a sub-product of the milling industry, which is not available locally, so the main cost is transport.

The mixtures using solid humus (combined with soil and raw husk) and compost (combined with lime and raw husk) had better characteristics in terms of germination rate of lettuce; moisture retention capacity; infiltration and drainage; contamination; colour of the crop; environmental conservation; cost and availability at local level; and quality. With these mixtures, the urban farmers obtained lettuce with a greater number of leaves and a higher fresh weight, thus leading to better earnings. The other types of substrate produced lettuce with nutritional deficiencies and thus led to lower quality and output. For more information see Tibaitatá-Corpoica research center (2009).



Substrates were tested in different technologies at the Tibaitatá research centre

Photo: Blanca Arce, Urban Agriculture Project-Corpoica, Colombia

The production of lettuce using these mixtures achieved results similar to those obtained with the use of commercial substrate. The disadvantage of the latter is that it is more expensive and comes in larger (25 kg) bags. These need to be stored, which is not good for the quality of the substrate. A mixture of compost with local products seems to be a good alternative in terms of price, performance and accessibility (it is easy to produce or buy in shops in the city).

Future

Teachers, students and households are replicating and adapting their vegetable production systems in built-up areas, including the design of their urban garden schools and household productive units. By using different containers, they can take better advantage of the scarce amount of space available, and plant a wider variety of species for their own consumption and for sale. In this way they have been able to improve their family's diet, diversify their food patterns, and generate complementary income. Recommendations are being developed on the use of substrates containing compost and local sub-products. A growing use of compost will reduce the amount of waste in the city. The results are encouraging, but more research is needed on issues like transport, type of containers and vegetable varieties.

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The city of Cairo has been the capital of Egypt for more than a 1,000 years and its roots extend back more than 50 centuries.

The city's population in 2006 was 7.8 million on a total area of about 3,085 km². Cairo is made up of one old city and five new cities encompassing about 29 municipalities.



Donkey-pulled cart

Urban and Periurban Agriculture Producers' Organisations in Cairo

A significant portion of those involved in urban and periurban agriculture (UPA) are the urban and periurban poor. Women constitute an important segment (FAO, 1995) of the urban farmers, since agriculture and related processing and selling activities can often be easily combined with their other tasks. For instance, it is not difficult for women to combine selling livestock products such as eggs and milk with their urban jobs that already require travelling to the town centre or to the houses of the rich in Cairo.

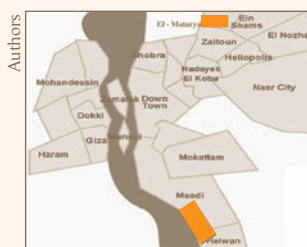


Figure
The urban agriculture areas under study (El Matarya and Helwan in orange).

GOVERNMENT POLICY

The Egyptian government's urban policy, which has been in effect since the 1980s (MALR, 1999, 2004), seeks to prevent informal urban development on scarce agricultural land, guide urbanisation towards new towns on desert land, and improve living conditions in poor and underserved urban areas. Even though conservation of agricultural land has long

been a priority of Egyptian development policy, much of the critically needed arable land in Cairo is being lost to urban development. Half of this urban development consists of illegal (non-approved) building and the remainder is made up of planned new developments in the desert. Although reports of a housing crisis have emerged in the international news media, it is estimated that Cairo actually may have a surplus of some one million housing units (FAO, 2004).

A case study on urban and periurban agriculture in Cairo was conducted by the Agricultural Economic Research Institute (AERI) and supported by FAO (FAO, 2006). The study revealed that land tenure for UPA activities is insecure in Cairo, whether the land is privately owned, rented or public (in parks and along roads, canals and streams). Urban and periurban agricultural activities in Cairo include the production of food (grains, root crops, vegetables, fruits) and livestock products (poultry, rabbits, goats, sheep, cattle, pigs, fish, honey, etc.) as well as non-food products (ornamental plants, tree products, cut flowers, etc.).

The primary objective of UPA in Cairo is self-consumption, while the producers trade any surplus for additional income. However, the volume and economic value of the market-oriented UPA should not be underestimated. Market-oriented products are usually transported by human- and donkey- or horse-pulled carts (see photo) to be sold at the farm gate, in surrounding neighbourhoods, local shops,

local informal markets or to intermediaries (rate tail consumer cooperative chains, co-ops and supermarkets). Products are mainly sold fresh, but some are processed for self-consumption; cooked and sold on the streets; or processed and packaged for sale to one of the outlets mentioned above.

The study identified 24 urban and periurban agricultural producers' organisations in Cairo, only ten of which are co-ops for small-scale producers. These co-ops are formal organisations dedicated to helping small holders improve their productivity and income and the community's livelihood.

This lack of low-income producers' co-ops in Cairo deprives the producers of income and reduces their access to resources, inputs, services and markets. This lack of organisation also prevents the small and unorganised, weak and vulnerable groups in urban areas from realising the full potential of their contribution to food security, income and employment generation. The majority of UPA co-ops in Cairo operate in the margins of society, as they often do not have a legal or legitimate status. Many low-income people's livelihoods depend on UPA-related activities in the food supply chain, such as production or exploitation, small-scale processing, and marketing and preparation (such as hawking, street food vending, and community-based catering). The precarious status of most urban and periurban producers often forces them to use degraded or dangerous sites and resort

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to practices that are unsafe and damaging to their own and others' health, as well as the environment.

The studied UPA co-ops have a legal status, however they are handicapped as a result of government interference. They are not able to address market inefficiencies, reduce transaction costs, protect the holding rights of their members or improve their members' financial position. As UPA co-ops generally do not have tools, facilities, capacities, experience or the means to provide financial support for market access, they can only provide extension services, crop inputs, and credit from their partners (such as the Ministry of Agricultural and Land Reclamation and its departments for co-operatives and extension, and the Principal Bank for Development and Agricultural Credit).

Rapid urbanisation in Cairo has created informal employment opportunities for the urban poor, but it has also created increasing problems for those involved in agriculture who have to find ways to dispose of UPA wastes and wastewater. Most of the irrigation canals in Cairo have been buried, forcing farmers to use groundwater, which is not cost-effective. Moreover, the use of wastewater is allowed only for wood tree production.

The fundamental challenge currently facing urban agricultural co-ops and their members in Cairo (as in many other developing and transitional economies) is to restructure their organisations into more market-oriented operations. This restructuring should also include harmonising the members' role as users of the cooperative's services with their role as capital investors. The following two cases illustrate different outcomes of this restructuring.

THE ANIMAL WEALTH CO-OP IN HELWAN

This cooperative was established in 1995 with only 22 members and L.E. 2000 (7.4 Egyptian pound to the euro) in capital to provide animal fodder for its members as well as the public. In just three years, the co-op grew to include 123 members. A new service of producing table eggs for consumption was then added. The co-op now has a capacity to manage one million eggs per cycle (of 14 months), offering proteins at a low price for its members and other local consumers. These activities have increased the co-op's capital to more than L.E 180,000. In the future, the co-op's primary challenge will be to develop the capacity of its members, using participatory and community-based approaches.

There is a lack of low-income producers' co-ops in Cairo

THE LIVESTOCK DEVELOPMENT CO-OP IN MATARYA

Several members of a family established the co-op Ahmed Oraby Agricultural Foundation to increase investment in the development of animal production. The co-op also had to invest in other agricultural products, however, to secure animal feed for its members. However, in 2000 the co-op's board was forced to comply with the new WTO policy, which limited subsidies for agricultural inputs such as fertiliser. The costs involved in attaining their primary objective thus increased beyond their means. As a result, the co-op board voted to change the primary objective to the rezoning and urbanisation of the agricultural land. If the board members had received capacity development support at the time the policy changed, they would have had a greater chance of achieving their original objective.

LESSONS AND RECOMMENDATIONS

Co-op boards suffer from opposing policies and fragmented responsibilities to different government agencies. This lack of alignment can only be solved by new legislation in support of UPA producer co-ops at local, district and governorate levels. This legislation will support and facilitate the daily work needed to develop the co-ops.

The value of agricultural production is relatively low compared to the value of other uses of the relatively scarce land, and thus agriculture can hardly compete in zoning plans. The Ministry of Agriculture thus has to restrict the re-zoning of agricultural land for non-agricultural use and/or the development of informal housing in or near agricultural areas.

Historically, water canals within Cairo served as an important source of low-cost irrigation. When the land is used for construction or other purposes, alternative pipelines should be considered to prevent the steep increase in irrigation costs beyond the producers' means. While large producers have the option of moving their agricultural production to desert lands outside the city, this is not possible for poor and low-income producers' families. Poor producers are thus forced out of business and eventually suffer from unemployment, poverty and hunger. Due to urban growth and development, the areas held by UPA producers' co-ops continue to shrink at an alarming pace. Reversing this trend will likely require UPA co-ops and related actors to adopt a complementary strategy for reducing urban poverty and food insecurity. A major problem in UPA co-ops is that the producers and their leaders lack the capacity to stimulate innovation and solidarity. Government agencies, decision makers, co-op board members and the producers themselves should be supported and trained in market orientation and management of the co-ops. Incentives offered by the co-ops also need to be restructured to ensure harmony between the members' roles as co-op service consumers and capital investors.

References

- Food and Agriculture Organization of the United Nations (FAO) & the World Bank. 1995. The Collection, Analysis and Use of Monitoring and Evaluation Data, Fourth printing. Rome.
- Food and Agriculture Organization of the United Nations (FAO). 2004. New strategies for mobilizing capital in agricultural cooperatives, J.D. Von Pischke & John G. Rouse, Food and Agriculture Organization of the United Nations. Rome.
- Food and Agriculture Organization of the United Nations (FAO). 2006. Urban and Peri-Urban Agriculture: Towards Better Understanding Of Low-Income Producers' Organizations. FAO/IDRC/AERI Gcp/Int/955/Can Cairo-Case Study. Rome.
- Ministry of Agriculture and Land Reclamation (MALR). 1999. Agriculture Policy Reform Program, (APRR), Reform Design and Implementation Unit (RDT); Rural Organizations in Egypt.
- Ministry of Agriculture and Land Reclamation (MALR). 2004. New Practice of Participatory Local Development in Egypt's Urban Areas. Policy Paper.



Goats and sheep at a governmental market

Noha Ramadan

Concrete Actions: Cape Town's Urban Agriculture Assistance Programme

Urban agriculture in Cape Town principally involves vegetable cultivation, although the sight of roaming cattle in the streets is also familiar to many inhabitants of the city. During the past five years, the city of Cape Town has been formulating a policy on urban agriculture, which will mainly assist in the improvement of the lives of its citizens in terms of food security and economic development.

Christopher Hewett



Members of the Florico Farming Group working in their garden near Atlantis township 45 km north of Cape Town (within the City administrative boundaries)

The phenomenon of urban agriculture has been taking place in Cape Town since its establishment, but faced with an unemployment rate of around 23.4% (equalling 2,275,230 persons), an economic growth rate insufficiently able to absorb the expanding labour force and 32% of the city's population living below the Household Subsistence Level (HSL) in 1999, the city has been looking to further enhance the potentials of urban agriculture as an intervention strategy to achieve poverty alleviation and job creation (City of Cape Town, 2006c).

The municipality of Cape Town has been directly involved in 33 urban agriculture projects in the city, while at the same time national and provincial governmental bodies have also been implementing food production activities. NGOs in the Cape Town area also make a large contribution to the development of the city's urban agricultural sector, such as Abalimi Bezekhaya (see UAM 6). However, so far these activities and initiatives have lacked municipal coordination and a common vision on

urban agriculture. This situation led to the realisation that a specific policy on urban agriculture was necessary as this would *'... provide a common vision for urban agriculture, give strategic guidance and create a mechanism to manage urban agriculture so that its maximum potential can be realised while negative impacts are being eliminated or reduced.'* (City of Cape Town, 2006b: 1). A formal policy will lay the legal basis for collaboration between all municipal departments on the issue of urban agriculture and will ensure each department's undisputed commitment; and it will eliminate the need to rely on the goodwill or preferences of individuals.

POLICY FORMULATION PROCESS

In May 2002 municipal authorities called a first urban agricultural summit to start a dialogue on the necessity and development of urban agriculture in the city with a special focus on the urban poor. The Economic and Human Development Directorate took the lead in this process and is still the 'organisational home' of the urban agricultural activities within the municipality. This summit mandated the city to compile an appropriate urban agricultural policy and assistance programme for the urban farming practitioners. The first draft of the policy document was compiled in

2002. From here on, a consultative process of policy formulation was started, which included the following steps: background study and concept clarification, determination of current status of urban agriculture in the city (a very superficial assessment), analysis of players and stakeholders, compilation of a first draft of the policy document, invitation for both internal and external comments on the draft, revision and formulation of final draft policy document (with valuable inputs also gained during a second urban agricultural summit in 2003) and submission of the final draft to the City Council for acceptance by the end of 2006. The consultative policy formulation process involved a wide array of actors: all internal municipal departments, the Agricultural Department at provincial levels, several universities, agricultural planning colleges and urban farmers and practitioners. On the one hand it presented an opportunity to educate selected players (officials and councillors) on the benefits of urban agriculture, while on the other hand, extensive formal consultation was done with urban agricultural practitioners to determine their specific needs and aspirations.

Due to a prolonged process to restructure and transform the City administration

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and local government election the process got stalled. As a result both councillors and top management were new and advocates for the urban agriculture policy within the municipality, thought it wiser to take the time to re-convince the politicians, rather than to force it through. In the end, the policy formulation process produced two separate documents, namely: a baseline document (reflecting the theoretical framework, international and national experiences, the current status of urban agriculture in the city, etc.) and a policy document (indicating the vision, objectives and interventions by the city and its partners).

The Constitution of South Africa does not list agriculture as a function of local government and, therefore, a lot of motivation and lobbying was necessary during the consultative process to convince city council decision makers that the development of urban agriculture should be viewed as part and parcel of poverty alleviation and economic development, which are the concurrent responsibility of all spheres of government (Republic of South Africa, 1997). In the end, city council members were convinced by the opportunities for economic development that urban agriculture can offer, as well as by the fact that the municipality does have a sector support policy for agriculture. Both aspects reinforce the idea of supporting urban agriculture through a municipal policy.



Christopher Hewett

Producing green vegetables near Atlantis township

THE POLICY DOCUMENT

Cape Town's vision is to build a partnership with all its people to make Cape Town a world-class city in which the quality of life of every citizen steadily improves (City of Cape Town, 2004d). Urban agriculture fits very well in this vision as it is seen as a strategy towards

poverty alleviation and economic development. The draft policy document has been formulated in accordance with the city's requirements for policy documents, i.e. it uses simple language that the affected parties can understand, and it is clear and concise on what interventions the city will make and what assistance the urban practitioners can expect from the city.

The draft policy document defines urban agriculture in its broadest sense, to make it as inclusive as possible while discerning the categories of plant production, livestock production and aquaculture. It acknowledges the benefits at the individual or household level (household food security, income generation, etc.) but also at city level (improved cleansing of the city, contribution to environmental restoration and greening, etc.). After listing the challenges and opportunities of urban agriculture locally and identifying relevant stakeholders, the policy document continues with an elaboration of concrete actions to be taken to achieve the policy's objectives; and it elaborates on the institutional framework and an implementation strategy.

One of the concrete actions described in the policy document is the city's assistance programme. The remainder of this article will concentrate on this programme as its contents, criteria and concise actions have been formulated in a detailed manner, which might provide other cities faced by similar challenges with ideas and inspiration.

THE ASSISTANCE PROGRAMME

Although the draft policy has not been formally approved by the city council, most elements of the proposed assistance programme are already being implemented. This is also the case for Cape Town's urban gardening assistance programme. People or community groups that ask for assistance for urban agricultural activities approach the City through a variety of windows or departments. These departments then direct them to the Economic and Human Development Directorate, which then gives strategic assistance, such as in improving the organisation of the group. In many instances, day-to-day (more technical) assistance is provided by

NGOs. This division of labour is due to the lack of manpower at the Economic and Human Development Directorate. A formal policy will provide more resources and support the directorate to make it more visible in its responsibilities, allowing it to advertise its assistance more widely and be more proactive instead of reactive.

A specific policy on urban agriculture was necessary

The Cape Town Assistance Programme for Urban Gardening works with a set of specific criteria to determine the type and extent of the assistance. Firstly, the kind of urban agricultural operation is classified. The city of Cape Town distinguishes between four different types of operations, which have been defined as:

1. home produce – home dwellers using their own gardens to grow vegetables and/or keep animals on a small scale in order to supplement the family diet;
2. community groups – a group of people who produce food collectively for themselves or for a community institution mostly on public land;
3. micro-farmers – individuals or groups of people involved in urban agriculture to generate an income on small pieces of unutilised (private or public) land; and
4. small emerging farmers – individuals or groups of people who are or aspire to be full-time farmers.

The last type is considered to take place in a formal business setting, while the other three types are regarded as informal economic activities. The policy focuses on Cape Town's urban poor, which make up all four categories mentioned above. However, as the policy is not directly aimed at commercial farmers, the small emerging farmers are mostly stimulated to contact the National Department of Land Affairs instead, where funding can be obtained from the Land Reform Programme for Agricultural Development (LRAD).

The objectives of the urban agriculture activity need to be in line with the city's strategies of poverty alleviation, economic development and/or community capacity building. Further

assessment will include the number of beneficiaries; other role-players involved; location; environmental impact; availability of water; feasibility; and the activity's compliance with integrated development planning and management.

Five main types of assistance are discerned: access to land, infrastructure, tools/equipment/implements, production inputs and extension services. While community groups can count on all types of assistance, home producers are supported only with small tools, basic production inputs and some extension services, but not with acquiring access to land or infrastructure as the Municipal Finance Management Act (MFMA) states that municipal capital may not be used to improve private assets (such as private land). A matrix in the policy document stipulates what type of operation can apply for what kind of assistance. A needs analysis performed for each applicant will be decisive for the actual assistance given.

Die Burger (local newspaper)



Cattle in front of a house in Khayelitsha, one of the poor neighbourhoods

Cape Town's assistance programme to urban agriculture also includes a so-called *start-up kit* for survivalist gardeners. Focusing on the poorest of the poor, a start-up kit is meant to support existing community groups that wish to start a gardening project. Per 10 people, the start-up kit will include basic items, such as a pick axe, spade, rake, watering can, seeds and compost. In addition, the start-up kit will be supported by skills training and extension services.

The city's assistance programme has a special focus on livestock keeping in the urban area. In Cape Town, many different byelaws on urban livestock exist as the municipality in its current form only came into being in 2000 (39 small municipalities were combined into 7 municipalities in 1996, which in turn

were united into 1 municipality in 2000). Currently, an intervention has been accepted by City Council to address the uncontrolled keeping of livestock in the urban area. As livestock represents an economic opportunity for many people, it should not be lost. Therefore, a three-prong strategy has been developed to remove the animals from the residential areas to places and spaces where they can be kept under controlled conditions. This involves the establishment of (a) community kraals (fenced areas) close to residential areas where small numbers of animals can be kept under zero grazing conditions, (b) commonage land (a traditional form of land rights, where the land belongs to the city and is meant for agricultural purposes) where larger numbers of animals can be kept under commercial farming conditions, and (c) private farms or small holdings through the grant funding system of the National Land Reform Programme. In the case of community kraals activities are located on state-owned land and the city provides all fixed infrastructure. Likewise the development and maintenance of infrastructure on commonage land is also done by the city, but participant farmers are required to pay an incremental rent which will reach a commercial rate within three years in order to give emerging micro-farmers a maximum chance to become successful small commercial farmers.

The assistance programme is founded on cooperative governance, strategic partnerships and collective action, i.e. the city has the buy-in and commitment from all the role-players so that when assistance is rendered there is no duplication of resources or distraction from the project objectives. Up until now urban agricultural assistance was done in a reactive way due to a lack of resources, but the formal introduction of the urban agricultural policy will make proactive involvement possible.

Stanley Visser



Production of tomatoes in a tunnel

PROGRESS TO DATE

Due to the long consultation and policy formulation process, the city council is already implementing a number of the proposed strategic interventions of the draft policy, next to the assistance programme described above. This includes the following: an annual budget allocation for urban agriculture, recognition of urban agriculture as a land use in the Integrated Zoning Scheme of the city, provision of space for urban agriculture in new human settlements, absorption of urban agriculture as an element of development programmes (e.g. greening of the city, Local Agenda 21, poverty alleviation, HIV/Aids prevention programme, etc.) and provision of strategic infrastructure for agriculture such as the newly constructed fresh produce market.

Acceptance of this policy will elevate urban agriculture

In the meantime the Provincial Department of Agriculture has opened a district office in the city of Cape Town and provides extension services and financial support to urban farmers. In the spirit of cooperation the city, the Department of Agriculture and a few NGOs have established two mechanised agricultural centres in the city as joint ventures.

Recently the Department of Land Affairs has approved a R8.7 million (equal to around US\$ 1.2 million) grant for the city to acquire a commercial farm, which will be used as commonage mainly by the urban livestock keepers. The City is now in the process of identifying an appropriate farm to buy with the grant.

In addition, the city has also started international networking activities with regard to urban agriculture and participated in a regional urban agricultural conference last year in Harare, Zimbabwe. As a result of this the city has forged a working relationship with the Municipal Development Partnership for Southern and Eastern Africa (MDP-ESA). Furthermore, Cape Town has been selected as a pilot city under the "Cities Farming for the Future" programme recently set up by MDP-ESA

Continued on page 64

The Siyazama Community Allotment Garden Association, Cape Town, South Africa

Urban agriculture has been practiced in Cape Town for a long time and involves many different types of activities. There is currently an increasingly organised community-based organic farming and gardening movement in the city. This movement is led by associations such as the Vukuzenzela Urban Farmers Association (VUFA). Abalimi Bezekhaya (Planters of the Home), which supports VUFA, is the leading urban agriculture organisation in Cape Town.

Rob Small



SCAGA Garden how it has changed

Part of this article has been published as a case, by the same author and under the same title in Cities Farming for the Future: Urban agriculture for green and productive cities, 2006.

Rob Small



SCAGA Garden: how it was before

Abalimi Bezekhaya provides support services such as the supply of low-cost bulk compost, seed, seedlings, training and on-site project extension. Abalimi's two non-profit People's Garden Centres annually supply agriculture and horticulture inputs to, on average, 2,000-3,000 home-based survival and subsistence gardeners and approximately 200 community agriculture and greening projects. Abalimi projects are encouraged to be 100 percent organic. The economic potential for community agriculture is significant, as there is a high and ever-growing demand for organic vegetables in Cape Town. Organic markets and retailers both large and small are always under-supplied.

VUFA

The VUFA began in 2002 as an idea when - with Abalimi Bezekhaya's assistance - 70-100 community-based urban agriculture associations began meeting to discuss common issues. Since then, a draft constitution has been accepted - see objectives listed below. At present, the VUFA comprises about 72 community-based UA associations and is organised as two main branches in the two main black township areas - VUFA Khayelitsha area and VUFA Nyanga-Gugulethu-Phillipi area.

The VUFA's objectives and activities are related to lobbying and advocacy, marketing and training on micro-enterprise development and social development. Vukuzenzela Urban Farmers Association (VUFA) is currently networking with other emerging small farmers groups provincially. Abalimi assists VUFA in enhancing its national and regional links. It is hoped that, over time, the emerging national and regional organic small and micro-farmers associations will federate to increase their leverage on behalf of the poor.

Internal and external politics and capacity issues always play a major role in organisational effectiveness among community-based social movements. The VUFA is no exception. Already in its short history, the organisation has suffered a few leadership crises, been almost destroyed by external government and political agendas which influence membership loyalty and focus, and is currently re-organising. Abalimi Bezekhaya is introducing the services of an excellent partner organisation - Community Connections - which focuses entirely on organisation building and development among community-based organisations. Although Abalimi Bezekhaya is able to rally and mobilise the

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VUFA through various interventions (like horizontal learning exchanges between the VUFA members and with other farmer groups), providing structured OB/OD services is not its core business. Abalimi is thus building a partnership with Community Connections to enable the VUFA membership to build organisational capacity over time, using the inevitable crises as learning opportunities rather than experiencing them as entirely negative and unwanted events.

SCAGA

The Siyazama Community Allotment Garden Association (SCAGA) is a member of VUFA. Since 1997 its members have farmed 5,000 m² in a corridor previously under power lines (low-intensity feeder lines that were later decommissioned) in Macassar, Khayelithsa. SCAGA could provide 3-4 permanent, full-time formal jobs, but decided instead to become a Livelihood Level garden, with up to 30 subsistence “jobs”, on a mixture of individual and communal plots. These form the centre around which a number of other entrepreneurial and service initiatives have been or are being developed. In SCAGA’s case, a small seedling nursery, a craft group, and a tea and catering service have been developed, and plans are underway for a soup kitchen and child care facilities. Adjacent land within the same corridor – some 3 hectares of sandy wasteland – has now been fenced and is being developed to accommodate another 200-300 gardeners.

There have been positive impacts on the position and role of women as leaders

Each SCAGA member receives a minimum cash and food income, after costs, of R50-R100 per month (USD 7-14) – a lifeline to households with no discernable income. In 2005, the project hosted its fifth group of 30 people, successfully marketing high-quality organic produce. Group savings at year end, after costs and own consumption, have varied between R2,000 and R 20,000.

This community-oriented project of SCAGA has had far-reaching impacts, both within the local community and on policy development in Cape Town. It has sparked hundreds of applications from

new groups and has given planners solid proof to argue for community-managed open spaces and for self-help job creation. SCAGA is repeatedly visited by VIPs, including local government ministers and senior officials. The Western Cape Department of Agriculture (in contrast to its national counterpart) has recently begun to give some solid support to community organic agriculture projects, mainly in the form of improved infrastructure.

The most (potentially) helpful government-support programme of all was launched three years ago by the City of Cape Town - Dept of Economic and Human Development. Stanley Visser of the City of Cape Town reported on this in issue no. 16 of the UA-Magazine (Stanley Visser *et al.* 2006). This is the process by which an Urban Agriculture Policy for the City of Cape Town, plus linked support programmes, was launched and tested. The policy is now in the final stages of ratification and will provide for long-term and rational support to UA practitioners, especially among the poor.

Impacts on the local environment have also been quite substantial. Soil fertility inputs have decreased, while pests, once a large problem, are hardly mentioned now. Improved health is also becoming evident, as are the medicinal use of fresh organic food to strengthen the immune system and the awareness of the therapeutic value of organic growing. New members often show signs of malnourishment, have low energy and little money. After one season, remarks about their generally improved health are often heard.

There have also been positive impacts on the position and role of women as leaders, through, for example, Ilima - traditional mutual-help work events. These have now become a practical tool in increasing women’s empowerment and mobilisation, facilitating community support and muscle power for SCAGA projects. It began with SCAGA women recruiting unemployed men to do heavy work by re-introducing a traditional rural practice of serving traditional beer and food after the work is done. These events cost very little, but more importantly the women earn wide respect and support in the community through the work they do. SCAGA is now firmly women-led, and women-run projects in VUFA are now the norm. On

occasion, husbands and sons come to help female members with heavy work in the gardens, thus alleviating the women’s additional responsibility of managing households. But friction arises whenever the men insist that all the food produced has to be sold. Such problems are now being minimised as female leadership is more generally accepted. It has recently been decided that men, while needed for the heavy work, should run their own gardens separately!

But women are not perfect either. Organisational dynamics are the single biggest obstacle to community-level development and are the main cause of most lapsed projects. Problems with land, water, inputs, capital and skills are all relatively easily solved in comparison. In the world of poverty alleviation and work and income creation among the poor, people cannot operate in isolation; they have to co-operate and problems always arise. After nearly falling apart many times due to personality and leadership dynamics, the SCAGA group has chosen to work only in plenary decision-making format. In other words, all decisions are taken by everyone together. No single person is mandated or permitted to take executive powers on any important issue. This approach was recommended to them by Abalimi. Independent field research has confirmed that it is more viable than attempting to build corporate structures prematurely. As a result of this way of working, SCAGA is running smoother, with fewer disagreements. However, decisions can take a long time and SCAGA, like any other group, has to evolve in order to deal with the increasingly demanding economic and legal necessities related to every aspect of running an organisation. For instance, SCAGA has applied for non-profit registration from the National Dept. of Social Services- maintaining this registration is, on its own, a sophisticated task and requires production of financial reports. Thus the pressure is always on to develop a more sophisticated organisational structure. But there are no ready-made models for grassroots cooperative organisations among the poor and SCAGA- like most of the emerging movements Abalimi services- has to evolve its own structure step by step. As already mentioned, however, Abalimi is bringing in a new partner (Community Connections) to assist with this process.

Furthermore, once commercial factors are considered, money management becomes a litmus test for organisational health. Dividing profits equitably can be problematic, as can mixing up different types of money. In SCAGA's case, all members work equally on the communal commercial section (50% of the garden) and thus share the profits from this section equally. They do as they please with the profits from their own plots. They have also separated their personal group savings bank account from their project bank account. Profits from sales of vegetables grown on their communal commercial section go into the project account, and money earned from sales of vegetables from the members' individual plots goes into their personal savings accounts. This solution sounds simple, but it is a good example of the kind of elementary management decisions that have taken much time for SCAGA (and other groups) to arrive at.

The development continuum is a clear step-by-step pathway for the creation of sustainable community gardens among the poor

THE DEVELOPMENT CONTINUUM

Based on Abalimi's experience with organisations like SCAGA, a step-by-step development continuum and sustainability index for community-based agriculture has been developed. It is currently being field-tested and is almost ready for distribution. The development continuum and sustainability index evolved from actual field experience over the last 12 years. Before 1994 (when South Africa's first fully democratic elections took place) it was not possible to work developmentally among the poor, who were mostly black and involved in a vicious political struggle. The notion of a development continuum is not new, however, a clear step-by-step pathway for the creation of sustainable community gardens and micro-farming projects among the poor definitely is.

The development continuum and sustainability index was created to support urban agriculture development projects. At the moment, energy is being wasted by donor

agencies attempting to enable survival-level farmers produce at a commercial level too quickly, while the beneficiaries themselves are confused about which level they would like to achieve, or even about whether they want to be farmers at all!

This continuum and measurement system (sustainability index) tracks the development of community agriculture projects through four levels: from survival, through subsistence, into livelihood and then to commercial. These levels have been identified from field experience, and sustainability measurements have been defined for each level. The continuum takes into account social dynamics such as group conflicts and the "flow-through" of members, enabling these to be seen as positive events rather than limiting factors. It is now known that new groups need about seven years to establish a relatively stable organisation for community agriculture, while sustainable-level skills and knowledge take approximately three years to acquire within each level. The physical infrastructure for community agriculture, in contrast, can be created within one year – with the exception of fertile soil. The development continuum takes the limiting factors into account and allows for a constructive and empowering "flow-through" of participants who have other aspirations and use farming or gardening only as a temporary stepping stone.

Based on this continuum, Abalimi (in partnership with the South African Institute of Entrepreneurs - SAIE) is developing a special training programme to provide community farmers and gardeners with sustainable assistance, while allowing for the "flow-through" of temporary farmers. The training enables both illiterate and literate people farming at survival level to progress to the level that suits them, or to eventually achieve the commercial level. The training model also takes account of a new type of community garden that is emerging at survival, subsistence and livelihood levels – this is the "treatment support garden", which supplies fresh organic vegetables to the chronically ill (*CSI Handbook*, 2006).

SERVICES

To further extend the community development potential of SCAGA, Abalimi's organisation-building arm uses tried and

tested interventions to build farmers' and gardeners' skills and organisational capacity (since 2000). Horizontal learning (farmer-to-farmer) exchange, action learning and savings mobilisation are key development activities. Micro-credit will be available in the near future to groups with consistent savings records through projects aimed at the livelihood and commercial levels of the development continuum. Periodic farmers' markets, tunnel greenhouses, cold-storage rooms and value-adding packing sheds will follow in subsequent years, supplying a wide range of produce for cooperative marketing and creating new livelihood and job opportunities for the poor. Bulk organic certification is now being sought by Abalimi and VUFA. This would allow association members to obtain certification more cheaply and thereby increase the external marketability of their products.

Abalimi is also determined to ensure that organic certification does not act as a deterrent to emerging players. Together with SAIE, it is developing a "Master Gardeners" training programme (now called Agriplanner 2) that, once accredited, will enable illiterate gardeners and farmers to move from survival through commercial development levels. This will also form the basis of a capacity building programme that will enable genuine organic farmers to return to abandoned Eastern Cape lands.

With its social objectives and relative economic success, SCAGA is South Africa's first example of sustainable urban community organic farming as a permanent lifestyle choice. Consistent with the best intentions of community development, there is no limit to what can be achieved by Cape Town's urban farmers once they find ways to work again on the land with trust and goodwill.

The greatest single hurdle facing sustainable farmers' organisations among the poor is the achievement of group-organisation integrity in a neo-liberal competitive world, given the usually very limited resources available to enable their development. This integrity cannot be achieved if driven from the top down. It must be built member by member and association by association at micro-level in order for meso and macro arrangements to have real effect.

Vegetable Box Scheme in Cape Town, South Africa

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Femke Hoekstra
Rob Small

Although quite a number of experiences with community supported agriculture (CSA) and box schemes in Europe and the United States have been documented, there are not so many examples from the South. Abalimi/Harvest of Hope is a special case even in the South, as it is a social enterprise that works with poor people in urban areas who are the producers of the vegetables.

How it started

*Abalimi Bezekhaya*¹ (meaning “Farmers of Home” in Xhosa) is a civil society organisation working to empower the disadvantaged through ecological urban agriculture. Abalimi operates in the townships of Khayelitsha, Nyanga and surrounding areas on the Cape Flats near Cape Town. This area has a population of nearly one million people, the majority of whom are from the Eastern Cape - the former apartheid homelands of Transkei and Ciskei. Many are unemployed. Abalimi has been working with small-scale producers living in these informal settlements for 28 years. The producers (or micro farmers as Abalimi calls them) are poor people – mainly women – who are engaged in vegetable gardening in home gardens and community gardens in order to supplement their diet, improve household food and nutritional security, and provide sustainable additional income. Other benefits are community building, personal growth and self-esteem.

The central tool for the success of Abalimi (and Harvest of Hope) is the development of the “Development Chain”. The rationale behind the Development Chain is that conventional approaches pull the urban poor into commercial production too soon, while they first need to go through a number of preparatory steps to enable social learning. Furthermore, without sufficient support (subsidies and training) the development that ensues is unlikely to be sustainable. A step-wise approach is necessary to deal with the socio-political, environmental and economic dynamics and challenges which the poor encounter on a daily basis, such as poor education, poverty mentality, gender/racial and class tensions, very poor soil and mass unemployment. The development chain has four phases: the survival phase, the subsistence phase, the livelihood phase and the commercial phase (read more on the development chain in Van Veenhuizen, 2009, p.160).

Over time Abalimi noticed that some of the producers in the subsistence phase had the ambition to sell (part of their)



Harvest of Hope staff packing vegetable boxes
Photo: Femke Hoekstra

produce, but it was a struggle to sell their produce to a wider audience than their local community (selling “over the fence”). At the same time, Abalimi noticed a growing public interest in quality organic produce in Cape Town. This eventually led to the setting up of a marketing system selling boxes of organically grown, in-season vegetables on a weekly basis. A marketing unit within Abalimi was created, named Harvest of Hope.

The main goals of the Harvest of Hope initiative are to:

- create a sustainable and expandable market for producers in and around Cape Town;
- use this market as an engine for growth and an instrument for poverty alleviation in poor communities;
- give customers access to fresh competitive organic produce and contribute to fewer food miles.

Why a box scheme?

After a thorough market analysis, an organic vegetable box was chosen as the most promising marketing option for the producers for a number of reasons. The box system is sufficiently flexible to deal with crop failures, late harvests and poor quality, giving producers time to learn about consistent production, in terms of both quality and quantity. Varying the box content each week allows for yield inconsistency as producers build towards stable output targets, because quantities do not have to be exact.

The concept of the food box deals with various challenges that producers face: broadening the distribution chain (access to markets outside their local community), cash flow and liquidity issues (getting cash monthly instead of having



Labelled plots in a community garden

Photo: Femke Hoekstra

to wait an entire growing season), price fluctuations (a regular price is guaranteed), as well as seasonal fluctuations (contents of the box may differ).

Although the price that producers get for selling to Harvest of Hope is (often) lower than if they sold crops directly to the local community, Harvest of Hope offers them a regular market and a more secure and upfront source of income. The price set for the vegetables is based on a comparative analysis of prices at different supermarkets and wholesalers.

How the scheme works

The participating producers are trained in agribusiness systems. They sign simple contracts to grow specified crops in a designated size plot for pre-planned yields at pre-determined prices, to be harvested on targeted dates. The producers do the quality control, harvesting, cleaning and bunching of vegetables themselves. Harvest of Hope picks up the vegetables from the gardens once a week and delivers them to the packing shed, which is located on the perimeters of the Abalimi office and has all the equipment needed to process vegetables. There the vegetables are weighed (to record the amount of vegetables delivered by each garden), washed, cut and packaged or bundled, depending on the type of vegetable. An equal number of vegetables are packed in each box. The core packing staff consists of about five people, including Abalimi field staff. In addition, several producers work in the packing shed on a rotational basis to learn about the entire process of processing and marketing.

There are two types of boxes. The big box (sold at R95~10 Euros), a stackable crate, contains between 9 and 12 different vegetables depending on the costs of production. Standard vegetables in the box are potatoes, onions, carrots, a salad pack and bean sprouts. Other vegetables, depending on the

season, include tomatoes, green peppers, butternut, baby marrows, sweet potatoes, beans, peas, pumpkins, spinach, Swiss chard and beetroot. Boxes also usually contain a special and expensive vegetable, such as mushrooms, cherry tomatoes, red or yellow peppers, which are supplied by other farmers. The small box, which was introduced on demand in February 2009 (sold at R65~7 Euros), is actually a plastic bag (they are looking for a better alternative) containing 6 to 7 varieties of vegetables.

After the packing, the Harvest of Hope staff delivers the boxes to the collection points, most of which are primary schools (about 15-20 in total) in the suburbs of Cape Town, but also some institutions and a retail outlet. Schools seem to be the best distribution places, as parents can combine collecting their children with picking up a food box.

Harvest of Hope in numbers, April 2010:

- *Harvest of Hope is the marketing unit of Abalimi. Since it was started in February 2008 it has grown from working with 8 producer groups to 18 groups (with 118 producers) and has increased the number of commercial subscribers to their weekly food boxes from 79 to about 180 in April 2010 (and the number of subscribers continues to increase).*
- *For each 100 boxes produced, 8,415m² of land is required. The total amount of land used for Harvest of Hope is 26,047m².*
- *Income per producer is up to R3,000 a month on an average plot of 500m².*

Supporting the CSA movement

Running the business encompasses production planning, training and preparing producers for (semi-) commercial production, monitoring the producers' performance, and arranging inputs and finance. An intermediary organisation operating between the producers and consumers (in this case Abalimi/Harvest of Hope) is required, especially during the initial period. At operational level, the business is now almost entirely run by the target group, while being represented at management and board level by the main leader of the producers and other local black leaders from the target community.

Abalimi monitors the sustainability of all gardens on the basis of several pre-defined indicators to make sure that the producers are ready to become part of Harvest of Hope. Furthermore, Abalimi organises the production planning. Harvest of Hope developed a planning tool, which shows for each week of the year how much needs to be planted in each garden to obtain a certain amount of kilos per week per box (for a total number of boxes). Harvest of Hope plans for a production surplus of 10%. Through this surplus, they are able to cope with production loss and they can deliver their best produce to their customers. The surplus goes to charity projects, staff and volunteers.

In addition, Urban Producer Field Schools (UPFS, which are part of the RUAF From Seed to Table project) aim to look at weak areas in the production cycle and train producers in order to increase production. UPFS provide training sessions on subjects including quality control, soil management and pest management.

Abalimi provides inputs such as seeds, seedlings, compost, fertiliser and equipment. These are either free or subsidised, depending on the price of the input. Groups are starting to contribute (100% of seed and seedling costs, 10% of bulk cow manure costs) and this is deducted from their monthly

payment. At present the groups are only capable of contributing as they cannot afford to make new investments by themselves, but Abalimi believes that subsidies and services are necessary for any farming activity nowadays.

Consumer relations

It remains a challenge to keep all consumers satisfied. Consumers are informed by weekly emails and can participate as a volunteer or join a weekly tour to the gardens and the pack shed to become part of the CSA. A customer feedback survey (March 2010) among 56 non-active consumers showed why people decide to quit. This had to do with (a combination of):

- Size (concern for 23% of customers): either too much quantity leading to food waste or too little of everything;
- Variety (a concern for 25%): kind of vegetables offered (too much or too little variety, not enough of the basics (like potatoes), or not "child-friendly" enough);
- Pick up (25%): concerns with time, date or location. Some would prefer home delivery;
- Financial (7%): financial concerns, being able to find the same quality of food cheaper in supermarket;
- 5% had started their own garden and produced enough vegetables;
- 7% had issues with choice; some wanted to be able to select for themselves or know in advance what would be in the box so they could adapt their other shopping based on this information;
- Others have either moved; are buying more readymade food (cut, peeled and prepared); found another supplier; or don't know how to prepare the vegetables (although a recipe is always included).

Furthermore, when the schools close during the holiday there is no alternative market outlet, so sale volumes can be very low. This year box numbers dropped from 195 to 131 during the most recent holiday.

Masikhanye garden in Khayelitsha

Photo: Femke Hoekstra



The future

Since 2008, Harvest of Hope has developed from a small-scale initiative to a well-organised, complex logistical marketing business. It has created access for small-scale producers to a new market and is working towards the

Note

- 1) Abalimi is one of the local RUAF partners and Harvest of Hope is part of the From Seed to Table programme.

References

- Abalimi Bezekhaya. (2009). HoH Business Plan. Cape Town: Abalimi Bezekhaya.
Femiano, M. (2010). Harvest of Hope customer feedback survey. Cape Town: Abalimi Bezekhaya.
Van Veenhuizen, R. (2006) Cities Farming for the Future, Urban Agriculture for Green and Productive Cities. Philippines: IIRR, IDRC and RUAF Foundation.

creation of an alternative food system. In 2010, Harvest of Hope won the Impumelelo Innovations Award, which “rewards exceptional projects, which involve partnerships with the public sector that enhance the quality of life of poor communities in innovative ways”.

In some community gardens, the average age of producers is as high as 60 years and the levels of production remain relatively low. The low level of participation of younger people may have sustainability implications in the long run.

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Developing an Organic Box Scheme in Accra, Ghana

The demand for sustainably produced and healthy vegetables and fruit is growing in Ghana. This provides an opportunity to set up sustainable local value chains. A consortium of farmer cooperatives and traders in Accra, supported by the Netherlands-based NGO Agro Eco-Louis Bolk Institute (LBI), is developing an organic fruit and vegetable box scheme.

Organic produce grown in Ghana is currently mainly exported. Growing crops for the local as well as the international market will enable the (often small-scale) farmers to diversify their farms, thereby reducing their financial risks and also benefiting the soil, water conservation and biodiversity.

The partners

This initiative is the work of the Forward Ever Youth Cooperative (supported by the Ghana Organic Agriculture Network), Ideal Providence Farms, and Quin Organics.

Forward Ever sites are located around Woe, a suburb of Keta in the South East of Ghana. Established in 1997, the cooperative has 45 registered members, all of whom are full-time vegetable farmers. These farmers will provide vegetables for the box scheme including cucumber, lettuce, cabbage, green pepper, chilli, eggplant and okra. The farmers grow these crops according to organic agriculture principles and are in the process of acquiring organic certifications. Ideal Providence Farms, established in 1998, manages the production of tropical fruits and herbs on two farms covering a total of 85 acres. This company is also active in organic wild collection: about 150 women in Northern Ghana collect shea nuts, which are processed into shea butter for export to European and other markets. Quin Organics is a certified organic farming and processing business in Ghana that deals in vegetables, herbs and spices. In addition to running a nucleus farm, it also coop-

erates with farmer-based organisations in the Keta District through an out-grower scheme and a training scheme. Quin Organics focuses on both the local and the export market. It will provide fruits and herbs for the box scheme and is in the process of building a pack house for processing and storage.

The box scheme

Interested consumers will register and receive a weekly box of organic vegetables and fruits for a fixed price. The box can be delivered to an office or residence, or picked up at one of several locations in town (including fruit stalls, supermarkets and gas stations). The box scheme targets high- and middle-income Ghanaians in Accra as well as expats, since these people are willing and able to pay a bit more for the quality products.

The initiators aim to make the box scheme financially independent once it is up and running. The farmers will receive a fair price, which includes a premium for the organic products and sufficient extra to cover the costs of assembling, packaging, marketing and distribution. It is estimated that some investment will be needed at the start of this initiative, for which funds are currently being raised.

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Sample of a large organic vegetable box in Accra

Municipal and Civil Society Food Systems Policy Development

There is a growing belief among Chicago citizens that all residents should have access to safe, culturally acceptable and nutritionally adequate food through a sustainable food system that maximises community self-reliance and social justice. A variety of efforts are underway to raise the level of public discourse on this issue in order to design a sustainable food system that will be able to foster the development of community food security in Chicago.

The organisation of local forums around community food security in the past ten years, has led to the formation of the Chicago Food Policy Advisory Council (CFPAC) in 2003. CFPAC is a network of organisations and individuals who want to share their experiences and concerns about food security in the Chicago region in order to influence policy makers to make informed decisions motivated by the goals of community food security. The Chicago Food Policy Advisory Council is a long-term effort to develop plans and recommendations and then advise policy makers in all areas of food security. Membership and participation on the Council is open to anyone. It currently includes emergency food agencies (food banks and pantries), urban agriculture organisations and practitioners, public health officials, researchers, land use groups, food distributors, farmers' markets, churches, city planners, environmental organisations, chefs and community organisations.

CFPAC originated in the 1990s after the Community Food Security Coalition held its annual conference in Chicago. Out of this came an effort by organisers and participants of the conference, to examine

the feasibility of pursuing innovative programmes such as food policy councils and performing comprehensive research on the state of food access in the Chicago region. In 2001 the first Illinois Food Security Summit, funded by the Chicago Community Trust (the local foundation that makes grants available out of pooled funds from local donors), brought together emergency food providers, government and sustainable agriculture interests. The summit utilised an open space format such that participants supplied the summit's content and priorities for moving forward. This process generated more than 40 topic areas for the summit participants to vote on. The creation of a Chicago Food Policy Council was a top priority (see the Proceedings from Working Sessions in Open Space of the Illinois Food Security Summit held in 2001, available at www.michaelherman.com).

CFPAC has been in a process of development for over five years utilising consensus to establish a mission, organisational and operating structure and outreach to ensure inclusive membership representing a cross section of Chicago's residents. CFPAC was formed through community outreach and involvement. The organisational structure of the Council was determined to be a "hybrid" model, as it is neither government agency nor a stand-alone non-profit. There were concerns that if it was incorporated within the governmental structure accountability to the larger community would be lost. Concerns also arose that the administrative burdens of managing a non-profit would take up much of the Council's energies. CFPAC does work cooperatively with Chicago's municipal government and encourages the city's participation and support.

CFPAC is comprised of an Executive Committee and a general membership body involved with community food security in one way or another in the Chicago Region. Staff members of three not-for-profit organisations (Growing Power, Heifer International, and Sustain) were elected to serve on the Executive Committee to

support the council. These organisations were chosen because their missions overlap with CFPAC's mission and because they have committed a portion of their time to working with CFPAC.

CFPAC developed a white paper that details the budgetary commitments and responsibilities for the city of Chicago's agencies and departments in relationship to food as its first publication. The paper also includes a list of initial policy recommendations for the city. This report will be available on the CFPAC's website, www.chicagofoodpolicy.org, by early November 2006.

There were concerns that if it was incorporated within the governmental structure accountability to the larger community would be lost

The first annual Chicago Food Policy Summit, sponsored by CFPAC, was held in February 2006. Over 170 people participated in the event. During panel discussions, participants presented their concepts for improving community food security policies in Chicago. These concepts have been refined over several meetings and strategies for pursuing them are now being decided upon.

Government participation on the Council has been piecemeal up to this point. Most participation has been based on the personal interest of individuals and department heads. The Executive Committee has done outreach to the Commissioners of Planning, Environment, and Public Health as well as the Mayor's Director of Policy to find overlaps in interest and to encourage more active participation. All of Chicago's elected aldermen are now receiving notices of meetings and several staff representatives of the aldermen have attended meetings of the Council. It is hoped that within the coming year, more formal connections and relationships will be developed with government officials to help move the policy agenda forward.

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Growing Home and the Emergence of Urban Agriculture in Chicago

Growing Home, located in Chicago, Illinois, was founded in 1992 by the late Les Brown, then Director of Policy for the Chicago Coalition for the Homeless. The Growing Home programme is designed to provide entry into the job market via the experience of urban agriculture.



Harry Rhodes

Growing Home trainee at Green City Market

Although Growing Home (GH) was founded originally with a focus on urban agriculture, it immediately ran into difficulty establishing its urban presence. Les Brown was able to secure two parcels of land from the United States government; one urban site at Navy Pier and a rural site in LaSalle County about 75 miles southwest of Chicago. The plans for the urban agricultural site were delayed because of political and environmental issues, until another opportunity arose to partner with the Su Casa Catholic Worker House, which was started as a shelter for Central Americans seeking asylum in the USA due to civil unrest in their countries of origin. The arrangement with Su Casa provided an opportunity to develop an urban agricultural site of about $\frac{1}{4}$ acre (1,012 m²) that works in conjunction with the rural site. These two farms have served as the main sites for the job training programme and the social enterprise created by GH that creates new jobs in urban agriculture, and employs low-income Chicagoans in a transitional jobs programme.

Currently the social enterprise of GH obtains most of its produce from the rural farm. The rural farm will remain an important aspect of GH operations, although the organisation is currently also developing a one-acre urban site, and with plans to develop another one-acre site in spring 2008.

The GH's social enterprise includes sales of organic produce to consumers through a sustainable farmers' market, the Green City Market, and through the organisation's 80-member Community Supported Agriculture (CSA) programme. Additionally, GH has a few restaurant clients for whom the organisation also supplies organic produce. Chefs in Chicago are very interested in urban agriculture, and committed to using produce that has been produced locally. In spite of the success and evolution of GH during the past five years, the goal to establish a year-round urban agricultural operation has not yet been realized.

THE QUEST FOR POSITIVE REDEVELOPMENT IN ENGLEWOOD

In 2005 Growing Home was contacted by Teamwork Englewood (TE), an organisation in the Englewood community on the south side of Chicago, to assist in developing an urban agriculture district. The plans for creating an urban agricul-

tural district were compatible with GH's plans to expand its urban operations. The Englewood Quality of Life Plan (QLP), a document outlining the community's redevelopment goals, emerged through a series of community-based planning discussions and meetings during which the community identified urban agriculture as part of the QLP.

GH was brought into the process of creating the urban agricultural district with the Center for Urban Transformation (CUT) in an arrangement that now includes the Angelic Organics Learning Center and the Shed Studio architectural firm. The development of urban agriculture in Chicago has thus been dependent on the joint work of community organisations, together with municipal entities.

BUILDING COMMUNITIES THROUGH URBAN AGRICULTURE PROJECTS

The process of acquiring a site suitable for creating the initial urban farm as part of the urban agriculture district is proceeding nicely in partnership with a local elected official, several municipal agencies and the project partners. Although the process of acquiring the property was not complete at the time this article was written, GH was given permission to begin development of the site.

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So far three hoophouses have been constructed on the approximately one-acre site, and once a redevelopment agreement is secured and the ownership of the property is transferred to GH, a greenhouse, office and classroom building will be constructed. Additional processing, cooling and storage facilities will be constructed as well. A small market stand is being organised for the site that will begin operation during the summer of 2007. One unique feature of the market stand is that it will include farmers of African descent from the Pembroke community about 75 miles southeast of Chicago in Kankakee County. This is an example of an urban-rural partnership that GH has initiated.

The Pembroke community has been home to farmers of African descent for several decades. This unique arrangement is vital as the population of the Englewood community is 98 percent of African descent and culturally appropriate products are vital to the success of the market. GH is committed to growing and selling culturally appropriate products for local consumption as well as products for the farmers' market, CSA or restaurants.

In the immediate future GH has plans to open at least one other approximately one-acre site located close to the site under development. The site being considered is owned by the Chicago Public School (CPS) system and GH wants to use it to increase its capacity and operate a garden for students.

The Englewood community, like so many communities of predominately African descent, suffers from lack of food access and food security. Other projects related to the urban agricultural district and GH are also being planned. Plans currently under development by the Center for Urban Transformation (CUT) include the creation of several produce markets or small grocery stores, the creation of at least one large farmers' market and a public market.

Another proposed project will include the development of a subscription community kitchen for local entrepreneurs interested in starting or expanding businesses such as catering services. The kitchen will also include a bakery that will operate as a wholesale and retail bakery business. These enterprises will utilise green building strategies. The urban agriculture district will include both large-scale and small-scale commer-

cial projects creating a vibrant mix of entrepreneurial entities that will solve the problems of food access and food security in underserved communities.

Perhaps the most important aspect of the programmes being planned by GH and its partners is one that was unintended: GH and all of its partners in the development of the urban agriculture district are well positioned to provide technical assistance to communities wishing to replicate various aspects of the projects in the urban agriculture district. To this end, instruction manuals for the development of greenhouse and hoophouse operations will be compiled in conjunction with regional academic institutions and researchers. The development of urban agricultural economic theory and practice will help make urban agriculture a viable way to grow, distribute and sell a large percentage of local communities' daily food requirements for years to come. No one knows what the potential crop yields are, nor the number of jobs that can be created through the development of a sophisticated system of urban agriculture – particularly one that has room for diversity and fairness for sole proprietors, non-profit organisations, socially responsible corporations and financial institutions. It is known that urban agriculture creates jobs that pay a living wage, allowing people to raise families. The public health benefits of a widespread, large-scale urban agricultural system are widely anticipated by those of us involved in the development of the next generations of urban agriculture. This is important because of the loss of manufacturing and industrial jobs to other parts of the global community.

Lastly, the importance of reducing environmental problems related to the transportation of food over long distances cannot be over-emphasised, particularly when the issue of global warming must be confronted and solved.

SUMMARY

Although Growing Home started as a humble job training and social enterprise, it suddenly finds itself together with its partners in the position of becoming the catalyst for a revolution in agriculture through the creation of various programmes and projects related to the various aspects of urban agriculture (multiple functions) and related enterprises.

The potential for urban agriculture is huge and the opportunity to shape the next generations of urban agricultural systems cannot be lost. Organisations such as Growing Home, the Center for Urban Transformation, the Angelic Organic Learning Center and others, not only in the United States but elsewhere, must recognise this potential and evolve into entities critical to the development of new urban communities.

Chicago is at the forefront of the urban agriculture revolution. Non-profit organisations and individual urban farmers have together initiated a network to promote urban agriculture called Advocates for Urban Agriculture. This network works closely with the City of Chicago, and has received a pledge from Mayor Daley and city officials that they will support the efforts.

As demonstrated by communities such as Englewood on the south side of Chicago, urban agriculture is a practice that can create green space, new economic and community development opportunities and redevelopment options for inner city communities. This is particularly true in Chicago, a city that has an estimated 70,000 to 80,000 vacant lots, numerous flat top roofs and abandoned or under-utilised commercial buildings. Many of the vacant lots are in minority communities and they provide an opportunity for inclusive economic development integrated with urban agriculture. While it is intriguing to think of the new opportunities presented to organisations such as Growing Home, their original mission cannot be forgotten. Providing opportunities to create a new generation of job-ready people and new entrepreneurs must continue through the design of new and better training programmes for those who have been disenfranchised. Growing Home and its partners are the bridge into a new age of urban life and must always aim to assist people in reaching the highest level of their human potential.



René van Veenhuizen

Guided tour at the Growing Home Urban Farm

Urban Agriculture as a Social Justice Change Agent and Economic Engine

Growing Power is a national non-profit organisation and land trust that supports people from diverse backgrounds and the environments in which they live. Growing Power provides hands-on training, on-the-ground demonstration, outreach and technical assistance through the development of Community Food Systems that help people grow, process, market and distribute food in a sustainable manner.

Growing Power



Youth Corps at the Chicago Avenue Community Garden

Growing Power was established in 1998 as Farm-City Link, a farmer-operated greenhouse and small farmers' cooperative located in Milwaukee, Wisconsin, USA. It was formed to assist small farmers in their efforts to compete for business contracts with wholesale buyers. Soon the property's owner and farmer, Will Allen, began to field requests from the community to install gardens, often with youth involvement at the core of the programmes. Supported by Heifer International, Growing Power established the first youth project consisting of youth training in and production of aquaponics and vermicomposting.

PROFITABLE AND SUSTAINABLE

Vermicomposting is now at the core of Growing Power's vision and activities to make urban agriculture a viable option in cities. Compost is the key to viable farming. Nutrient-rich waste and organic material are sourced from local restaurants and food wholesalers and are broken down by worms to produce a sustainable fertiliser that outperforms synthetic fertilisers. Growing Power embraces reuse, recycling and reclamation in its economic and ecological model for intensive production.

Allen has combined his knowledge of farming and his understanding of the city as a series of interconnected food and ecological systems to develop an urban food production system. Part of Growing Power's philosophy is that there is always more than one right way to do things, and that a variety of solutions offers community members options. The multi-cultural nature of the organisation and its policy that everyone is welcome and valued lead to innovations and new approaches as additional perspectives and skills are shared.

"Growing Power inspires communities to build sustainable food systems that are equitable and ecologically sound, creating a just world, one food-secure community at a time".

Growing Power greenhouses are made of salvaged frames from local nurseries and farms that were unable to compete with large-scale industry. These greenhouses have several levels of plant growth: hanging baskets (for pea shoots, sunflower sprouts, rugula lettuce and Bull's Blood beets), pots partially submerged in water in aquaponic systems, and beds edging along the sides. In one of the greenhouses a swimming pool serves as a water reservoir and home for tilapia fish. They clean the water, which is drawn upward to the top of the structure to flow down through the growing levels.

The hoop greenhouses used by Growing Power are unheated and draped with shade cloth in the summer for cooling. Growing Power has developed so-called "Living Biological Worm Systems" to grow food in the winter months using the "hoop

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Growing Power

Grant Park Potager

within the hoop" method of hot beds covered with mini hoops to preserve heat that is generated from the composting process. Growing Power's Living Biological Worm System approach is an active learning tool to teach young people and adults the importance of closed loop systems and how to grow food in urban soil and depleted/contaminated spaces.

All of this leads to an important economic reality: this type of year-round production has a yield value of nearly \$200,000 per acre per year! This type of production is labour intensive, but that labour means jobs in urban environments.. It also translates into healthy, sustainable produce for local restaurants, which allows them to spend more money on healthy food and less on shipping produce from California or international sources. Nearly every aspect of the organisation's production, programmes, and products directly benefits the local community. Some of the most under-served populations in the United States are starting to produce their own food. In addition, facilitators across the nation and around the world are being trained to set up similar community food centres in their own communities (most recently in Skopje, Macedonia).

URBAN AND RURAL

The Growing Power Community Food Centre is the last remaining farm and greenhouse operation in the City of Milwaukee. It is currently owned by Growing Power Director, Will Allen, but

plans are being developed for the organisation to purchase the property from Allen in order to build a new premise where it can expand its training, youth development and food processing capacities.

The property in Milwaukee currently includes six greenhouses, three hoop houses, a small retail store, a utility building, a small barn that houses some of the livestock and the beekeeping operation, outdoor pens for livestock, and a large plot of land on which the first stage of the organisation's sophisticated composting operation is located. The centre offers opportunities to a wide array of city stakeholders to learn from and participate in the development and operation of Community Food Systems.

In addition to this urban centre, Growing Power has a rural farm site in Merton, Wisconsin. On this 17 hectare parcel of land Growing Power hosts the Immigrant Farming Project and the Food and Fitness Initiative with the Greater Milwaukee Boys and Girls Club. Two hectares of this rural farm are devoted to intensive vegetable production. The rural site compliments the urban facility. In addition to growing the vegetables sold at the market, it houses a herd of meat goats, raises pasture poultry, cultivates grasses for the variety of animals on site and produces large volumes of compost.

ACTIVITIES

Growing Power's projects fall essentially into three areas (consistent with its objectives):

Training: On-site workshops and hands-on demonstrations are given in Milwaukee and Chicago.

Technical assistance: Training and assistance in project development focus on the development of Community Food Centres and on transforming urban areas into gardens and urban farms. This includes national and international outreach to farmers and communities.

Food production and distribution: Food production takes place in the organisation's urban demonstration greenhouses and on the rural farm site. The distribution of produce and value-added products takes place through the Rainbow Farmers' Cooperative and the year-round food security programme: Farm-City Market Basket Program (including Community Supported Agriculture);

Growing Power undertakes community outreach through education programmes that show how the organisation is contributing to the availability of locally grown, fresh, safe and healthy food that exceeds certified organic standards. This food is supplied to Chicago's farmers' markets, Farm-City Market Basket (Growing Power's CSA-style food security programme) and partners in procurement contracts. All of these activities provide important opportunities for individuals and communities to network as they work together to promote food security and environmentally sound food production practices.

A number of factors are currently contributing to the need for training programmes for emerging producers: available land, growing consumer demands for food safety and environmental responsibility, and the increasing interest among the youth in growing food and new employment opportunities.

MILWAUKEE

Growing Power serves as a "living museum" or "idea factory" for the young, the elderly, farmers, producers, and other professionals. Over the last ten years, Growing Power has developed a number projects in Milwaukee.

- **Growing Power Youth Corps:** This is a year-round, youth leadership programme offering both academic and professional experience in Community Food System development and maintenance. Young people from primary school through college work at the Growing Power Community Food Centre during the summer and gain competencies in all active demonstration areas of the facilities.

- **"Urban Farm Girls" Program (launched fall 2005):** A diverse group of young women, ranging from 7th- to 11th-graders, from eight different schools attend weekly meetings and plan, grow, and market their own crops and value-added products.

- **Farm-City Market Basket Program (FCMB):** This is a weekly, year-round, food security programme that supplies safe, healthy, affordable vegetables and fruit to communities at a low cost. The programme effectively increases city residents' access to affordable food, while providing a viable market for small farmers and urban gardeners in which to sell the food they grow.

- **Rainbow Farmers' Cooperative:** Growing Power helped create the Rainbow Farmers' Cooperative, a network of small family farmers who grow and market food using sustainable techniques.

- **Growing Together: Community Food Systems "From the Ground Up":** This is a national, grassroots training programme of neighbourhood-based food and gardening projects.

A Community Food Centre provides wonderful spaces for hands-on activities, for large demonstration projects, and for growing a myriad of plants, vegetables, and herbs. A space no larger than a supermarket can hold some 20,000 plants, thousands of fish, and a livestock inventory of chickens, goats, ducks, rabbits, and bees.

Demonstration and training modules include:

- **Large-Scale Food Residue Processing.** Using aerobic and anaerobic digestion methods, food waste is diverted from landfills and made into organic compost, which is then used in local community garden and urban agriculture projects.

- **Vermicomposting and Composting:** These "living" systems are composed of carbon residue, customised microorganisms, minerals, and red wiggler worms. The resulting "material" is remarkably fertile, giving plants access to the nutrients needed for both plant growth and for human nutrition.

- **Aquaponics:** A closed-loop plant and fish growing system that can be utilised in small spaces, with minimal cost and maintenance. Growing Power does not use chemicals or artificial additives in this system.

- **Living Skills:** A training series on food production, processing, marketing and distribution, utilising year-round horticulture, agriculture, composting, vermiculture, and aquaculture techniques.

CHICAGO

In 2002, Growing Power opened a Chicago office to assist urban agriculture initiatives in the Chicago area. It currently operates three urban agriculture farming projects, delivers to eight Farm-to-City Market Basket drop sites, manages an active stall at the Green City Farmers' Market and delivers local produce to premier restaurants. In addition, Growing Power is involved in food policy issues via the Chicago Food Policy Advisory Council and provides guidance to thirty high school and four college interns and one apprentice. Their projects include the following:

The Grant Park Urban Agriculture Potager (Urban Farm) partnership with the Chicago Park District is proving that the social benefits of urban agriculture reach beyond local food miles and food security and encompass youth economic development and education. This edible garden of 1850 square meters in the midst of Grant Park has over 150 varieties of vegetables, herbs and flowers, and it is used as a hands-on educational site for 10-30 youth interns, sponsored by the City of Chicago's After School Matters programmes

El Conuco Farmers' Market in Chicago's largest Puerto Rican neighbourhood is in its first season. Growing Power is the primary vendor at the market and another youth project, God's Gang, also sells produce at this market. Customers are beginning to ask for produce that is more

specific to Puerto Rican cuisine, such as "Recao", a staple herb. It is a challenge to find new farmers who are willing to produce these vegetables and sell them at a small and developing market.

The Jackson Park Farm Site and Education Center was established in June 2007. Most of the site is dedicated to production for Growing Power and community farming. Supported by Growing Power's Chicago Youth Corps, community members learn gardening basics and apply the Living Biological Worm Systems. The Chicago Youth Corps is a year-round teen development programme. Teens work five days per week for 4.5 hours per day in the summer months to learn both farming skills and "soft" job skills, such as appropriate communication skills for the workplace, conflict resolution, and teamwork. This year during the spring and fall, these teens helped develop a food literacy campaign to inform other teens about local agriculture and healthy food options. They produced a button with the slogan "Turnip the Volume on Vegetables", and painted a mural at the office in Chicago.

GROWING FOOD AND JUSTICE FOR ALL

This Initiative, hosted by Growing Power, is an new comprehensive network that views dismantling racism as a core principal bringing together social change agents from diverse sectors that are working to bring about new, healthy and sustainable food systems and support and build multicultural leadership in impoverished communities throughout the world.

Coupled with our vision for social and food justice, Growing Power has a vision to share and help others grow food where we all live, thereby decreasing our reliance on petroleum-fuelled industrial farming while maintaining technically complex and flourishing biological production systems that are accessible to all people regardless of economic circumstances or environments. This is the future of agriculture: using natural processes to create highly productive, urban food sources, and introducing healthier alternatives for people and the environments in which the systems are implemented.

References

USDA. 2004. Household Food Security in the United States.

Youth Corps at the Chicago Avenue Community Garden



The Suburban Farm: An innovative model for civic agriculture

Innovative US developers are integrating farmland into their residential areas (subdivisions), providing space for food production and linking residents to their farmer-neighbours, with positive consequences for both. Suburban farms can be an important part of a sustainable regional food system.

Nevin Cohen



Farming is an integral part of Prairie Crossing

Growing concerns about the negative environmental and social impacts of the agro-industrial food system have led to the rise of an oppositional movement promoting alternative food systems, shortened food chains, or what is broadly defined as civic agriculture (Feagan, 2007; Lyson, 2000). Civic agriculture implies a commitment on the part of producers and consumers to developing and strengthening a sustainable system of agriculture and food production and distribution that relies on local resources and serves local markets. The institutions that make up a civic agriculture system are a part of the local economy, produce and sell food that matches the ecological and cultural needs of the community, are small-scale, not capital intensive, and rely on the knowledge of the individuals who live in a particular place (DeLind, 2002).

Civic agriculture includes flexibly organised farms and food producers, including urban farms. On the retail side, civic agriculture comprises various forms of direct marketing, such as farmers' markets, community supported agriculture (CSA), or cooperative production and distribution, all of which closely connect food producers and consumers.

CIVIC AGRICULTURE AND CIVIC SPACE

This civic engagement is critical and is related to the locality in which civic agriculture occurs. Specific spaces that bring producers and consumers together, like a weekly farmers' market, can help restore a sense of community to a city or town (Feenstra, 2002; Norberg-Hodge et al., 2002; Allen, 2004). Creating social spaces for civic interaction is an important part of fostering civic agriculture and the creation of successful food system alternatives (Feenstra, 2002). And, according to DeLind (2002), civic agriculture has the potential for "grounding people in common purpose" and for "nurturing a sense of belonging to a place and an organic sense of citizenship."

THE FARMING SUBDIVISION

The farming subdivision is an innovative response to the desire to foster civic agriculture. A small but growing number of residential developers are producing housing subdivisions designed from the start to include working farms (Munoz, 2007). These farmland subdivisions are geographically dispersed, and are built in both suburban and more rural locations. The type of farming practiced varies, too, from simple haying to diversified organic vegetable farming. In comparison to traditional subdivisions, they have numerous potential environmental benefits, including land conservation, land restoration (if organic growing methods are used), and production of food destined for local markets. They also provide social benefits as well. Residents in developments with common spaces report that the shared open space in these communities enables them to meet and connect with other people (Plas and Lewis, 1996).

By bringing homeowners and farmers together in a cohesive community, these types of developments also have the potential to reduce the physical and emotional distance that has grown between consumers and food producers.

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By carving out farmland and farm markets in the midst of homes, these communities offer spaces for individuals to interact with their neighbours and with the people growing and selling food, thus contributing to the development of a civic agriculture system.

FARMING VENTURES AT PRAIRIE CROSSING

Prairie Crossing is a 267 ha residential development with 359 single-family homes and 36 condominiums, located 60 km north of Chicago (but considered suburban, since many commuters live here). It is an excellent example of the farming subdivision. The project was built on farmland. Designed from the start as a conservation development, it features clustered homes and approximately two-thirds of the land is set aside for open space, ecologically-restored wetlands and prairie grasslands, two commuter rail stations that connect to Chicago, and (62 ha) organic farming activities (Prairie Crossing, 2007).

The area supports Sandhill Organics, which is a small, organic, family farm enterprise, on approximately 16 ha. Sandhill Organics relies on a CSA model to sell its produce, with CSA shares providing approximately 60% of its annual \$300,000 revenue, and farmers' market sales accounting for another one-third. In addition to leasing land to Sandhill Organics, the subdivision also supports a 1.2 ha educational farm on the site that works with 375 students from two local schools. An additional area of farmland has been set aside as a beginning farmer incubator programme, enabling individuals interested in becoming farmers to develop business skills and gain experience on relatively small parcels. The incubator programme is in its second year, with five beginning farmers who have been recruited through informal networks growing food on approximately 2 ha parcels a piece.

Farming in Prairie Crossing, as in many suburbanising communities, presents logistical challenges. One common concern, according to Sandhill Organics, is that the agricultural infrastructure does not exist in this community in the way it would in a more rural community. On the other hand, farming in a more densely populated community also has its advantages. Among the biggest advantage is

Sandhill Organics' proximity to its markets.

Residents interact with the farm in a variety of ways because the farm is a point of interest in the Prairie Crossing landscape. A walking trail on a rise separating the homes from the farm enables residents to look over the working landscape. The farmers' market has become an important meeting place for the community. Residents can interact more actively by helping with farm chores. A little over one-quarter of those residents surveyed reported that they had volunteered on the farm at least once (Watson, 2006).

The owners of Sandhill Organics go so far as to say that they have more in common with the people who live in Prairie Crossing than with the handful of nearby farmers they know. They think of themselves first as neighbours to the people who live in Prairie Crossing and second as the community's farmers.

CONCLUSIONS

As a farming subdivision, Prairie Crossing embodies many of the values of civic agriculture. Farming is an integral part of Prairie Crossing, with homeowners and farmers interacting as neighbours, friends, and food producers and consumers. Residents have a close physical connection to the farmland through trails and roads that border and cross the farm, and have a connection to the process of farming. The farm itself is embedded in the identity of the community, serving as an important common space. In addition, Sandhill Organics is clearly part of the economy of the development itself. By growing food organically, the farmers are meeting the conservation goals of the community as well as satisfying the tastes of Sandhill's customers.

An important feature of civic agriculture is that it is a system of food production "characterised by networks of producers who are bound together by place (Lyson, 2004)". As one of a growing number of organic produce farms in Northern Illinois, Sandhill Organics is an integral part of the region's diverse, civic network of family farmers.

If Prairie Crossing does nothing more than to increase the connection of residents to their food system and demonstrate the

feasibility of integrating organic farmland into the growing number of suburban and exurban residential communities being developed across the nation, it is likely to move us a small, incremental step towards food system reform. By participating in and supporting alternative agricultural models, such as communities built around small farms, both consumers and farmers help to create an opening for more significant restructuring and transformation.

Prairie Crossing is a unique project, the challenge for planners and developers is to design truly affordable versions of the farming subdivision that accommodate a diverse population and fit into a wider variety of residential communities, including older suburbs and urban neighbourhoods undergoing redevelopment.

Diffusing the farming subdivision innovation throughout the residential development industry would require the education of planners and developers about the financial feasibility, marketing advantages, and public benefits of these types of developments. The US Green Building Council's Leadership in Energy and Environmental Design programme for Neighbourhood Development (LEED-ND) has taken a step in that direction by awarding a credit for projects designed with permanent farms and gardens, helping to legitimise and promote the idea of farming subdivisions. Other organisations, from cooperative extension offices to non-profit land trusts, can educate developers about the value of integrating farmland into their projects, and the methods by which they can do so.

Spreading the concept of a farming subdivision is important, but public policies are also necessary to make it easy, and cost-effective, for a developer to build farmland into a residential project. At the federal level, federal farm subsidies should be shifted to smaller-scale fruit and vegetable growers. State and local governments should set stricter limits on the development of prime farmland surrounding cities, update zoning ordinances so that they encourage conservation developments, and provide financial assistance to developers who preserve, restore and enhance the value of the farmland on their properties.

References

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Alliances Between Farmers and Other Actors in Dakar

Urban farmers produce crops within and around cities (Mougeot, 2000). They do not form a separate group from the urban population, nor do they live self-sufficiently. They maintain diverse relations with other actors in the city. Some of these relations go beyond the sale of agricultural or non-agricultural produce and become strategies and alliances among socio-economic and political actors.

The city of Dakar with its surrounding rural area belongs to the department of Rufisque and is the smallest region of Senegal. It covers only 550 km², or 0.3 % of the national territory, but has a population of 2.4 million inhabitants, or 24% of the national population (DPS, 2002). The population growth rate in the city is 4% per year, far higher than the national rate of 2.9%. Population density reaches about 10,500 inhabitants/km² in the district of Pikine and the commune of Dakar (ISRA, 1997). The growing population necessitates greater innovation in livelihoods and an increase of food supplies.

The city is supplied by production in the outlying rural areas, but despite its relatively easy access by road and rail, local production on agricultural areas within the city's boundaries, mainly the Niayes area, is also quite important¹. Alliances between farmers and other actors in the agricultural areas of Dakar, and the influence of policy-makers will be discussed below.

THE STUDY

This article reports on the results of a study conducted by the author in 2005 and 2006 on six categories of actors in agriculture in Dakar. A group of 180 farmers were interviewed in 2005, and 98 of them were re-visited in 2006. In addition 60 consumers, 30 vendors, 13 elected officials at local level (mayors of Pikine Nord and Ouakam) and regional level, 8 extension officers and 6 planners were interviewed. The group of producers was composed of 34 market vegetable gardeners, 36 fruit growers, 30 flower growers, 31 micro-gardeners (mainly

subsistence), 1 rice producer, 38 various breeders and 10 fishers.

ANALYSIS FRAMEWORK

The general organisation of the provision of supplies to the cities can be analysed in terms of sectors, within which actors provide the necessary functions in the chain. These elementary functions (see figure), are organised around three moments of price negotiations:

- in and around farms between producers and collectors;
- at wholesale markets when goods brought by collectors are purchased by distributors;
- at retail markets when consumers buy the commodities.



Economic functions of the agricultural produce marketing sector

In a normal situation, i.e. the negotiation of prices in the market, the economic position of an actor influences his capacity to determine the price. Production and consumption are normally separated, and actors in the wholesale market (collectors and distributors) dominate the transactions. However, other organisational forms are emerging, which will be illustrated for Dakar. New forms of negotiation get close to the concept of equitable trade, in which the economic weakness of a partner does not necessarily place him in a position of being dominated.

DIVERSIFICATION OF JOBS AND PROFESSIONS

Specialisation

The proximity of the urban market offers urban producers the opportunity to



UPROVAN Farmers in Pikine



Small vegetable plots in Pikine

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Downstream integration

Commonly known as Bana-bana in Senegal, stockists are often specialised in the retail sale of non-agricultural produce. Thus, producers can order and receive supplies of products at their workplace, mainly agricultural inputs such as fertilisers. In the Great Niaye of Pikine, this role is often played by women. One of these women has become a market gardener while pursuing her primary commercial activity. She has rented a plot of land and hired a farmer (Sourgueu) to cultivate it.

Although individual, these strategies help strengthen the capacities of producers and their organisations, saving time that can be devoted to production. These exchanges are beneficial to the community.

BUILDING LINKAGES

Producer to the consumer: collective action in Pikine Nord

In Pikine Nord, a district adjoining the Great Niaye of Pikine, a Consultation Platform (Espace de Concertation –ECO) has been set up to take action in several domains such as economic development, culture, sanitation, etc. Created in 2002 and officially recognised in February 2003, the ECO federates about 50 structures such as sports and cultural associations, grassroots community associations, women's support groups, and economic interest groups. Some of the latter have been set up by farmers operating in the Niaye. The ECO has put in place a retail stand, a sort of mini-market, to facilitate the purchase and sale of agricultural produce, but also to offer farmers in the area a marketing outlet for their products. The store for consumers located in town is important as it bypasses the long wholesale market chain and supports the local producers. This organisation thus helps strengthen producers' capacities.

Self-consumption first: micro-garden collectives

This type of market gardening consists of the production of all sorts of vegetables in containers. These containers can be filled with solid substrate such as groundnut husk or rice bale (used alone or mixed together), laterite or water. Both solid and liquid substrates receive micro and macro elements to boost the plants' growth. The only natural condition required for a productive micro-garden is at least six hours of sunshine per day.

Since its introduction, this technique has rapidly developed thanks to the multi-actor strategy involved. In fact, from 50 in 1999, the number of families that have adopted the technique skyrocketed to 1,440 in 2002 (Department of Horticulture, 2002). These producers contribute to their own food supply and, through local or market sales, to that of their neighbours and other city dwellers. This success can be attributed to the fact that the promoters first targeted the economic interest groups, which are often comprised of women. For example, in a sample of 31 micro-gardeners, 16 belong to an economic interest group. Some of these women had been trained already by agents of the Departmental Services for Rural Development (DSRD), first on the production process itself and later on the management of inputs (to bring them closer to users). In turn, these women have become trainers of other members and relay goods for their families, particularly their children.

INSTITUTIONAL ALLIANCES AND FORMS OF SUPPORT

Funding of market gardening campaigns

Contracts for pre-funding have been developed in the district of Rufisque, where farming fields may be up to 20 ha in size and are generally wider than in the three other districts in the Dakar region²⁾. This mechanism gives the market gardener the necessary funds for his production. For example, a big trader operating in the market of Thiaroye, the vegetable market of Dakar, advances money to a market gardener in the area of Conduite de Gaz on the condition that the latter guarantees him priority for the purchase of his production. This advance is not attributed at random. It is based on trust, but also the quality and quantity of the expected production. If the funds advanced by the trader happen to be higher than the value of the harvest, the market gardener reimburses the balance; otherwise the trader pays the deficit (see also Moustier et al., 2001). In some of these contracts, the land owner advances the funds necessary for the purchase of inputs and agricultural equipment, and even provides part of the tenant farmer's meals. In this case, after the sale of harvested products, the owner first retrieves his funds before the profits are shared. This mode of pre-funding entails a risk of domination and dependency.

Another form of pre-funding is based on solidarity among actors. This system is more equal and applied more often by small urban producers, such as through the Network of Savings and Credit Banks (RECEC)³⁾. This network was created with the support of Enda-Graf Sahel⁴⁾ and facilitates "access to credit from the mobilisation of popular savings through solidarity". It enables the poor to finance activities of urban agricultural production (market gardening, fruit arboriculture), the breeding of small ruminants and poultry (free-range chicken) and the marketing of products. In 2001, some 5,671 credits were allotted. These credits reached 588 million CFA francs, 98% of which was granted to physical persons, while the other 2% went to grassroots organisations. Women account for 83% of the credit beneficiaries, and men 15%.

In many districts of Dakar town councils promote micro gardening

The credits are allotted on a short-term basis and essentially enable the beneficiaries to cover their farm's working capital (purchase of agricultural inputs, remunerations, etc.). The investment funding (acquisition of equipment) is exceptional: 20 % of the credits are deposited as guarantee savings. This solution is therefore a form of alliance that is more equitable than the first one.

INVOLVEMENT OF LOCAL COMMUNITIES

In many districts of Dakar, such as those of Pikine Nord, Ouakam or Patte D'Oie, town councils promote micro-gardening. The support materialises through the provision of locations for the micro-gardens. The town council of Rufisque devoted 12 million CFA francs in 2005 to the development of micro-gardens.

As part of the Master Plan for the Development and Protection of the Niayes and Green Areas of Dakar (PDAS) and the Programme of Actions for the Protection and Urban Development of the Niayes (PASDUNE), all the local stakeholders were involved in consultations aimed at defining plans for the development of six sites, and subsequent

Continued on page 29



tenure is an important element in instigating initiatives to form farmers' organisations and increase political involvement as a means to protect land rights in the face of competing land uses, land scarcity (urbanisation) and evictions. Security of tenure is not a prerequisite for the creation of farmers' organisations, yet it is central in providing informal and formal access to land for their members, particularly rural-to-urban migrants. Paradoxically, formal urban farmers' organisations can have informal tenure arrangements. It has also been observed that farmers' level of organisation and political involvement

decreases as one moves from intra-urban private lands towards customary peripheral lands; while land security, on the other hand, increases from private lands towards customary peripheral lands.

There are also socio-economic differences amongst the studied farmers' groups depending on their spatial location. For instance, intra-urban farmers are older, more established in the business and in better economic form than farmers in the peripheries. Suburban farmers experience a constant influx of rural-to-urban migrants, who start practicing

urban agriculture and reinterpret rural customary practices in an urban context. Periurban farmers generally have lower levels of literacy and are related to each other by kinship. These factors, in addition to the land constraints discussed above, may be important determinants of the organisational capacity and development of farmers' organisations.

Group/Location	Land Regime	Main Means of Access
Yiriwaton (Downtown)	Statutory	Only renting
Dyen Te Don (Suburban)	Statutory/ Customary	Mostly borrowing, squatting, inheriting, buying, occasionally renting
Benkadi (Periurban)	Customary	Mostly owning, some borrowing

Table: Farmers' organisations' means to access land

References

- Groupe Recherche/Actions Pour le Développement. 2001. Potentialités et conflits dans les zones péri-urbaines: le cas de Bamako au Mali. Rural-Urban Interactions and Livelihood Strategies Series. Working Paper 5. London: IIED. <http://www.iied.org/docs/urban/rururb_wp05.pdf>.
- Vélez-Guerra, A. 2004. Multiple Means of Access to Land for Urban Agriculture: A Case Study of Farmers' Groups in Bamako, Mali. CFP Report 40. Ottawa IDRC. <http://www.idrc.ca/upe/ev-71105-201-1-DO_TOPIC.html>
- Zallé, D., F. Meite, and A. Konate. 2003. The Land Issue and Urban Agriculture in Bamako. Urban Agriculture Magazine. No.11. p. 13-14.



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activities were undertaken at three sites, while the other sites were involved in city level activities. Two of the objectives of this process were to promote collective reflection on the historic, environmental, economic and social aspects of the sites and establish an alliance for the protection and sustainable development of the *Niayes*.⁵⁾

CONCLUSION

Whatever the angle or viewpoint, the main purpose of any linkage among farmers, whether informal or institutionalised, is to ensure agricultural production provides sufficient supplies to urban populations. Thus, the restyling of the sector and the development of producer/consumer linkages is ongoing in urban agriculture in Dakar. Despite the development of a large gap between production and consumption in the past, the presented examples show alliances that maintain or restore social linkages, thereby strengthening local solidarity and enabling these actors to counter the adverse effects of market relations.

NOTES

- 1) A *Niaye* is an inter-dune depression where the underground water is not deep.
- 2) The Dakar region has four districts: Dakar, Pikine, Guédiawaye and Rufisque.
- 3) Of the total of 21,750 members and users, there are 1,087 basic organisations. The others are individuals

(80 percent women and 15 percent men).

4) Environnement Développement Afrique-Groupe de Recherche-Action-Formation, ONG.

5) Programme of Support for the Development and Concerted and Sustainable Management of the *Niayes* (PACN). Assessment and Prospects.

References

- Direction de l'Horticulture (Department of Horticulture). 2002. Rapport micro-jardins 2002, 28 pages (Report on micro-gardens).
- ENDA-GRAF Sahel. Le financement de l'agriculture familiale dans le contexte de libéralisation: quelle contribution de la microfinance? Seminar in Dakar, 21-24 January 2002, 21 pages.
- Institut Sénégalais de Recherches Agricoles (ISRA = Senegalese Institute of Agricultural Research) Strategic Plan of the *Niayes* area. In French. Doc. ISRA, October 1997, 75 pages.
- Fall S. T., Fall A. S. Citées horticoles en sursis? L'agriculture urbaine dans les grandes *Niayes* du Sénégal, CRDI, Ottawa, 2001, 138 pages.
- Mougeot L.J.A., 2000. Urban agriculture: definition, presence, potential and risks. In: Bakker N. et al., Growing cities, growing food: urban agriculture on the policy agenda, a reader on urban agriculture. Feldafing, Germany.
- Moustier P., Moumbélé M. and Huat J. La gestion

concertée et durable des filières maraîchères urbaines. In: Smith Olanrewaju B., Moustier P., Mougeot L. J.A. and Fall A.. Agriculture urbaine en Afrique de l'Ouest et du Centre: enjeux, concepts et méthodes en recherche-développement, CRDI, Ottawa, 2001, 144 pages. (p. 69)

Ndione D. Thèse de géographie sur les *Niayes* de Dakar, UCAD, Dakar, 1986.

République du Sénégal National Agriculture Census 1998-1999, p. 20

République du Sénégal. Ministère de l'Agriculture et de l'Elevage, DAPS, RNA 1998-99. Volume 5. Répertoire des zones et sites de production horticole périurbaine d'après le pré-recensement horticole 1999-2000. 126 pp.

République du Sénégal. Direction de la Prévision et de la Statistique. Division des Enquêtes démographiques et sociales, January 2001. Website: http://www.primature.sn/senegal/population_chiffres.html

Micro-gardens in Dakar

Micro-gardening is an innovative response by farmers to urban constraints, but also to urban demands with respect to the quality of products. The urban context in that sense is conducive to technological innovation because of the numerous developments and interactions which take place.



A meeting of the UPROVAN Farmer Association in Dakar

The city plays a prominent role in technological development (Lefebvre, 1968): “For a very long time, the Earth has been the great laboratory, (...) it was just recently that this role was taken over by the city”. Specific circumstances in Dakar have stimulated the development of micro-gardening, such as the annual arrival of many new inhabitants (about 100,000 according to IUCN, 2002), the subsequent search for new livelihood opportunities, the problematic access to farming land (Mbaye and Moustier, 1999; Fall and Fall, 2001), and several efforts of NGOs and researchers promoting urban agriculture.

A micro-garden is a soil-less farming system, which involves the cultivation of plants on either solid substrate or in water (hydroponic). This technology has been tested by FAO in Latin America and the Caribbean (see for instance articles by Abensur Riós and César Marulanda in UA-Magazine no. 10, 2003). Since

1999, the Department of Horticulture in Senegal has been coordinating a project called the Micro-gardens’ Programme. This department has played a crucial role in innovation, firstly by taking the decision to entrust researchers with the project, which was to be developed together with the farmers. Another innovation was to have the researchers and farmers experiment with a number of solid substrates such as groundnut shell, rice husk and laterite. These ideas originated from the researchers but were tested by ten beneficiary families.

A micro-garden consists of a container and a planting substrate on which the crops grow. In the Micro-gardens’ Programme the plants are most often first raised in nurseries by the farmers themselves using a solution of nutrients. The stock solution is made by chemical industries and bought at the market. Initially the programme provided the solution free of charge to the farmers, but after special training the farmers started to make their own (Programme Report, 2004).

The innovative character of the technology is in the application of a modern production technology – hydroponics – in small areas, such as a courtyard, terrace, roof, the city council compound or school grounds. This is done, for example, in the backyard of the municipality building (*commune*

d’arrondissement) of Ouakam and in the *Centre de Sauvegarde* of Pikine-Guédiawaye. The major determinants are the availability of land and the willingness of the municipal authorities to support the implementation of micro-gardening. Micro-gardens are generally managed by women’s economic interest groups (EIGs).

HUMAN RESOURCES IN AGRICULTURAL RESEARCH

Before the project could be launched, the organisation of the Department of Horticulture’s research management and agricultural administration (under the Ministry of Agriculture) needed to be adapted. First, agricultural technicians of the Horticultural Development Centre (CDH), particularly those working in the agricultural supervision services like the Departmental Rural Development Service (SDDR), needed to be familiarised with this new technology. This department was responsible for the training of the beneficiaries. The programme particularly worked with farmers who were members of economic interest groups (EIG). An EIG is an association of people who join forces to create a small enterprise oriented at processing and marketing local products. Each EIG has 12 members and the beneficiaries’ training sessions were decentralised and held at district level. According to the Department of Horticulture, “a five-day training workshop addressed to the regional technicians of the project

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was organised in December 2002. At national level, some 1440 people from the country's ten regional capitals, the departments of Dakar, Kaffrine and Linguere, benefited from the training". The trainees were selected according to their degree of poverty and willingness to participate in (micro) gardening (in line with the objectives of the Micro-gardening Programme).

Most of the trainees were women (more women than men are members of EIGs), and since women's access to land is very limited, their role in urban agriculture is strengthened by providing them with a micro-garden. It is also mostly women who are involved in hydroponics. A survey conducted by the author in 2005 found that, 36 of the 180 Dakar-based farmers (market gardeners, orchardists, flower growers, micro-gardeners, animal breeders, fishermen and rice farmers) were women. Twenty-five of these women were engaged in micro-gardening.

The programme is ongoing and new farmers are being trained and supported in Dakar as well as in the regions. Individuals or agents from private institutions wishing to undergo training pay only the cost of materials. The agricultural technicians who conduct the training are paid by the project. Another survey conducted in 2006 among 98 of the farmers in Dakar showed that participants found the duration of the training rather short.

The success of the micro-gardening activity is due primarily to the micro-gardeners' higher production. According to the Programme, a micro-garden can provide 6 cropping cycles each year and obtain an average yield of 30 kg of vegetables/m²/year. The 2006 survey also showed that most participating families consume between 5 and 9 kg of vegetables per month, which is more than what non-participating families consume (on average between 1-4 kg). Surplus production is sold to neighbours and friends, or others interested in organic produce, and provides additional income.

No marketing training is currently provided, but the programme is looking into ways of including this in the regular training. In addition, in order to better

manage this marketing effort, micro-gardeners would like to have a specific place to sell their products. This would provide them with the opportunity to explain the quality of micro-garden vegetables and their benefits to consumers' health. Already a few restaurant owners have started using micro-garden lettuce: who verify their origin.

Micro-gardens can be located in various places, 75% of micro-gardens in Dakar and Pikine are located on terraces (roof gardens). In other parts of the country, they are placed on the ground in courtyards or outside the home.

USING URBAN WASTE

Many micro-gardens are made out of recycled materials, both the containers as well as the substrate. Containers can be made of wooden boards from boxes found at the port of Dakar, plastic bowls, buckets, tyres cut longitudinally and polystyrene boxes formerly used to package fish.



Micro gardens on rooftop in Dakar

The solid substrate or water (for the hydroponic production of leafy vegetables) filling of the containers is often made up of waste. Solid substrates are made from agricultural waste: groundnut shells (60%) and rice husks (40%), both of which can be replaced by laterite gravel (a material that is used less and less). The shells and husks need to be cleaned and stored for at least twenty-four hours to facilitate fermentation. The different researchers and the project team experimented with these materials with a view to improving access to the technique: by using the most abundant substrate in each regional context, the price for farmers could be minimised. In Dakar, these inputs are offered in an increasing number of places, to ensure their proximity to the beneficiaries and thus reduce transportation costs. These materials have to be bought by the farmers.

Macro and micro-stock nutrients have to be kept in a cool place. In addition, micronutrients need to be stored in a dark place. Their dosage depends on the substrate (liquid or solid), the type of plant and its growth stage. The two examples in the box were given by the micro-gardening project for liquid, hydroponic substrates. The water is often tap water used for irrigation. However, well water is also used and the possibility of using rainwater is also being considered.

CONCLUSION

In Dakar, researchers and farmers collaborated in the development of micro-gardens. Research contributed to the understanding of plant nutrients and the use of solid substrates to replace the soil. In addition, participative training was provided to the farmers, in farmers' schools. This innovation is a technical response to the constraints and advantages found in the city. In Dakar, the port and food processing industries can be considered as advantages for the supply of substrates and wood used in the fabrication of micro-gardening tables. The soil-less fresh vegetable production system has been adopted by some inhabitants (50 percent of the surveyed producers mentioned that they commenced their agricultural activity in 2000). However, the poorest beneficiaries need help in order to strengthen their self-reliance.

References

- Abensur Rios, J., 2003. Hydroponics Technology in Urban Lima, Perú. In: Urban Agriculture Magazine no. 10, Micro Technologies for Urban Agriculture. 2003. RUAF.
- Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS). 2002. Institut du Sahel. Programme majeur population / développement (CERPOD). Ministère de l'Economie et des Finances. Direction de la Prévision et de la Statistique (DPS). Rapport de recherche. Profil démographique et socio-économique du Sénégal 1960-2000. 174 p.
- Fall S.T., Fall A.S. 2001. Cités horticoles en sursis ? L'agriculture urbaine dans les grandes Niayes au Sénégal. CRDI, Ottawa.
- Lefebvre H., 1968. Le droit à la ville I. Editions anthropos, Paris, 165 p.
- Marulanda Tabares, C.H. 2003. Hydroponics in Latin America. In: UA-Magazine no. 10, Micro Technologies for Urban Agriculture. RUAF.
- Mbaye A, Moustier P. L'agriculture urbaine dakaroise. 1999. 26 p.
- Prain G. 2001. Farmer Field Schools, an ideal method for urban agriculture? In UA-Magazine, No. 5. RUAF.
- République du Sénégal. Ministère de l'Agriculture, de l'Elevage et de l'Hydraulique. Direction de l'Horticulture. FAO. PSSA. Projet Micro-Jardins, (2004). Programme Microjardins 2002 : rapport technique et financier. Mai 2004. Pp. 7 et 8. 29 p.

Closing the Phosphorus Loop in Hanoi, Vietnam

13

Agnès Montangero

In Hanoi, Vietnam, water bodies are polluted by high levels of nutrients, which are discharged in wastewater. At the same time, farmers in and around the city use artificial fertilisers. A nutrient accounting tool indicates where to set priorities to enhance nutrient recovery, and in this way reduce water pollution and the mining of limited phosphorus reserves. The analysis in this article focuses on phosphorus.

Phosphate rock - the main source of phosphorus used in fertilisers - is a finite resource, and global production of high-quality phosphate rock is estimated to peak by 2033 (Cordell et al., 2009), after which demand for fertilisers will exceed supply (also see the box in the editorial).

Material flow analysis

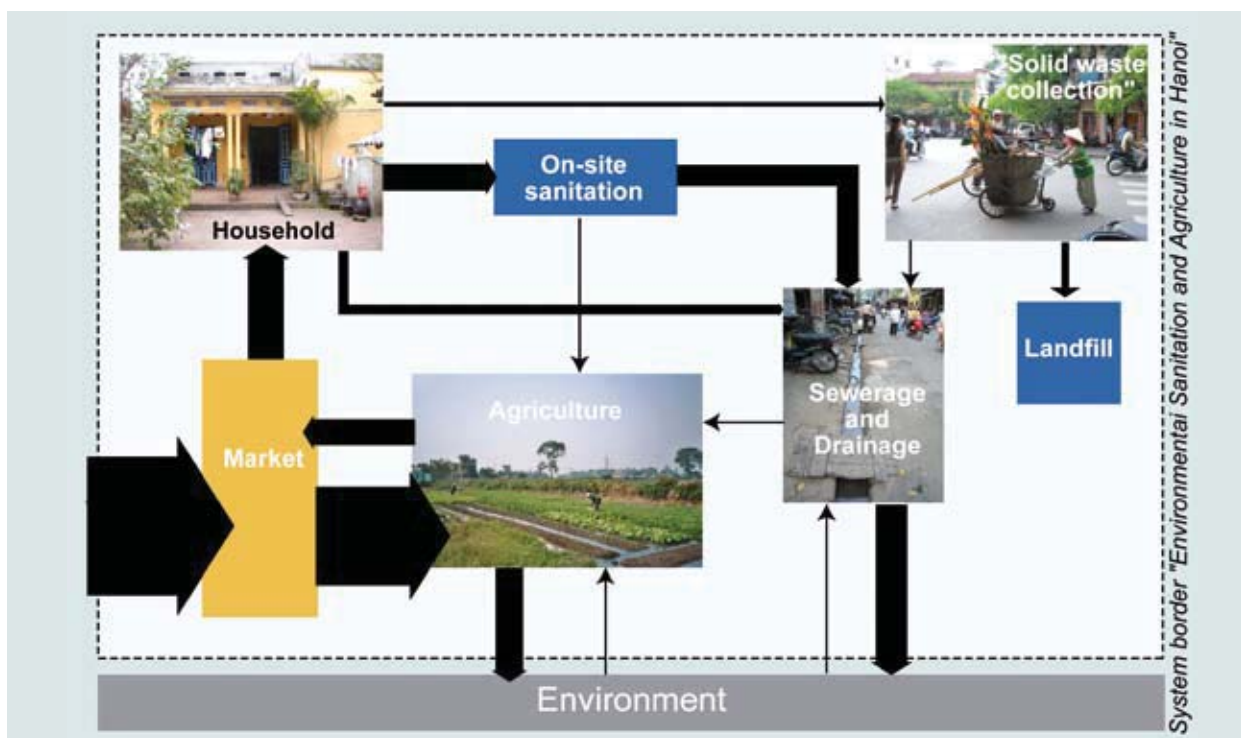
EAWAG/SANDEC and its partners in Vietnam have developed a tool to estimate and visualise water and nutrient flows in a region. The tool links urban organic waste/wastewater management and urban agriculture. Concretely, it consists of a computer model made up of a series of Excel-based



Wastewater irrigation in periurban Hanoi
Photo: Montangero

nutrient accounting sheets. The user enters various parameters, such as the number of inhabitants, type of sanitation system, area under cultivation and livestock population. The model subsequently estimates, for instance, phosphorus inputs into surface waters and phosphorus recovery for agricultural use. The model is designed to support local actors in analysing the impact of different measures on fertiliser need and nutrient discharge in the environment.

The tool is based on material flow analysis (MFA). This method studies the fluxes of resources used and transformed as they flow in a specified region. In industrialised countries, MFA proved to be a suitable instrument for the early recognition



Simplified representation of the environmental sanitation and urban agriculture system of Hanoi Province

of environmental problems and development of counter-measures (Baccini and Brunner, 1991). It can also be applied in rapidly developing cities in the South to evaluate the impact of changes in consumption patterns, solid waste and wastewater treatment infrastructure, periurban agricultural production, and waste and wastewater reuse practices on resource consumption and environmental pollution.

Phosphorus supply and demand in Hanoi

In Hanoi, like in many other cities in developing countries, high population growth, industrialisation and economic development have led to increased resource consumption and environmental degradation. Periurban agriculture is of key importance in the supply of food and provision of income, especially to the poorest section of the population. However, rapid urbanisation also creates pressure on the land. Farmers tend to use more fertilisers in an attempt to enhance yield and maximise benefit from their decreasing land area. A better balance between nutrient supply in urban waste products and nutrient demand in periurban food production could be the key to reducing resource consumption and environmental pollution (Montangero *et al.*, 2007).

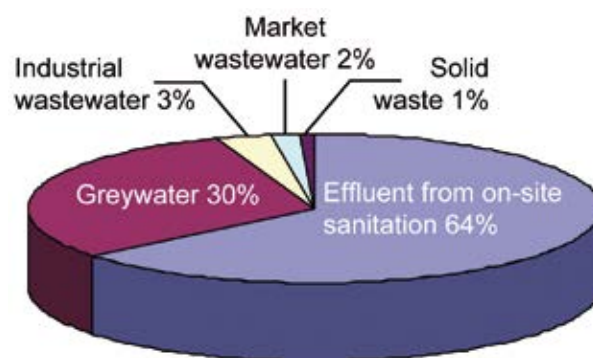
The MFA tool was applied to demonstrate the effects of selected extreme scenarios on phosphorus inputs into the river and on phosphorus recovery for agricultural use. For this purpose, the effects of various parameters, such as the type of sanitation system, area under cultivation and livestock population were simulated.

The impact of urine diversion toilets

To illustrate the model, this article looks at the impact that the type of sanitation system has on phosphorus recovery (more information and different scenarios can be found in Montangero *et al.*, 2007 and Montangero and Belevi, 2008).

In Hanoi, most buildings are connected to septic tanks, which collect wastewater from toilets. Most of the phosphorus contained in toilet wastewater leaves the septic tank in the pre-treated effluent (septic tanks do not retain phosphorus efficiently). Effluent from septic tanks and greywater (laundry, kitchen and bath wastewater) reach surface waters via roadside drainage channels. Together, they account for 94 per cent of the total phosphorus load in Hanoi's water bodies. Only a small proportion of this phosphorus load is recovered for use in food production.

Urine diversion toilets offer crucial advantages over septic tanks with regard to phosphorus recovery, since these toilets have two compartments, keeping urine and faeces separate. Urine leaves the toilet through a pipe / tube. Faeces are stored directly beneath the toilet. After defecation, dry soil, ash or sawdust is spread over the faeces, controlling odour and absorbing moisture. There are generally two chambers for faeces used alternatively. When one of the chambers is full, the other is used and the faeces/ash mixture is stored in the first compartment for about a year. During this period, pathogenic microorganisms die off, substantially reducing the health risks associated with reuse of the mixture as a fertiliser in agriculture. The urine, meanwhile, possibly



Relative contributions of various sources to the total phosphorus load in Hanoi's surface waters

diluted, can be used for irrigation. This system makes it possible to retain all the nutrients contained in human excreta – apart from a small amount of nitrogen volatilising during urine storage. These nutrients could subsequently take the place of some of the artificial fertilisers used in agriculture. It is interesting to note that this kind of system was formerly widespread in North Vietnam.

The extent to which phosphorus recovery could potentially be increased was quantified. Assuming, for example, that all septic tanks in Hanoi were replaced by urine diversion toilets, the amount of artificial phosphorus fertiliser required could be reduced from 2800 to 1200 tonnes per year – a 57 per cent decrease! This is one step towards closing the phosphorus loop.

Need for an integrated planning approach

To further develop scenarios such as that involving urine diversion for Hanoi (or other cities), more information is needed on users' perceptions of new sanitary facilities, the costs and whether these are acceptable to users, longer term market analysis, etc. MFA could be used as a tool in integrated planning that involves all stakeholders.

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References

- Baccini P, Brunner PH, 1991. *Metabolism of the Anthroposphere*. Springer, New York.
- Cordell D, Schmid-Neset T, White S, Drangert JO, 2009. Preferred future phosphorus scenarios: A framework for meeting long-term phosphorus needs for global food demand. In: *International Conference on Nutrient Recovery from Wastewater Streams*. Edited By K. Ashley, D. Mavinic, F. Koch. IWA Publishing, London, UK.
- Esrey S, Gough J, Rapaport D, Sawyer R, Simpson-Hébert M, Vargas J, Winblad U (ed), 1998. *Ecological Sanitation*. Swedish International Development Cooperation Agency, Stockholm, 1998.
- Montangero A, Belevi H, 2008. An approach to optimise nutrient management in environmental sanitation systems despite limited data. *Journal of Environmental Management* 88:1538–1551.
- Montangero A, Cau LN, Viet Anh N, Tuan VD, Nga PT, Belevi H, 2007. Optimising water and phosphorus management in the environmental sanitation system of Hanoi, Vietnam. *Science of the Total Environment* 384:55–66.

Assessing Patterns of Nitrogen Management in Periurban Agriculture of Hanoi, Vietnam

15

Dionys Forster, Harald Menzi, Roland Schertenleib, Bernd Lennartz

To identify the potential for organic waste reuse for agricultural production in and around a city, in so-called “spatially explicit scenarios of re-use”, it is necessary to analyse existing patterns of nutrient management. These management patterns are mainly influenced by the type of crops cultivated, the distance between the field and the farmer’s homestead and the perceived soil fertility.

Urban food demand will strongly increase in the coming decades, especially in Africa and Asia. Cities constitute a sort of “nutrient sink” (Belevi, 2000; Drechsel et al. on page 8 of this issue), since some components of the imported agricultural products end up in waterways or on landfills. Better use of organic residues in urban and periurban agriculture could help overcome the waste problem and save limited resources while contributing to sustained food security (Drechsel and Kunze, 2001; Schertenleib et al., 2004).

Knowledge of existing and potential patterns in crop and nutrient management, is a pre-requisite for any waste reuse scenario. Therefore, the nutrient use in urban and periurban agricultural systems needs to be analysed, in order to avoid surplus application of fertiliser. This article highlights experiences from a study undertaken in Hanoi and published earlier as “Exploring spatially explicit crop rotation models for periurban agricultural production systems” (Forster et al., 2009a) and “Linking nutrient flows to spatially explicit crop rotations” (Forster et al., 2009b).



Interviewing farmers on their farming system
Photo: D. Forster

Bac Hong, Hanoi

The commune Bac Hong, in north Hanoi, was selected because of its diverse periurban production system. The commune covers 7.2 km² of flat land, of which 5.1 km² is allocated to mixed farming, including crop and livestock production. Staple crops such as paddy rice (*Oryza s. L.*), sweet potato (*Ipomoea batatas L.*) and cash crops like maize (*Zea mays L.*) are the main crops for the warm and humid tropical first and second seasons (mid-February to mid-June and mid-June to mid-October), while maize and other cash crops such as vegetables are grown on a reduced area of land during the cooler third season (October to February).

The study

Thirty-four farmers were selected from all parts of the commune. The selected farms had 5 to 7 fields each that ranged from small (79 m²) to large (862 m²). Semi-structured interviews and a differential GPS system were used for data collection. Similar to NUTMON (see page 11), the crop, soil conditions (e.g. farmer’s perceived soil fertility) and the management practice of each field was discussed and recorded on a farm map during field visits in two consecutive years (2005/2006). Three different yearly crop rotations were evaluated: 1) *staple crop based*, with two staple crop seasons and one fallow season; 2) *cash crop accentuated*, with two staple crop and one cash crop season; and 3) *cash crop based*, with three cash crop seasons.

Factors that possibly influenced the choice of crop rotations were: distance from the homestead to the field, field size, perceived soil fertility, water availability, topography and livestock. The importance of these factors was analysed to explain why a specific rotation was used. Since the environment and land use strongly influence the combination of crops in rotation, rather fixed patterns in requirements of production sources could be expected. Thus, in a second step, nutrient flows associated with crop rotations were analysed. Organic, inorganic and total (inorganic + organic) nitrogen fertiliser inputs were used as indicators for nutrient flows. The nutrient inputs were farmyard manure, compost or inorganic sources such as chemical fertilisers.

Crop allocation

The distance from the homestead to the field proved to be an important influencing factor. Farmers whose fields were located farther from their homesteads were more likely to choose crop rotations based on staple food crops, while the closer the field was to the homestead, the more likely a crop rotation with cash crops such as vegetables would be used.

In addition to distance, perceived soil fertility played a role: the likelihood of finding cash crops in rotation was higher on plots with perceived high soil fertility. With increasing distance and decreasing perceived soil fertility, the number of cash crops in rotation decreased while the number of staple crops increased.

Nutrient management

Total, inorganic and organic nitrogen fertiliser inputs (260, 210, 50 kg ha⁻¹, respectively) were significantly lower for the staple crop based rotation. Furthermore, mean total nitrogen fertiliser input was found to be significantly higher for cash crop based rotation (540 kg ha⁻¹) than for the cash crop accentuated rotation (480 kg ha⁻¹). In addition, variation of organic fertiliser inputs was considerably high among all rotations. In general, the average nitrogen input contributed by organic

fertiliser was far higher for the cash crop accentuated (110 kg ha⁻¹) and cash crop based (120 kg ha⁻¹) rotations than for the staple crop based (50 kg ha⁻¹) rotation. The latter can be partially explained by the fact that the cash crops usually respond well to the application of organic manures. Longer distance and limited availability of organic manures further pronounced the pattern. As a first priority, farmers applied manure on close fields with a high proportion of cash

crops. Only if manure was left over it was then applied on more distant fields dominated by staple crop based rotations. Likewise, when farmers were asked to allocate organic and inorganic fertiliser on different fields of an exemplary farm, the majority of organic fertiliser was applied on fields close to the homestead. Farmers argued that organic fertiliser should be used on all fields, but in practice, they often would try to economise fertiliser management. Though farmers knew that crops benefit from organic matter application, they primarily applied the bulky manure on cash crops, close to their homesteads. Conversely, inorganic fertiliser could easily be transported by bicycle to staple crop rotations on remote fields.

In the periurban commune of Bac Hong, Hanoi, organic manure is still highly appreciated by farmers. In general, total nitrogen fertiliser supplies are sufficient to meet the crops' nutrient requirement. Since organic fertilisers cover only a small fraction of the crops' total nitrogen requirement (20 – 30 per cent), reuse of organic waste still has an important development potential. Surplus application of organic fertilisers has not been observed; however, surplus application of inorganic fertilisers may, in some cases, give cause for concern. Additional organic waste reuse in the commune could contribute to reducing application of mineral fertilisers. Possible obstacles include costs associated with transport of the waste, its quality (e.g. pathogens, heavy metals, etc.), and the lack of incentive among farmers to use the rather bulky organic waste instead of easily manageable mineral fertilisers.



Data collection in Bac Hong
Photo: D. Forster

Conclusion

Crop rotations can be spatially explicit: the crop rotation may change depending on where the field is located and how soil fertility is perceived. As different crops have different nutrient requirements, fertiliser input is likely to change as well, depending on the crop rotation. However, crop rotations are temporal and allow the summing up of nutrient inputs over the entire rotation (e.g. spanning one year). Variations in nutrient supply, which are often difficult to explain at larger scales, can thus be consolidated and presented in one figure. For instance, when different crops were grouped into rotations, the coefficient of variation of total nitrogen input was almost 10 per cent less than for single crops. Therefore, if the commune or village area can be mapped according to crop rotations, it is possible to estimate nitrogen inputs for the classified area. In addition, the area with high or low organic fertiliser use can be identified. Besides nitrogen inputs, data on crop outputs could also be assessed and used for nutrient balance estimates. Furthermore, instead of only assessing nitrogen, phosphorous or potassium could also be included to provide a more comprehensive picture of nutrient flows for the respective commune or village.

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References

- Belevi, H., 2000. Material flow analysis: a planning tool for organic waste management in Kumasi, Ghana. 03.04.14 2003 <http://www.gtz.de/ecosan/download/belevi.pdf>
- Drechsel, P. and Kunze, D. (Editors), 2001. Waste Composting for Urban and Peri-urban Agriculture: Closing the Rural-Urban Nutrient Cycle in sub-Saharan Africa. CABI, IWMI, FAO, Wallingford, Colombo, Rome, 229 pp.
- Forster, D., Amini, M., Menzi, H. and Lennartz, B., 2009a. Exploring spatially explicit crop rotation models for peri-urban agricultural production systems. submitted to Agricultural Systems.
- Forster, D., Amini, M., Menzi, H. and Lennartz, B., 2009b. Linking nutrient flows to spatially explicit crop rotations. submitted to Agriculture, Ecosystems and Environment.
- Schertenleib, R., Forster, D. and Belevi, H., 2004. An integrated approach to environmental sanitation and urban agriculture. Acta Hort. (ISHS). 643, 223–226.

Cash crops are cultivated closer to the homesteads

Photo: D. Forster

The Role of Farmer Organisations in Marketing Periurban 'Safe Vegetables' in Vietnam

Paule Moustier
Nguyen Thi Tan Loc

In Vietnam, urban agriculture still represents a substantial share of food supply and employment. Its contribution to the food needs of the entire population of Hanoi was estimated at 44 per cent in 2002 (Mai et al., 2004). In the same year, over 70 per cent of leafy vegetables originated within a 30 km production radius of the city (Moustier et al., 2004). Cu Chi district, a suburb of Ho Chi Minh City, is the major provider of leafy vegetables to this city (Cadilhon, 2005). About 30 per cent of the population around Hanoi Province and in the periurban districts of Ho Chi Minh City is engaged in agriculture (Hanoi Department of Agriculture and Rural Development, 2009; Dang, 2008).

Yet, the more than 100,000 vegetable farmers in Hanoi face a number of constraints to sustaining their activities. Surprisingly, despite the short distance to urban markets, marketing is the first constraint expressed in a survey of farmers. Analysis of price data shows strong price fluctuations. For example, the maximum prices of tomato and cabbage are ten times the minimum prices in the period 1996-2001 (Moustier et al., 2004). Another issue is consumer distrust of vegetable safety. A recent survey, conducted in 2005 among 800 consumers in Hanoi and Haiphong (the third largest city of Vietnam) shows that 75 per cent of consumers are extremely concerned with food safety in general (Luu et al., 2005). Food safety is deemed of primary importance in vegetables, fruit and meat, together with the freshness of these products. In Hanoi, sample analyses show that farmers commonly use banned pesticides and apply more nitrates and pesticides than are authorised (Vietnam Ministry of Agriculture, 2009). Lowering the use of chemical inputs is not easy because pests and diseases thrive in the humid conditions. Besides, cheap pesticides from China are easily available.

Concerns for food safety among consumers actually represent market opportunities for farmers, if they are able to respond to them. They may also help farmers to protect their land from urban development. The city authorities are

prepared to keep some land for agriculture provided it is 'ecological and innovative'. Otherwise, it is likely that the process of conversion of agricultural land will continue. As in other cities of the world, urban development proceeds rapidly at the expense of agricultural areas. For instance, in Hoai Duc district, farm land decreased from 8355 hectares to 4373 hectares between 2000 and 2008, as roads and buildings encroached. Donadieu and Fleury (1997) argue that, if it is to be sustained in the city, agriculture needs to develop in alliance with urban concerns.

Success factors

Some farmers have proven able to meet this challenge; they have realised new market opportunities and increased the profitability of their businesses. Three factors are strategic in these success-stories: technical training through public programmes, the capacity to join farmer organisations that are focused on quality development, and the integration of some stages of marketing. These are further explained below.



Internal control in a safe vegetable cooperative in Hoai Duc district, Hanoi

Photo: Nguyen Quy Binh

In 1995, public interest in the safety of vegetable products led the Vietnamese Ministry of Agriculture and Rural Development to implement an ambitious programme called 'safe vegetables'. Based on integrated pest management (IPM) principles, this programme educated farmers in moderate use of fertilisers and pesticides as well as in the use of water from wells and non-polluted rivers. The programme also helped to market 'safe vegetables' through various communication strategies. These included the organisation of annual safe vegetable fairs and support to farmers and traders who wanted to open 'safe vegetable' shops or market stalls. The Danish NGO ADDA also organised training programmes for farmer groups on IPM vegetable production in Hanoi Province.

In Ho Chi Minh City, the programme was implemented by the Department of Agriculture of the city in 1997. The first targeted area of this programme was Ap Dinh hamlet in Cu Chi district where households that had belonged to a cooperative in the early 1980s were now farming individually. In 1997, five of them formed an association so that they could join the training programme. From 1997 to 2000, membership expanded from five members to forty. After the city's vegetable fair in September 2000, the Ap Dinh Association received numerous orders from vegetable companies, city caterers and shops. To meet the increase in demand, the association has gradually expanded its membership, which now numbers 200 households divided into 4 smaller groups in four villages. They produce a wide range of leafy and fruit vegetables (Phan and Loan, 2006).

In 2008, twenty-seven Hanoi cooperatives held a certificate of safe vegetable production issued by the Plant Protection Department. But not all are successful when it comes to marketing their products. In fact, 'safe' vegetables are commonly mixed with ordinary vegetables. This is partly because the cooperatives only produce a limited range of vegetables, so traders who buy from safe vegetable cooperatives also buy from neighbouring conventional cooperatives. Moreover, there is no control of the use of the safe vegetable label by public or private organisations. Yet nine (of the 27) cooperatives have developed an efficient marketing strategy. Among these nine cooperatives, six are regular suppliers of supermarkets, and six (including three selling to supermarkets) have market stalls or shops where they sell directly to consumers. Approximately 500 farmers are involved in these cooperatives.

All of the nine cooperatives regularly supply directly to canteens. Unlike the traditional market supply chain – which is characterised by a chain of collectors, wholesalers and retailers – the distribution of 'safe' vegetables generally involves one or no intermediaries. This is a deliberate strategy of the farmers themselves, so that they see their quality efforts rewarded. The farmers' strategy of integration of marketing stages (i.e. removing intermediaries) is an effective way of reducing food safety uncertainties and of commanding higher prices. The farmer-consumer or farmer-retailer relationship is an opportunity to exchange knowledge on production methods. This fulfils the purchasers'

needs for reassurance, as producers are perceived as the most competent persons to give this information. At the same time, direct farmer-consumer exchanges enable farmers to better appreciate consumers' demands.

Organisation is important

Traditionally, cooperatives in Vietnam concentrate on service provision, especially irrigation. The nine safe vegetable cooperatives in the Moustier et al. study are characterised by their collective action for quality promotion and marketing (2010). This active role is the result of government support for quality improvement (especially training on IPM), which has deliberately targeted farmer groups as a strategy for overcoming the problems of Vietnamese agriculture, in particular those faced by small-scale farmers. It is also the result of the initiative taken by certain dynamic farmers, who have taken advantage of this support and the emerging demand for specific food qualities.

The first advantage of collective action for farmers is the centralisation of marketing operations. This brings economies of scale in terms of quantities collected, contacts and negotiations with purchasers, investment in a common operator with adequate skills and time for marketing tasks, and participation in flexible contracts with supermarkets, shops and schools. The second advantage of belonging to a farmer organisation is that it enables the farmer members to have access to training on quality improvement. A third advantage concerns joint investments by members of farmer organisations in the areas of quality development, labelling and certification. These investments are necessary to satisfy the quality requirements of supermarkets.

Safe can be profitable

A study carried out in 2002 provides data on the profitability of periurban safe vegetable production compared with that of conventional production. A survey was done on costs and benefits for 30 conventional farmers and 32 safe vegetable farmers in Hanoi Province. The results obtained for cabbage and choy sum indicate that safe vegetables have higher costs

Retail shop of a safe vegetable cooperative in Gia Lam district, Hanoi
Photo: Paule Moustier



of production, mainly due to higher labour costs. Yields are lower because of greater prevalence of disease, but higher resale prices generate higher profits (see Table 1).

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Table 1 Comparison of costs and profits of conventional (Van Duc commune, Gia Lam district) and safe vegetable production (Van Noi commune, Dong Anh district) in Hanoi Province

	Unit	Cabbage		Difference safe/conv.	Choy sum		Difference safe/conv.
		Conv.	Safe		Conv.	Safe	
Total costs:	Vnd/ kg	850	1090	28,2%	464	639	37,7%
Input costs	Vnd/kg	552	599	8,5%	204	261	27,9%
- Seeds	Vnd/kg	170	229	34,7%	40	74	85,0%
- Fertilisers	Vnd/kg	187	250	33,7%	54	72	33,3%
- Insecticides	Vnd/kg	153	87	-43,1%	94	95	1,1%
- Other	Vnd/kg	42	33	-21,4%	16	20	25,0%
Total input costs	Vnd/kg	552	599	8,5%	204	261	27,9%
Labour costs*	Vnd/kg	298	491	64,8%	260	378	45,4%
Total costs:	Vnd/kg	850	1090	28,2%	464	639	37,7%
Sale price	Vnd/kg	900	1200	33,3%	1025	1500	46,3%
Profit/kg	Vnd / kg	50	110	120,0%	561	861	53,5%
Yield	Ton/ ha.	32	28	-12,5%	21	19	-9,5%
Revenue/10m ²	Vnd	28800	33600	16,7%	21525	28500	32,4%
Profit/10m ²	Vnd	1600	3080	92,5%	11781	16359	38,9%

*Family labour cost is converted into its equivalent as salaried labour cost; note – 1usd = 15,000 vnd at time of survey.

Source: (Son et al., 2003)

Yet the profitability of the safe vegetable business is fragile. The reputation of the farmer groups is vulnerable because of the lack of an external, rigorous control and certification system. The limited range of vegetables that each group sells intensifies the problem. As a result, they buy vegetables outside the group but sell under their own label, without any control (and thereby undermining the validity of their own label). Lastly, the protection of agricultural areas (even ecological ones) from urban development is still uncertain.

Nevertheless, there is still some room for manoeuvre for producers of safe vegetables to increase profitability and sustainability. First, using more organic inputs instead of chemical inputs could reduce the costs of production. Safe vegetable farmers still purchase expensive organic pesticides and fertilisers instead of using natural green manure and pesticides (see UA Magazine no. 23). Second, getting farmers to be more organised, for example in farmer groups, and forming an alliance of safe vegetable farmers, will aid communication with local authorities and private land developers to ensure that land is kept for agricultural uses. Forming an alliance will also help overcome the problem of the lack of variety of vegetables sold, because it will encourage safe vegetable groups to network and to make joint deliveries to buyers. The building of such an alliance has started under the Superchain project but still needs to be consolidated (Moustier et al., 2009).

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References

- Cadilhon, J.J., 2005. Business-to-business relationships in the vegetable marketing system of Ho Chi Minh City (Vietnam). University of London, Wye Campus, London.
- Dang, N.A., 2008. The mega-urban transformations of Ho Chi Minh City in the era of doi moi renovation. Colloque international : Les tendances de l'urbanisation et de la périurbanisation en Asie du Sud-Est. IRD, Ho Chi Minh Ville.
- Donadieu, P., Fleury, A., 1997. L'agriculture, une nature pour la ville. In: Annales de la recherche urbaine, 74, pp. 31-39.
- Luu, H.M., Nguyen, T.M.H., Nguyen, T.T.M., Pham, H.T., Tran, H.N., Ngo, N.H., 2005. The demand for organic agricultural products in Hanoi and Haiphong, VNFU/ADDA organic agriculture Project, (Ed.), Hanoi.
- Mai, T.P.A., Ali, M., Hoang, L.A., To, T.T.H., 2004. Urban and peri-urban agriculture in Hanoi: opportunities and constraints for safe and sustainable food production, AVRDC Technical Bulletin nr 32.
- Moustier, P., Dao, T.A., Sacklokham, S., 2009. Linking small-scale farmers to supermarkets and other quality chains. Final Superchain report. CIRAD, CASRAD, Hanoi, <http://www.malica-asia.org>.
- Moustier, P., Phan, T.G.T., Dao, T.A., Vu, T.B., Nguyen, T.T.L., 2010. The role of Farmer Organisations Supplying Supermarkets with Quality Food in Vietnam. In: Food Policy, 35, pp. 69-78.
- Moustier, P., Vagneron, I., Bui, T., 2004. Organisation et efficience des marchés de légumes approvisionnant Hanoi (Vietnam). In: Agricultures, Cahiers d'études et de recherches francophones, 3, pp. 142-148.
- Phan, T.G.T., Loan, L.T., 2006. The participation of the poor in vegetable chains to Ho Chi Minh City, in: Moustier, P., Dao, T.A., Hoang, B.A., Vu, T.B., Figuié, M., Phan, T.G.T. (Eds.), Supermarkets and the poor in Vietnam. The Gioi, Hanoi, pp. 292-324.
- Son, H.T., Nguyen, H.A., Moustier, P., 2003. Coûts et résultats économiques de certains cahiers des charges de production des légumes CIRAD, internal document, Montpellier.
- Vietnam Ministry of Agriculture, M.O.H., Cida, 2009. Report on Supplementary Food Safety Survey Results. CIDA, Hanoi.

The Development of a Women Producers' Cooperative in Istanbul

Istanbul is an old, but rapidly modernising city. Large-scale migration from throughout Turkey into Istanbul and the integration of Turkey into the regional and global marketplace have been changing metropolitan patterns of household livelihood, food security and environmental conditions since the 1950s.

As immigration pushes Istanbul's population beyond 15 million (12 million officially), it is becoming progressively more difficult for people to find work, receive health and education services, and meet their household food needs. The expanding area of metropolitan Istanbul now exceeds 1,500 km² and threatens the watersheds upon which the city relies for its fresh water. According to recent surveys, Istanbul may have close to a million unemployed. Many people, amongst them most of those who recently migrated to the city, work at or below the official minimum wage (of USD 250/month), which is insufficient to satisfy minimum food needs for a family of four (which is USD 350/month). With annual rural to urban migration of over 300,000 per year, the social and environmental pressures are mounting and already exceed the formal sector's ability to absorb and manage the growth.

City officials are exploring ways to cope with urbanisation and increasing poverty and seek to integrate economic, social, spatial and ecological programmes with land use planning and national and regional policies. In the presentation of its Master Plan, the city of Istanbul showed interest in multi-functional urban agriculture as a productive use of open spaces and green belts around the city. Partnerships are being developed in identifying meaningful and workable ways to meet the city's goals and commitments while targeting poverty alleviation and the integration into sustainable urban development planning and policy making.

Pilot Project in Gürpınar

Under the title "Contribution to Improve Employment Opportunities and Provide

Food Security of Groups Under Risk Through Urban Agriculture", a project in Gürpınar, Istanbul, started in 2005. The project, which was executed by the urban agriculture group of UYD (see box below), targeted local poor women for education, empowerment and employment. The project was financed by the EU (Ankara) through the governmental institution (ISKUR).

The NGO Toplumsal Kalkınma Gönüllüleri Derneği (TKGD) aims to show urban authorities that agricultural production has social, economic and environmental dimensions, relating to such urban issues as food security, poverty, health, unemployment, micro-enterprise development, waste recycling, leisure and recreation, and the building of communities. Until 2005, TKGD was part of Ulaşılabilir Yaşam Derneği (UYD). At UYD, the TKGD team was responsible for the project in Gürpınar and was supported by ETC-UA.

The aim of the project was to develop and use a model oriented towards employment and food safety of vulnerable groups in urban regions, using urban agriculture. The project decided to work with unemployed migrant women from low-income households who showed interest in agriculture. Twenty-five participants were selected from a large group of interested women. Most of them reside in the municipalities of Esenyurt, Kiraç and Gürpınar in Istanbul (on the European side of Istanbul). These women cannot make full use of the employment possibilities in the city, because they lack education, skills, and the time needed for cultural adaptation. Agriculture was their main occupation in the rural areas. Practising agriculture in the city gives them the opportunity to use previously attained experience and skills, while learning about and adapting to the city. In addition, their self-esteem improves, their social network expands and their



Women clearing the lands in Gürpınar



Preparing for the first crops

employment chances increase.

Capacity building

The group of 25 women was trained by a team of trainers from UYD and several universities in a wide variety of subjects, from cultivation of different vegetables, composting and food processing, to marketing, management and organisation. The women received USD 10 per day of training. Twelve of them worked permanently in the gardens and earned about USD 250/month on the shared profits from vegetable sales. In this way they enhanced their household food supply by as much as 30%. For some of these families, the total amount of money earned represented Turkey's average income per family. In addition, all 25 women satisfied their summer vegetable needs with the produce from the gardens, which off-set their family food budget by another estimated 25%.

In the project, which lasted one year (2005-2006), two cropping cycles were

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realised. The focus in the first period was on the production of a wide variety of crops and on various practices. Most of the yield was used by the women and their families, but some of the produce (especially tomatoes and parsley) was sold at the local bazaars. The second period focused more specifically on processing, sales and marketing of selected crops (again tomatoes and parsley), and the formation of a cooperative. Additional training in “small entrepreneurship” was organised with support from Ankara University (Faculty of Agriculture). In this training, the roles of the women in the agriculture cooperative, financing, and the development of an efficient and transparent institution were dealt with. Basic management information such as cost analysis, income and expenditures analysis and profit calculations were also provided to the trainees.

Now in its second year, the Gürpınar project is self-sustaining and currently employs six women from the original group (three full-time and three on a part-time basis). The full-time workers earn between USD 300-375 per month plus additional compensation for transportation and meals. The part-time labourers receive about USD 15 per day. The cooperative was never established due to limited income for the full group, but the farm is operated by the small team of three women and supported by a TKGD volunteer who also works full-time in the garden. Produce is also sold two times a week at the local market in Gürpınar. The project managed to change the lives of the participating women and provided a good example to the neighbourhood, but it also showed the municipality of Gürpınar and other institutions in Istanbul an alternative way of using available open spaces.

Municipal support

The municipality of Gürpınar made the land available and provided access to water for the project, but it also supported the project in other ways as needed (such as by providing meeting facilities). The project was attractive to the municipality, because in addition to facilitating the temporary use of open spaces in the newly developed areas and providing an employment opportunity, the project included the re-use of organic waste collected from urban areas. The compost not only represented a source of nutrients

for the organic farm, but also assisted in raising awareness among visitors. The community building aspect of the project was especially valued. The creation of opportunities for cooperation between citizens with a low income level and unemployed citizens, and the development of alliances with the local authorities were seen as tremendously important. The pilot project maintained regular contact with the municipality and other actors and used the media as much as possible to show that urban agriculture contributes to employment and food safety. This proved to be a very important asset. In addition, the project organised several visits to the farm and a seminar in Istanbul in August 2005 to publicise its experiences. In addition to a number of municipalities in Istanbul and elsewhere in Turkey, the neighbouring municipality of Büyükçekmece showed interest and requested TKGD to develop a similar initiative.

Practising agriculture in the city improves their self-esteem

Büyükçekmece

Based on the experiences obtained in Gürpınar, and supported by a small contribution by UNDP, TKGD started a similar project in mid-2006, in cooperation with the municipal government in Büyükçekmece. In this new project, this time on a 60-hectare plot, 50 women were selected by TKGD for the urban agriculture poverty alleviation projects, based on information and suggestions from neighbourhood leaders. Again they received a number of training sessions on agricultural and project management. The women indicated that they would like to be part of the initiative on a part-time basis. Several winter vegetables were planted in late summer 2006 for training purposes, but in early 2007 the decision was made to focus on the organic production of herbs for the Istanbul market.

The significance of this project goes further than the one in Gürpınar, as the plot is in the green belt surrounding the Buyuk Cekmece Lake – which provides Istanbul with 17% of its drinking water and is being threatened by encroaching development. Regular agricultural production (using high amounts of inputs) and construction is not allowed in this area. Beyond setting an impor-

tant example for urban agricultural techniques, contributions and household/community welfare, the project includes extensive planning and negotiation with local and greater municipal government officials on the further development of the multiple functions of urban (organic) agriculture. These scenarios show a need for multi-stakeholder planning, with active participation of the various stakeholders, in joint visioning, development of criteria, decisions on and implementation of activities, and assessment of outcomes and impacts.

The challenge is to establish a viable urban farm with income from the sale of (organic) agricultural produce. But both TKGD and the municipality see the potential for this farm to further develop educational, recreational and capacity-building facilities and activities, like waste recycling and water saving (techniques). Alternatively, bike and walking paths, for example, can be made part of urban agricultural green corridors to provide alternative transportation systems and exercise opportunities to city residents. What is currently needed is commitment of the parties involved, the development of a proper business plan and support in designing an urban farm that is adapted to the urban situation (with its specific environmental, social, economic, and aesthetic factors).

Both experiences in Gürpınar and Büyükçekmece demonstrate that open spaces in the city can be turned into productive areas that may have a wide range of public benefits, like leisure, recreation and education, and even serve as community gathering spaces in the event of emergencies like earthquakes. By creating the context in which urban agriculture is allowed to thrive, the benefits multiply.

During one of the trainings



Yılmaz Korkmaz

Integration of Urban Agriculture in Municipal Agendas: Experiences from Lima, Peru

In Peru urbanisation is intense, especially in metropolitan Lima. Massive migration resulted in urbanisation of poverty, which in the case of Lima is concentrated in the expanding outer zones of the city. In this context of an impoverished urban-rural interface, urban agriculture is a promising alternative that can make an important contribution to the fulfilment of the Millennium Development Goals for fighting poverty and ensuring food security. This article describes experiences in two districts ⁽¹⁾ of metropolitan Lima: Villa Maria del Triunfo and Lurigancho-Chosica.



IPES

Policy making and action planning

In 1999, the municipality of Villa Maria del Triunfo became involved with the issue of urban agriculture and identified the need to develop a municipal policy to promote urban agriculture as a strategic activity. The process was supported by regional and international organisations that promote urban agriculture, such as the Cities Feeding People Program of the International Development Research Centre (IDRC/CFP Canada), the Urban Management Program (UMP-LAC) of UNDP and UN-HABITAT, IPES – Promotion of Sustainable Development and the Resource Centres on Urban Agriculture and Food Security (RUAF Foundation). Since 2003, the Urban Harvest programme located in the International Potato Center in Lima (a CGIAR⁽²⁾)

This article is a combination of two articles that were submitted on Lima:

- 1) "Villa Maria del Triunfo: Developing an Urban Agriculture Municipal Policy", by Gunther Merzthal and Noemi Soto (of IPES/RUAF Foundation), and Raquel Barriga, and Paula Ruiz (of the Municipality of Villa Maria del Triunfo)
- 2) "Toward the Integration of Urban Agriculture in Municipal Agendas: an experience in the district of Lurigancho-Chosica", by Blanca Arce and Gordon Prain (of the Urban Harvest Program - International Potato Center) and Miguel Salvo (of Urban Harvest Program and the Universidad Politecnica de Madrid)

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initiative) has been implementing a project in the municipality of Lurigancho-Chosica and the municipality of Santa Maria de Huachipa with the objective of promoting urban agriculture as a positive, productive and essential component of sustainable cities and its integration into municipal urban management. The purpose of the programme model is to raise awareness, facilitate support, build capacity and offer tools to municipal governments to implement urban agriculture programmes and policies.

VILLA MARIA DEL TRIUNFO

The district of Villa Maria del Triunfo is located 17 km south of Lima (Peru) and has a current population of 367,845 (52 percent women). The urban area occupies a third of the municipal territory, while the rest consists of steep hills. As high as 57.3 percent of the population lives in poverty (FONCODES 2000), while 22 percent suffers extreme poverty. The malnutrition rate is nearly 15 percent and at least 23 percent of children under eight suffer from chronic malnutrition. 77 percent of the economically active population of the city engages in formal and informal commerce, 18 percent in service activities, and only 5 percent in productive activities, such as industry and manufacturing (VMT *et al.* 2005). Villa Maria del Triunfo has a tradition of community organisation and high level of

participation of both men and women in public policy making, based on mutual aid, solidarity and community work. In this context, the municipality created a strategy in order to improve food security of the poorest citizens, by complementing and diversifying the quantity and quality of food consumption and facilitating the generation of supplementary family income.

In 1999, the Mayor of Villa Maria del Triunfo ⁽³⁾ and some council members initiated a learning process about the contributions of urban agriculture to the fight against poverty and other problems caused by urbanisation, and to reflect on its potential and risks. They shared lessons learned and participated in regional events and forums for reflection/discussion with various Latin American cities that had already been implementing municipal urban agriculture programmes and projects ⁽⁴⁾.

URBAN AGRICULTURE IN CITY DEVELOPMENT

The increased knowledge about the impacts of urban agriculture on urban management and the exposure to experiences of other local governments in Latin America encouraged the authorities of Villa Maria to incorporate urban agriculture into the strategic component called "Healthy District" of the city's Integrated Development Plan for 2001-2010.

The municipality, faithful to its tradition of community organisation, promoted a consensus-based process for the elaboration of this plan with the active participation of organisations, leaders, and representatives of all of civil society. As a result, the Municipal Urban Agriculture Promotion and Environmental Protection Program (PAU) was created in July 2000 under the Human Development Department of the municipality, in order to facilitate the incorporation of the issue into the agenda of the municipal administration.

This process mobilised a broader group of stakeholders around urban agriculture

In 2004, during a process of internal restructuring, the municipal council and the mayor of Villa Maria del Triunfo decided to give greater emphasis to the promotion of urban agriculture and converted the PAU into a separate unit (Sub-Gerencia, third level administrative unit) of the Local Economic Development Department (see figure 1). In that year, the municipality allocated about US\$ 35,000 of its budget as co-financing funds for various UA activities (provision of inputs, agricultural production, processing and commercialisation). This amount does not include the human and logistical resources of the UA unit, which are valued at about US\$ 20,000. This contribution represents 2 percent of the municipal budget. In addition, the municipality, in alliance with local organisations, has been channelling resources from local cooperation institutions for the development of urban agriculture projects. The urban agriculture unit has three lines of work:

Capacity building. This includes activities for promotion, training and orientation of urban producers, documentation of activities, systematisation and elaboration of baseline studies and research projects, and liaison and exchanges with other local, national and international parties.

Productive development. Includes activities tied to technical assistance, implementation of demonstration projects, identification and granting of vacant land, and commercialisation support.

Enhancing the institutional environment.

This component deals with the local, national and international alliances which encourage the promotion of urban agriculture-friendly policies and legislation, as well as the activities and financial management involved in priority projects. Also included are the activities of consensus-building and participation in district development plans and the platforms derived from them.

The target constituency of the urban agriculture unit is the urban producers from the most vulnerable sectors of the population, including women heads of households, teenage mothers, working children and the disabled. Unfortunately, this initial process was based solely on political support and lacked quantitative and qualitative data on the situation of urban agriculture producers themselves. This lack of information limited the results and impacts of the activities since they were not conceived in a strategic way, nor did they always respond to the real needs and priority issues of the different groups of urban producers. On the other hand, financial and human resources were also scarce and thus also limited the efforts to fulfil the needs and demands of urban farmers.

INCLUDING URBAN AGRICULTURE IN SECTORAL AND THEMATIC PLANS

In 2004, the municipality of Villa Maria del Triunfo brought together several institutions to elaborate its participatory Economic Development Plan. Participants worked on four areas: commerce, services, production and urban agriculture. The inclusion of urban agriculture as an independent area was very much debated. The final decision was based on the following considerations:

- the political will to promote urban agriculture
- the availability of vacant land
- the existence of urban agriculture practices in all zones as a traditional cultural expression of the population
- urban agriculture as a strategy for generating income with low investment
- urban agriculture as an anti-poverty strategy

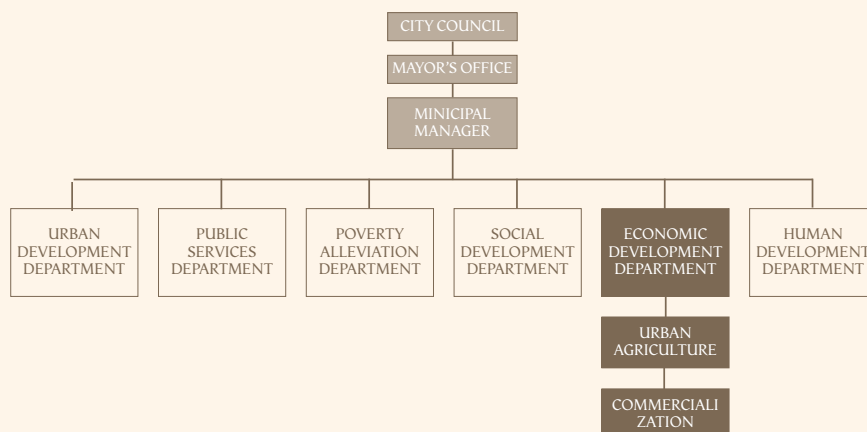
The methodology used to elaborate the plan included an initial working session to present the development proposal and an initial SWOT analysis. The presence of urban producers from all areas of the district verified that the decision to highlight UA was the correct one. The producers, principally represented by women, participated actively during the entire plan formulation process and in further dissemination at various other venues. This assisted very much in assuring that all the local stakeholders learned about the problems and alternative solutions proposed. Given that the problems in the various zones were similar, the process also helped strengthen group cohesion and develop a sense of identity among the producers, as they were not (nor had they ever been) formally organised.

The plan focused on commercialisation of produce but did not touch on productive and transformation activities. Moreover, since there was no data on the real situation of urban agriculture in the district, the plan was mainly based on the perceptions of those who took part in its formulation.

Having made some headway on the issue but always aware of the limitations of the process, the municipality of Villa Maria del Triunfo – with the support of IPES/RUAF (through its Cities Farming for the Future Programme)– started revising its urban agriculture policy and began formulating a Strategic Plan for Urban Agriculture as a tool to make that policy operational. This process included the active participation of urban producers and other local stakeholders. The Strategic Plan is based on an analysis of quantitative and qualitative



The Mayor of villa Maria del Triunfo harvesting with a local producer

Figure 1:**Organisational flow chart for the municipality of Villa Maria del Triunfo in 2004**

information on urban agriculture and the assessment of the needs, perceptions and current practices of the urban producers that were conducted during a participatory diagnosis. The process allowed for the definition of key issues and intervention strategies to overcome identified problems and promote the potentials of the current situation of urban agriculture in Villa Maria. The plan looks primarily at how to strengthen and consolidate the existing activities.

It should be pointed out that this process encouraged the formation of the urban farmers' network, strengthened the capacities (technical, methodological, participatory and gender-sensitive approach, etc.) of the urban agriculture unit staff and mobilised a broader group of stakeholders around urban agriculture. All these stakeholders actively participated in the formulation of the Strategic Plan and will contribute to its management and implementation through the City Forum on Urban Agriculture that was created on June 2006. The City Forum already has a functioning structure and is formed by 20 organisations and institutions (such as universities, NGOs, CBOs, national government institutions, international organisations, such as the FAO, and private businesses). The Strategic Plan will allow for a strategic and consented intervention, optimising human and financial resources in favour of urban agriculture. The final version of the plan is due on September 2006 and its implementation phase (pilot projects, training activities, etc.) is expected to start in October 2006.

THE LURIGANCHO-CHOSICA DISTRICT

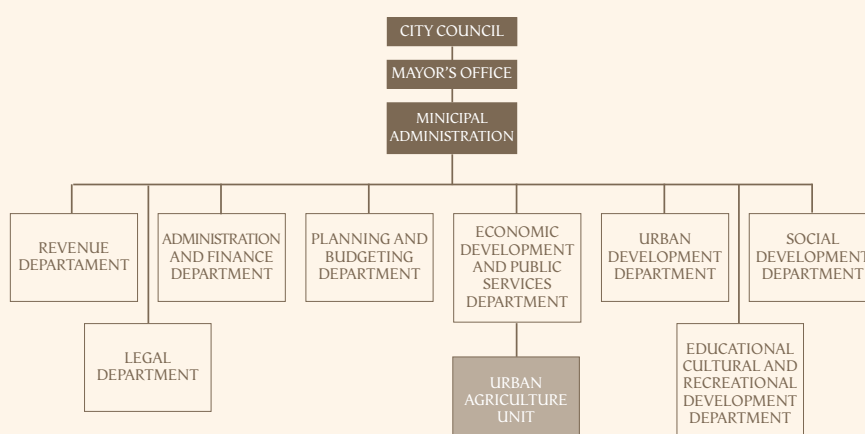
The Lurigancho-Chosica district is located in the basin of the Rimac River, some 13 km east of the centre of Lima. It has a total population of 125,000. Approximately 10 percent of the adult population (aged over 15) work full-time or part-time in crop production, while 65 percent work in the service sector. 32 percent of the children under 6 are affected by chronic malnutrition (INEI, 1993). It is one of the most extensive and least urbanised districts of Lima Province. Most of the agricultural land is located on the valley floor (nearly 45 percent of the district area) and supports a wide variety of urban and periurban agriculture, mainly as a way of life in the struggle against urban poverty. The district supplies about 25 percent of metropolitan Lima's vegetables and includes many farms with animals including birds, guinea pigs, rabbits, pigs, cattle and goats (Arce and Prain, 2005). In

this context, the municipality of the Lurigancho-Chosica district, with the support of Urban Harvest, began a process at the end of 2003 of enacting urban agriculture legislation. The aim was to promote urban agriculture as a means of generating income and increasing food security while contributing to a productive, healthy, green urban environment, all of which are essential components of sustainable cities.

LEARNING ABOUT URBAN AGRICULTURE

The process began with the strategy of building awareness among municipal authorities and local institutions about the reality of the families that depend on agriculture for their livelihood. Two international workshops for mayors have been held since 2003, in which different Latin American cities exchanged experiences about the development of urban agriculture for confronting poverty and other problems caused by urbanisation. The mayors participating in these workshops signed agreements committing themselves to promoting urban agriculture in their cities and districts (these workshops were co-organised with IPES-Promotion of Sustainable Development). The municipality of Lurigancho-Chosica identified the promotion of urban agriculture as a strategic municipal activity. Urban Harvest assisted in:

- creating a programme to identify the key stakeholders and to locate them within the municipality
- formulating an awareness-raising plan, organising workshops to raise awareness, coordinating information-

Figure 2: Organisational flow chart for the municipality of Lurigancho-Chosica in 2004

sharing, workshops within the municipality

- facilitating round-table discussions, organising significant public events (inauguration of the UA sub-section, inauguration of agricultural production activities, fairs, etc.) and visits to model farms, where ecological urban agriculture is practiced.

In this process, the authorities increasingly became convinced of the important role urban agriculture can play in the sustainable development of their cities. The lessons learned also extended to other stakeholders in the municipality. Meetings were also held with the Irrigation Users' Board, including the provision of training in agricultural production techniques and the organisation of farmer field schools, with 26 farmers involved as promoters.

CREATION OF THE URBAN AGRICULTURE UNIT

Before these activities were implemented, the municipality was not aware of the realities of the urban farmers, hence the farmers' demands remained unheard. However, through sensitisation, advocacy, action research and other learning processes, the local administration recognised the importance of local agricultural production and decided to support it through the creation – in late 2004 – of an urban agriculture unit (*Sub-Gerencia de Agricultura Urbana*) within the municipal organisational structure (see figure 2).

This unit is a service centre for agricultural producers and the local population by promoting the link between production and consumption. By using the production chain approach, it offers information to the producers about opportunities for training and programmes that support production and sales efforts in the municipality. The municipality managed to put together a budget of US\$ 100,000, with co-financing from Urban Harvest, for various activities. The specific objectives of the urban agriculture unit are to:

- intervene in urban planning with new constructive initiatives and legislation for the productive use of vacant lots
- support producers/farmers in building a sustainable, economically viable agro-ecosystem that is less dependent on chemicals
- contribute to producing higher income

through improved practices and diversification.

The action plan of the Lurigancho-Chosica urban agriculture unit is similar to that of the urban agriculture section in Villa Maria del Triunfo, and it involves:

- building the capacities of urban farmers and municipal stakeholders
- ensuring productive development, and
- fostering strategic alliances aimed at the integration of urban agriculture in municipal physical and land-use planning and encouraging social integration with attention to gender concerns.

The unit managers were trained with the support of IPES. This helped to complement their practical experience in municipal administration with specific knowledge on urban agriculture and highlighted the need to elaborate a strategy for urban agriculture development. The effort was part of a mutual learning process of unit personnel and staff from Urban Harvest.

Awareness raising process is crucial in the formulation of urban agriculture policy at city level

INTEGRATION INTO THE MUNICIPAL AGENDA

After training, and with the support of the Urban Harvest programme, the municipal urban agriculture office began to develop a participatory process for strengthening local agriculture. This process integrates all municipal actors, including farmers, consumers, public managers and NGOs, among others.

This participatory and dynamic working process allows the municipality to adapt its structure according to the needs of the population. It has led to the creation of a number of ordinances in support of urban agriculture. To date, three ordinances have been promulgated: 1) creation of the Urban Agriculture Municipal Unit for the Lurigancho-Chosica district and the town of Santa Maria de Huachipa, which has already been approved; 2) establishment of a "no services no urban taxation" agreement, so that producers who do not receive the

urban services of sanitation, drainage and waste collection continue to pay rural taxation rates (approved); and 3) regularisation of the management of restaurant waste for the feeding of pigs (currently under revision).

Dialogue and identification of needs

A first step of the municipal management plan was to create forums for constant communication between the sub-unit managers, farmers and local institutions in order to optimally use the managers' capacities and potential and also to ensure continuous training, generate bonds of trust and encourage transparency. This will allow the creation of a solid programme to benefit the farmers.

A participatory identification of the needs of the producers was carried out with the Irrigation Users Board of the Rimac River, representatives of the producers themselves and municipal authorities. These meetings produced mutual learning among the different stakeholders and resulted in:

- identification of the current problems and the real needs of the farmers of the region
- a SWOT analysis of urban agriculture in the district
- a typology of the urban farmers
- creation of a strategic plan that will feed into a longer term action plan
- implementation of the existing urban agriculture programme.

The information generated was processed using Geographic Information Systems (GIS) in order to display a spatial analysis of the urban ecosystem and natural resource management. This has led to new proposals for territorial-physical planning.

A development strategy

Based on the results of the diagnostic study and the process of social learning, the urban agriculture unit has created a local team made up of representatives of the local population (farmers with land, farmers without land and food pantries), technical staff from Urban Harvest and a representative from an NGO active in the area, who together with municipal technicians started formulating an action plan for the unit for the next few years. The idea is to develop further urban agriculture in the municipality, by incorporating the proposals of the

affected groups into municipal policy. These proposals cover issues such as access to land, land tenure, access to and quality of water, investments (micro-credits), strengthening commercialisation and processing channels, environmental conservation, organic waste treatment and the quality of agricultural products. The initial strategy has been presented to the city council for debate.

The next steps will include the organisation of a series of participatory workshops in which the strategy will be shared with various sectors of the local population for modification and improvement. With this process of consensus-building, it is hoped that the activities of the unit will correspond to the real needs of the population.

CONCLUSIONS

Raising awareness among decision makers and other stakeholders of the potential of urban agriculture to alleviate hunger and poverty is a key activity in promoting urban-agriculture-friendly policies. This can be accomplished through local seminars that present urban agriculture experiences (from other cities in the country or abroad), exchange visits, technical interchanges, etc.

It is also important to raise awareness among decision makers of the situation of urban agriculture and urban producers. Dialogue with and participation of producers in the aforementioned activities is needed to expose gaps and jointly seek solutions.

Although the awareness raising process is costly and requires much time and effort on the part of promoters, this activity is crucial in the formulation of urban agriculture policy at city level.

It is therefore essential to institutionalise urban agriculture, through its incorporation into the normative frameworks of cities (such as in their development plans), through the development of specific policies and legal frameworks (municipal ordinances, laws, regulations) for urban agriculture that facilitate and regulate its practice, and/or through the creation of municipal structures (units, departments, etc.) in order to operationalise the development of concrete activities for urban agriculture promotion.

Equally important is the strengthening of organisational, managerial, technical and networking capacities of urban farmers. A consolidated and strong organisation is better equipped to cope with the withdrawal of political support from the municipality.

While nothing ensures the success of urban agriculture activities, these reflections are presented in the hopes of contributing to the sustainability of urban agriculture beyond any particular municipal administration.

Notes

1) Metropolitan Lima has 42 districts. Each district is a municipality on its own represented by a mayor and a municipal council.

2) The CGIAR is a unique global partnership of governments, multilateral organisations and private foundations that works to promote food security, poverty eradication and the sound management of natural resources throughout the developing world.

3) The mayor referred to is Dr. Washington Ipenza Pacheco, democratically elected by the residents of Villa María del Triunfo for the periods 1996-1998, 1999-2002, and 2003-2006.

4) These events had been organised by IPES in partnership with UN HABITAT's Urban Management Programme

References

- Arce, B. and Prain G. 2005. La agricultura urbana como un componente económico familiar y su inserción en la gestión municipal: la experiencia del proyecto: "Agricultores en la Ciudad", Lima, Peru. Paper presented during the IV general assembly of the Latin American Network of Research into Urban Agriculture (la Red Latinoamericana de Investigaciones en Agricultura Urbana, Red AGUILA) in the seminar: Building Sustainable Cities with Urban Agriculture (Construyendo ciudades sustentables con Agricultura Urbana y Peri-urbana), from 28 to 30 April, 2005, México.
- FONCODES. 2000. Poverty Map of the National Social Welfare and Development Fund of Peru. Peru.
- INEI. 1993. Instituto Nacional de Estadística e Informática. National Census, 1993.
- Merzthal, G. and Barriga R. 2006. Combate a la pobreza e inclusión social a través agricultura urbana en Villa María del Triunfo: la importancia del diseño, planificación e implementación participativa y multi-actoral. Document prepared for the Third World Urban Forum, Vancouver 2006.
- Municipality of Villa María del Triunfo, DESCO, FOVIDA, IPES, SEDES. 2005. Participatory Economic Development Plan.



Urban agricultures in the hills of Villa María del Triunfo

From page 26

But more attention is needed for participatory monitoring of the *process* of policy formulation and implementation. This is why the local partners involved in the RUAF programme also apply instruments, from the start of the MPAP interactive policy formulation process, to periodically review the communication and cooperation between the stakeholders, and progress made in the realisation of the various commitments of the partners involved. They also analyse changes that have come about in the various participating organisations, the degree of participation of the intended beneficiaries and gender considerations. To do this they apply methods such as "participatory change monitoring" and "outcome mapping" (Earl *et al.*, 2001).



The development and institutionalisation of an interactive process of policy formulation thus go hand in hand with the development and institutionalisation of urban agriculture. This article has described the principles, phases and challenges of an MPAP interactive policy formulation process developed for urban agriculture. The following articles will describe in more detail experiences gained by RUAF partners in various cities and provide more insights into how to further develop and promote this type of process.

References

- Deelstra, T. D. Boyd and M. van den Biggelaar. 2006. Multifunctional Land Use, Promoting Urban Agriculture in Europe. In: R. van Veenhuizen. 2006. Cities Farming for the Future: Urban Agriculture for Green and Productive Cities, RUAF Foundation/IDRC/IIRR.
- Hemmati, M. (with contributions from F. Dodds, J. Enayati and J. McHarry), 2002. Multi-Stakeholder Processes for Governance and Sustainability: Beyond Deadlock and Conflict. Earthscan. London, UK.
- Partners and Propser, 2004. Verslag Afronding "initiatiefase" opstelling regeling burgerparticipatie gemeente Westervoort.
- Earl, S., F. Carden & T. Smutylo. 2001. Outcome Mapping: Building Learning and Reflection into Development Programs. Ottawa: International Development and Research Centre (IDRC).

Agricultural Business Associations in Urban and Periurban Areas in Lima, Peru



CIP/Urban Harvest

Farmer group members harvesting organic products

The large urban market of Lima provides an opportunity for periurban and urban farmers in the east of Lima to sell their products. However, studies by the Urban Harvest Programme of CIP in Lima reveal that the current system for commercialisation of urban agricultural products is underdeveloped. In addition there is a lack of trust, insecurity and a lack of capacity among urban farmers to organise and improve through social learning processes and coordinated business management efforts. This article describes an effort to improve this situation.

The “Farmers in the City” Project, coordinated by the Urban Harvest¹⁾ programme in Lima, Peru, together with other research and development organisations, is strengthening the organisational capabilities of urban farmers from the lower Rimac River basin in Lima, Peru. (See for more background the article on Lima in UA-Magazine 16.) The project includes 924 families who make up the irrigation association called the Rimac User Board, and another group of families (around 10,000) located in urban commu-

nities whose primary activity is raising animals. The agricultural production system currently in place integrates the growing of crops and raising of animals. The main crops are beets, lettuce, turnips, and other produce and aromatic plants. The raising of pigs, birds, guinea pigs, sheep and other animals is a source of savings and food for the farmers. Raising birds and guinea pigs is a traditional practice among some migrant families from rural areas. The economic potential of these activities has been developed energetically. Raising pigs is mainly done in areas without cropland and that tend to be undeveloped.

ORGANISATION OF FARMERS


The first phase of the project included

a baseline assessment, focus group discussions and training workshops. The researchers found a high use of chemical products, like pesticides and fertilisers, and improper animal-raising practices. They also identified a high degree of individualism, mistrust and a lack of communication, as primary obstacles to the formation of social capital. Qualitative tools were employed, such as participatory information-sharing workshops, training on topics such as agro-ecology and animal raising, and field visits to individual farms. There was a definite need for more training in new production practices that could help farmers increase production and obtain fair prices. In the second phase, the project adopted the Farmer Field School methodology (*Escuela de Campo para Agricultores*, ECA) and adapted to the urban ecosystem. The initial process of inviting people to participate took three months, which was longer than originally planned, due to the complexity of urban agriculture.

Farmer Field Schools

This methodology calls for gathering together large groups of agricultural producers, both men and women, to address issues related to Integrated Pest Management (IPM) for the main traditional crops of the region. Two ‘schools’ were created, one on IPM for beets with farmers from the Carapongo subsector and another on IPM for lettuce with farmers from Huachipa. Similarly, the ECA methodology was adapted for participatory workshops on raising guinea pigs with farmers from the Ñaña subsector. Through this process, the farmers developed an interest in organising themselves in order to apply all of the knowledge acquired, produce healthy and clean (organic) products, access good markets with fair prices, and improve their quality of life. Urban Harvest supported these Urban Farmers Schools (*Escuelas de Agricultores Urbanos*, EAUs). With additional support from the municipality and the farmers themselves, two EAUs began to function in Huachipa and

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Carapongo. In both cases, pilot agricultural production centres were established to experiment, validate, demonstrate and replicate different techniques in the fields of participating farmers.

The production of crops in each of the centres allowed participants to begin selling products to new markets on a small scale. Management of the pilot centres by the farmers strengthened the bonds of trust among participants. In addition, the joint search for new markets for the benefit of all group members consolidated the organisations. This created the need to seek formal status in order to access larger-scale markets.

The search for formalisation

Consolidation of organisations by achieving a formal status can generate local development through an increase of competitiveness and productivity (De Soto, 2000). Two agribusiness associations were formed: the Association of Organic Farmers of Huachipa (APAOH) and the Healthy Harvest Carapongo SAC (COSANACA). The latter was constituted as a micro-enterprise, with help from the Self-Employment and Micro-enterprise Program (PRODAME), a state entity under the Ministry of Work and Employment Promotion (MTPE). The costs associated with the legalisation process were 700 and 900 new sols (USD 217 and USD 281 USD), respectively, and were carried by the two associations themselves with income obtained through the sale of produce (Huachipa), contributions from partners and fund-raising activities (Carapongo). The guinea pig farmers of Ñaña also received assistance from PRODAME in order to begin their own legalisation process.

The main contribution of this methodology is that it recognises that the organisation of small producers – in any form – is the indispensable element in sustaining productive micro-enterprises over time. In other words, small farmers have to be organised in order to access financing for their activities. They need to formalise some sort of association in order to pursue the development of micro-enterprises (De Soto, 2000).

To reach consolidation and formalisation of organisations of small agribusinesses, it is necessary to develop a function infrastructure with clearly defined roles for

members in the management of production and sales. The legalisation process, therefore, contributed in the cases described above to the institutionalisation of both associations.

ACCESS TO FAIR MARKETS

The key factor in the consolidation of organisations of small agribusinesses is obtaining access to alternative markets, without the interference of third parties. In that respect, the project has sought, together with the farmers, a commercialisation system that is more direct and profitable. According to the farmers, direct sales to consumers is very beneficial, given the good prices attained, the constancy and variety of the orders, and the farmers' physical proximity to customers.

At the moment, APAOH and COSANACA are gaining access to larger-scale markets, thanks to the formalisation of their status, and support from the project and governmental entities like the MTPE. In this way, both groups have a greater chance to become sustainable and develop further in the future.

Strengths and weaknesses in urban farmers' organisations

The key components contributing to the consolidation and strengthening of these organisations are *trust*, which is won through the training and follow-up process; *capacity* to produce and market organic products; and *teamwork*. However, the cohesion of the different agro-enterprise organisations' members may be undermined by a number of issues. The diversity in other occupations of some members may hamper their active participation in the organisation. In addition, due to substantial differences in the application of agricultural techniques, production quality may be too diverse. Finally, there may be insufficient capital for the productive development of agricultural activities.

ACHIEVEMENTS AND CHALLENGES

During the process of working with these groups of urban farmers, their social capital has increased. Through participatory learning methodologies the farmers have strengthened their technical-productive, organisational, business and commercial capacities. The formation and formalisation of agro-enterprise associations has also facilitated their access to new, more profitable and more just markets for organic products.

The main reason members of the groups began growing organic products on their farms was to improve access to local markets (farmers' markets, restaurants, clinics and homes) and commercial markets (fixed intermediaries, supermarkets and restaurants). Thus the farmers have also learned to develop crop planting plans in a coordinated fashion in order to supply the markets that have opened up to them.

Local and national entities have also been involved in supporting and promoting the newly formed organisations. The municipalities and national government (through the MTPE) have helped promote, formalise and provide access to new markets for the organisations.

Nevertheless, small organisations in developing countries face immense challenges, especially in urban agriculture, where there are constant threats stemming from the rapid growth of the cities. In the last 4 years, the amount of agricultural land in the study area has been reduced by 22%, due to increased housing developments and unplanned urban growth. This rate of urbanisation is a threat to urban agriculture and should be confronted in a consensual way by local and national authorities and the farmers. Due to the excessive use of fertilisers, chemical pesticides and the drainage of wastewater from households and factories there is also an increase in water, soil and air pollution. This directly affects the ability of urban farmers to produce healthy, clean products.

NOTES

1) Urban Harvest (Cosecha Urbana-CU) is an institutional initiative of the International Agricultural Research Advisory Group coordinated by the International Potato Center (CIP).

References

- Arce, B.; Valencia, C.; Warnaars, M.; Prain, G. and Valle, R. 2006. The Farmer Field School (FFS) method in an urban setting: case study in Lima, Peru. In van Veenhuizen, René (ed), *Cities Farming for the Future – Urban Agriculture for Green and Productive Cities*. RUAF Foundation, IDRC and IIRR, Leusden.
- Chambers, R. and Conway R. 1992. Sustainable rural livelihoods: Practical concepts for the 21st century. IDS Discussion Paper No. 296. Brighton: IDS.
- Lopez, M. 2005. Procesamiento y Análisis de datos de la Línea de Base del Proyecto Agricultores en la Ciudad – caso Cono Este. Consultant's Report. Urban Harvest Programme / International Potato Center (CU/CIP), Lima, Peru.

Urban Agricultural Experiences from the Perspective of Social Responsibility

The Atocongo Association is an organisation that has grown out of the corporate social responsibility efforts of Cementos Lima SA. It is committed to carrying out capacity-building and human development programmes and projects which help to create opportunities for marginal urban groups seeking to improve their quality of life. One strategy used by the association to achieve this goal is urban agriculture.

The association is assisted in this effort by the Small Grants Program of the United Nations Development Fund (UNDP) and the Global Environmental Facility (GEF). Within the framework of this alliance, the “Innovative and Participatory Initiatives to Conserve the Environment” programme is being implemented, which manages an Award Fund exclusively aimed at grassroots community organisations located in the southern cone of Metropolitan Lima. To date, three calls for submissions have taken place, and 19 projects have been selected, about half of which are related to urban agriculture, specifically in the districts of Villa Maria del Triunfo and Villa El Salvador. The Atocongo Association and the Small Grants Program support the projects by (1) providing advice and assistance with regard to the technical and practical aspects of growing produce, medicinal plants, or aromatic plants, as requested by the project itself and (2) assisting with the management tasks of the project.

THE ACTORS INVOLVED IN THE PROJECTS

Many of these projects are directly linked to food security and are led by women's organizations, such as mothers' clubs, soup kitchens, community centres, etc., made up of women who experience poverty on a daily basis and who do not have jobs which allow them to support their families with dignity. It is clear that in most cases, it is the women who assume the leading role in the quest for better living conditions, which will eventually

make it possible for them to overcome the social exclusion they currently face. As such, most women not only assume a central role in their own households, but also act as presidents or coordinators, chosen by the members of their organisations in general assemblies.

IMPACTS OF CORPORATE SOCIAL RESPONSIBILITY

The urban agriculture projects, which originally sprung from corporate social responsibility efforts, have had many different impacts, both on the level of the women involved as well as on the level of the communities they live in. Most of the organisations find that this activity is a way to improve their ability to prepare and provide food through their community kitchens. On the other hand, a space for dialogue and learning is opened up, and new collective commitments are forged for continuing the activity, which then gets replicated in the households and turns the bio-gardens into an opportunity to generate household incomes, in addition to stimulating their accomplishments as micro-entrepreneurs.

This multifaceted impact is also demonstrated by the testimony of Ms. Honorata Huaman (53), a housewife and local leader who is very concerned about improving the quality of life in her community: *“Having obtained a project like this has been a great accomplishment for my community. It has led to improvements in different areas, especially in terms of nutrition. We are continuing with the learning process so that we can sell the products we grow and earn an income that will enable us to cover the basic necessities like water and electricity bills.”*

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Hans Peter Reinders



Water is a scarce resource in the community gardens of Lima

Impacts on the women

Through participation in the projects, the women have increased their skills. They can now write reports, provide good leadership and use the internet as a medium for information and consultation, which enables them to learn about innovative solutions that can be adapted to their own local situation. They have strengthened their abilities to programme and facilitate workshops, and thus to guide the organisations' internal processes. In addition, most projects have resulted in the women learning how to plan, assume commitments and periodically address their fellow members in order to inform them of progress made and to establish a more dynamic relationship characterised by integration and solidarity. These newly acquired skills greatly enhance their community work.

The women are now not only well aware of the fact that there have been problems,

and that their performance is often criticised, but they also recognise that all of these obstacles serve to strengthen them, as they constantly receive recognition for their efforts and their desire to progress and help the community. Their families support them and see that their new attitude means that they will not stay at home all of the time, and that by “getting out” of the household as well as the community, they have opened up new spaces which provide them with valuable experiences. The progressively increasing participation of the men (generally the husbands) is a clear sign of increased family support, as they help out with the tasks of planting and harvesting, and get involved in the different activities proposed by the projects.

Impacts on their organisations and communities

The increased capacities of the women are clearly reflected in their organisations. Through applying these newly acquired skills, the women have managed to foster increased responsibility and commitment on the part of other members of their organisations, who are now participating

more actively in the different activities that take place. In addition, their organisations have also been strengthened as they take on new responsibilities through the creation of commissions for making purchases and for selling produce, with special attention to the bio-gardens and training activities, among other initiatives. Decision-making capacities have also been enhanced and negotiation skills have been developed, which in turn strengthen the internal democratic functioning of their organisations.

The enhanced functioning of the organisations is not limited to internal successes only, but is also mirrored in the results that they have achieved in building alliances externally. The members of the organisations have been introduced to other institutions and professionals and as an organisation they actively seek contact with other stakeholders through activities such as awareness-raising campaigns and drawing contests. Some alliances have, for example, enabled the organisations and their communities to participate in local farmers’ markets, where they can sell their products. Also, the organisa-

tions’ members now see knowledge as a tool that makes them stronger and that can be transmitted to their communities. For example, know-how is exchanged through apprenticeships and the systematisation of experiences. In this way, everyone learns from each others’ experiences. The impacts achieved have not been limited to the social realm of the communities, but have also extended to their environment as the organisations are helping to reduce pollution through organic farming; local ancestral customs and practices are revalued; native species in danger of extinction are cultivated; and soil is preserved by using organic fertiliser.

CONCLUSION

The story of the Atocongo Association shows us that corporate social responsibility can be an important and successful vehicle for community building through urban agriculture and that empowering socially disadvantaged groups such as women can start significant social, economic and environmental development processes in communities.

HARVESTING UNDER HIGH-TENSION WIRES

Luis Pérez Egaña

A good idea, a great challenge

The Peru Energy Network (REP), a company owned by the ISA Group Colombia, operates and provides maintenance for the national power transmission grid, through a concession granted by the Peruvian government. REP, as part of its community relations programme, maintains constant communication with the community members who are directly influenced by its activities. Three years ago, as a result of this dialogue, the idea emerged to convert the sandy fields of Villa Maria del Triunfo (located in the southern periphery of Lima) into gardens for urban agriculture. For this, REP brought together three institutions: the Municipality of Villa Maria del Triunfo, the NGO IPES and the local residents, who together with the company achieved significant synergies. Today, Villa Maria del Triunfo has three market gardens (huertas), which generate income for the direct beneficiaries.

Turning this ambitious project into reality was not an easy job. Villa Maria del Triunfo’s geography is irregular, with sandy hills, rocks and a humid climate with little rainfall. On terrain like this, implementing the project was a big challenge, as in essence it meant farming the desert.

United efforts

The park and gardens staff of the Municipality of Villa Maria del Triunfo took charge of identifying interested people in the communities, in order to later train them in issues directly related to urban agriculture. With 95 percent of the participants being women, they truly stand out, even more so as they assumed ownership of the project from the beginning. The engineers of IPES took care of selecting the plots, which had to be prepared for this activity, since they were levelled landfills or uncultivated land. Using the labour donated by the population and tractors provided by the municipality, the terrain was levelled or terraces were built.

In one of the gardens, baptised Machu Picchu due to its form, rocks transported to the site to serve as the foundation for the terraces had to be broken with picks and clubs by the residents themselves.

At the beginning of the project, the municipality facilitated the water supply and throughout project implementation, IPES provided professional assistance. REP was in charge of supervising and monitoring the project, in addition to providing the necessary support to overcome any difficulties that arose.

Currently, the municipality organises farmers’ markets where the farmers can offer their products for sale, thereby earning an additional 50 soles per month (about USD 20). In economic terms, the project gives the beneficiaries greater autonomy with respect to their household spending; and in terms of nutrition, these gardens supply vegetables to the community kitchens of the area, providing nutrients and enriching the diets of hundreds of indirect beneficiaries.

The Julian Cadavid, Machu Picchu and Indo-America gardens are the result of joint efforts between the public and private sectors, civil society and the community, and these efforts have made it possible to farm land underneath high-tension power lines.

Looking toward the future

Currently, an area for training is under construction for the southern cone on a 4,000 m² plot, thanks to joint financing by REP and RUAF Foundation. Luis Perez Egaña, a specialist in social responsibility for REP, looks toward the future with a great deal of enthusiasm and hope, saying that “*The future vision of this project is that by the time the concession contract ends, all land under the high-tension wires will be green, with people working and earning an income on it.*”

From Eradication to Innovation: Towards healthy, profitable pig raising in Lima

Pig raising is an important livelihood activity in the District of Lurigancho Chosica, which is a low-income periurban neighbourhood located in the Rimac valley in the eastern part of the city of Lima.

As many as 1600 families are thought to depend on this activity for some or all of their income. Without organisation, technical support or regulation, they mostly operate in small clusters of informal livestock units perched on the arid hillsides of this desert city. This type of production raises concerns about public health risks and environmental pollution, and yet relatively simple changes in management can make pig raising a profitable, sustainable activity that can contribute significantly to the well-being of urban and periurban families.

Urban Harvest



Group discussion and Capacity building with pig breeders of the Association Haras El Huayco

Before 2005 the municipal authorities in Lurigancho-Chosica focused only on the most negative aspects of informal pig raising activities. It was not even considered an informal production system, rather it was perceived as a clandestine activity. Since the creation of the municipal *Sub-department for Urban Agriculture* (UASD), as described in UA-Magazine no. 16 (Arce et al. 2006), the local government has changed its views. Now, instead of eradication as the major strategy, the government has begun to support a transformation process towards more organised pig raising. In this process the municipality has been supported by some local institutions and enterprises which have identified market opportunities for producers and themselves deriving from the pig raising transformation process.

In 2004 officials of the Ministry of Health (MINSA) identified the presence of a number of serious diseases such as cisticercosis and leptospirosis in several pig raising settlements in Lurigancho-

Chosica. At the same time Urban Harvest was working on a case study of the “*Asociación de Criadores Ganaderos Porcinos de Saracoto Alto*” in Cajamarquilla, the largest pig raising settlement in the district (129 producers with an average of 3000 animals). This study also identified some public health concerns and highlighted a lack of knowledge about certain aspects of livestock management as one of the main causes. As part of efforts to broker a better understanding between the municipality and the pig raisers, Urban Harvest convened the first round-table discussion between the parties, in August 2004, to discuss improvements in management on the one hand, but also formal recognition of pig raising as a small enterprise by the municipality, on the other.

However, a study about sanitation in relation to pig raising undertaken by the Health Directorate found negative effects on public health and the environment in Lurigancho – Chosica. Based on this information, MINSA requested the municipality to eradicate the Saracoto pig raising settlement in January 2006, because of the continuing unsanitary production conditions. Thanks to the ongoing dialogue between the municipality and

the pig raisers, however, the municipality (UASD) did not call in the local police, but instead called a meeting between the MINSA representatives and the Saracoto pig raisers.

Eventually, eradication was not seen as the first choice, because its sole effect would have been to force the producers to move to other unoccupied areas, thus spreading environmental and health risks to other parts of the district. The alternative approach was to eliminate the origin of those risks. The result of the meeting was a “transformation roadmap” in which MINSA postponed the order for eradication for six months and producers undertook to improve the management conditions, following a transformation agenda.

Urban Harvest supported this agenda with the organisation of a training course for over 100 producers during June and July of 2006. The course presented the technical, biological and nutritional aspects of a healthy pig farm, drawing on the resources available in the area and focusing on the transformation criteria agreed with MINSA. Farmers who successfully finished the course were invited to join the Healthy Pig Raising Organisation, a

council initiative created by the UASD to bring together those farmers interested in bringing about positive change in agriculture in the district. This course was the beginning of a new working style for the UASD, which involves promoting several linkages between public and private institutions to help producers face and overcome a negative situation.

PIG DEVELOPMENT PROGRAM (PDP)

The Pig Development Program (PDP) is a UASD initiative which formalises the pig raising transformation agenda in municipal policy. It was approved by municipal authorities in January 2007 and is thus a direct result of the round-table discussion meetings promoted by Urban Harvest.

PDP works towards the creation of sustainable pig raising parks by promoting the formalisation of pig raising based on MINSA criteria in three fundamental areas: order, cleaning and vaccinations. If producers meet the criteria in these three areas, they can effectively apply the new livestock management skills acquired in the courses. Application of these management practices can reduce health risks, better protect the environment and improve the quality of life of the small urban pig raiser (Figure 1).

PDP has been following these steps in the transformation process:

To date the actors involved in the process are: the Ministry of Health (district department (DISA IV – Este), the Agricultural Health National Service (SENASA), the Urban Harvest Program (UH/CIP), the Municipality of Lurigancho-Chosica, Two private teaching institutions, and the National Policy of Peru (PNP).

ACHIEVEMENTS AND CHALLENGES

Inter-institutional work promoted by UASD and supported by Urban Harvest and partners has led to the identification of 40 informal pig raising settlements throughout the district, involving about 1,600 families and an estimated annual stock of 5,000 female pigs and a total production of about 60,000 head per year (sourced from map of pig raising park2). This represents an important sector of the local economy, which the district authorities cannot afford to ignore. Actually the main beneficiaries of the system at present are the traders who represent the “legitimate” part of the pig production system through their links to the market,

allowing them to extract higher margins for themselves and maintain low margins for the small producers. With the transformation to a more formally organised pig raising system with an emphasis on quality and safety, it is expected that small-scale raisers will be able to sell their pigs directly to the market, leading to higher incomes.

To date about 200 pig raisers have participated in training courses. Of these, 25 production units have already transformed themselves into clean, organised and healthy farms and a further 70 production units are in the process of transformation. This means that almost 50% of trainees have applied their learning to radically change their livestock management. It also shows that after only five months the PDP has reached about 13% of informal producers, who are now aware of how to raise pigs under healthy conditions. Nevertheless, there is still resistance to change among some producers, even with the risk of eradication. Since the market still accepts their pigs as they have been produced for decades, they see no reason to change those practices, especially since transformation requires some additional investment in new infrastructure.

Pig producers who are unwilling to transform their systems present two challenges. First, there is a need to enhance the level of inter-institutional collaboration, especially the formation of a multi-actor quality monitoring system, involving public health and municipal authorities in coordination with the Healthy Pig Raising Organisation. The monitoring system needs to be given formal recognition through a Municipal Regulation on Healthy Pig Raising. To protect those

producers who have transformed their systems, the regulation must be strict with those pig raisers who, even after completing the training course, retain the unhealthy practices, because they are risking public health and the future of all pig raisers.

Secondly the UASD should help raisers get in touch with small credit institutions to finance the transformation of their management systems. Other UH/CIP experiences show that responsible participants in training courses are also responsible when receiving credit. To better facilitate the use of micro-credit, future courses will offer schemes for small-scale, gradual change in production systems, which can be financed with micro-loans, rather than present the option of a one-time, full farm restructuring.

Finally, a major achievement of this intervention has been the interest and support shown by the MINSA representatives with regard to the idea that innovation is an alternative to eradication when it comes to pig raising. They recognise that innovation protects public health and the environment whilst offering bigger benefits for local producers.

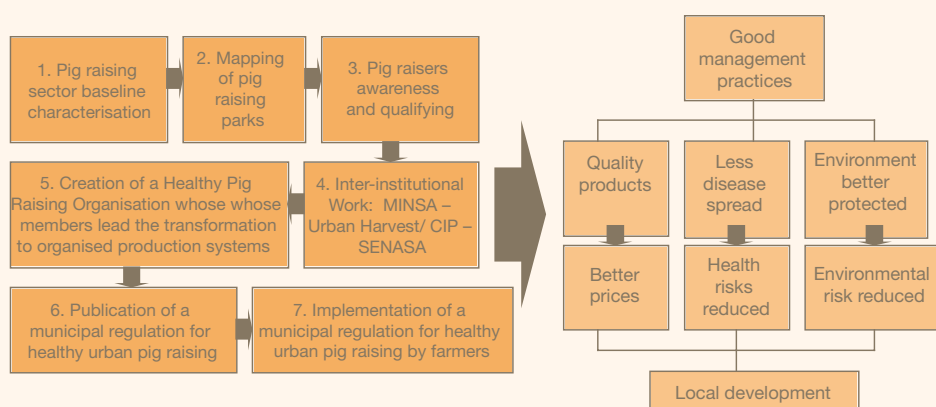
References

CEPIS (2007). “Riesgos a la salud por la crianza de cerdos alimentados en sitios de disposición final de residuos sólidos en América Latina y el Caribe”. CEPIS. Lima.

Data from SGAU of Mapping of pig raising park.

Arce, Blanca, Gordon Prain and Miguel Salvo, 2006. Towards the Integration of Urban Agriculture in Municipal Agendas: an experience in the district of Lurigancho-Chosica, Lima, Peru. In Urban Agriculture Magazine, No 16, RUAF, Leusden, Netherlands.

Arce, Blanca, Jessica Alegre, Dennis Escudero, Gordon Prain, and Jorge Sáenz. 2007. Crianza de Cerdos en Zonas Urbanas: Diagnóstico y Propuesta Municipal de Sistema de Manejo en el Distrito de Lurigancho Chosica, Lima (Peru). Compilado por IPES en Porcicultura Urbana y Periurbana en ciudades de América Latina y el Caribe.



Innovations in Producer-Market Linkages: Urban field schools and organic markets in Lima

Organically-produced food is increasingly in demand among more affluent urban populations of developing countries, and these city dwellers are willing to pay a premium for food quality and safety. Agricultural producers living in and around these cities are well placed to take advantage of this lucrative market.

Urban Harvest



Evaluating the yellow tramp during the agroecological analysis

As well as offering higher prices, the organic market also usually provides more stable prices throughout the year. However, most urban producers are unfamiliar with the specific techniques for organic production or else doubt the economic opportunities this market offers. Moreover, the organic market has strict quality demands, such as organic certification, and often requires negotiation capacity from producers because they often sell directly to consumers or specialised distributors. Most local producers are not used to these requirements. They especially lack business management skills and the capacity to organise themselves for better marketing.

Thus, innovative approaches are needed to enable producers to take advantage of this new demand. “Agricultores en la Ciudad” (Farmers in the City) is a collab-

orative programme of the CGIAR Initiative Urban Harvest (1) and local partners, which is being undertaken in Lima, Peru, to help producers take advantage of this opportunity and overcome their constraints. The programme is using the locally developed methodology of Urban Field Schools to strengthen farmers’ internal organisation and help develop novel linkages to diverse types of organic markets.

DEVELOPING A NEW “SCHOOLS FOR URBAN FARMERS” METHODOLOGY

A baseline study undertaken in 2004 identified strengths and limitations for agro-enterprise development among local agricultural producers and capacity building needs. An important conclusion that emerged was the need for capacity building in enterprise development, but it was also concluded that there was a lack of learning methodologies compatible with the urban life style. Based on its use in rural contexts by the International Potato Center, the Urban Harvest research team identified the Farmer Field School (FFS) methodology as a high-potential tool for use in urban environments, if it could be adequately adapted. Adaptation of the FFS model was undertaken over a period of two years in two districts of

Lima where the urbanisation pressure on agricultural land was highest. The objectives were to:

- Enhance access of urban producers to high-value markets for organic products
- Increase the access of consumers to fresh and healthy foods and improve family diets
- Eliminate harmful effects of agriculture on the environment.

Urban Harvest was supported by the “Junta de Usuarios Rímac (JUR)”, which is the local irrigation system management institution, and by the local government, the District Municipalities of Lurigancho Chosica and Santa María de Huachipa.

The Schools for Urban Farmers methodology has three steps. Although these were elaborated over a period of two years, the three stages can be completed in as little as 15 months, depending on local circumstances.

First, a participatory field diagnosis is conducted over a period of about six months. Using different diagnostic methods (participatory workshops, group interviews, surveys) this step involves documentation of local practices, opportunities and production constraints. This diagnostic process also includes information and sensitisation about the project

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goal and objectives.

The second step involves the creation of an urban-adapted farmer field school (FFS) about integrated crop management, with particular attention given to pests and soils. Preliminary sensitisation workshops help create awareness among farmers about the value of natural and human capital – protecting the environment and human health – and the value of social capital, in other words, the relevance of group organisation. An important part of the urban adaptation of the FFS involves intensive preparatory work with time-constrained urban producers on the advantages of this kind of agriculture. More intensive interactions take place between the research team and the selected producers than typically occurs in rural-based FFSs primarily because of the way that agriculture competes for time and space with other urban livelihood strategies, so that sensitisation to the value and potential of agriculture needs more time. The third step is an urban field school, involving capacity building on organic production and the development of a market orientation towards new commercial opportunities (Figure 1). These steps are discussed below in more detail.



Figure 1: Three step “Schools for Urban Farmers” methodology for stimulating organic production

PARTICIPATORY FIELD DIAGNOSIS

The diagnostic study in Eastern Lima used preliminary workshops, group interviews, key informants and surveys to understand the local production systems and livelihoods. From the study it emerged that local producers are poorly organised. Farms are very small and marketing relies on a complex array of intermediaries. Farmers have very limited information about market prices and the tendency is to grow the same products in the same seasons, leading to saturated markets and low prices. In this scenario, farmers try to maximise productivity and product appearance and minimise production costs and labour, which result in high dependence on chemical products (especially highly toxic pesticides, often

without paying much attention to safety procedures). With high input costs and fluctuating market prices, the economic returns on this kind of horticulture are frequently negative. Instead of selling the land to urban developers in the face of low returns, as some producers are doing, an alternative identified through the diagnosis is to take advantage of new, close by, urban markets. There is a local commitment to horticulture, but there is urgent need to find ways of making production more profitable.

ADAPTED FARMER FIELD SCHOOLS

The International Potato Center has extensive experience with the use of Farmer Field School (FFS) methodologies for building farmer capacity in rural areas, especially on integrated pest management (IPM) of potato. This method has also been shown to contribute to the strengthening of social capital among farmers (Pumisacho & Sherwood 2005).

The FFS methodology needs to be adapted to urban conditions because participants are urban producers involved in urban lifestyles and production systems that make different demands on time, labour and physical resources, and involve different crop rotations, soils etc., compared to the rural sector. The focus of the urban-adapted Farmer Field Schools (FFSu) was integrated crop management because the management of pests and soils were identified as the main weaknesses of urban producers. At the beginning of the FFSu (in 2005), the following comments were commonly heard:

- “Nobody can produce lettuce without Furadan” (a highly toxic local insecticide). “Chupadera [Fussarium spp an important fungal disease] wins.”
- “They lie when they say they don’t apply chemicals. They apply them during the night when nobody can see them.”
- “You can get a higher price, but if you grow without chemicals leaves are damaged.”
- “Plants grown without urea, grow with a yellow colour. Who will pay for them then?”

The FFSu aimed to change these sentiments, making farmers conscious of the possibility of using diverse means of controlling insects and diseases in order to reduce the use of agrochemicals. It also

sought to show the advantages of self-organisation so that they could exchange experiences and learning, reduce costs and improve their marketing abilities.

URBAN FIELD SCHOOL ASSOCIATIONS

The Urban Field School Associations (UFSA) are the result of self-organisation among some members of the FFSu, mainly for the purpose of strengthening organic or ecological production capacity and organisational and entrepreneurial skills. Members are thus self-selected from among the membership of the FFSu and are those with a strong interest in the organic or ecological production techniques introduced in the second step of the methodology. The third step encourages these self-selected and motivated producers to elaborate their specific needs and plans as part of the UFSA enterprise activities and capacity building. In the Lima case, producers expressed the need for more formalised organisation, more training in enterprise management, training and research on organic production and for support to apply what they learnt at the FFSu. They also sought help to reach the production conditions required to become formally certified for organic production. The participatory design of the methodology ensures that producers themselves implement and maintain the UFSA, whilst the R&D organisations provide technical support. Other local institutions, like the municipality or the Irrigation Users’ Authority (JUR), supported market research and enterprise dialogues with new business opportunities.

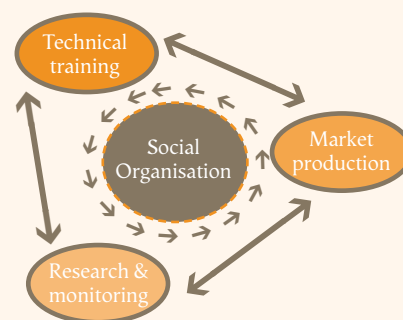


Figure 2: Urban Field School Association operational model

The UFSA is composed of three physical areas (Figure 2). A pilot production area is used for the application of organic methods for growing crops and raising livestock for the market. A participatory research area is used to evaluate new

organic technologies. A training and meeting room is used for capacity building. The UFSA Center aims both to train those farmers who were involved in its design and establishment and also to train other local producers who want to learn from the first group's experiences and ultimately join their organisation.

The UFSA is based on the self-organisation of farmers who take part in it. It takes approximately one year to reach the level of farmer participation, organisation and autonomy that can ensure the sustainability of the UFSA. Thus training begins with social subjects: self-esteem, leadership ability acquisition, networking, negotiation. From this base the group deals with the generation and application of integrated organic agricultural and farming techniques and its adaptation to the urban environment, processing to add value to the produce and finding market-places (Urban Harvest 2007). The farmers involved are also responsible for diffusion of the knowledge that they have learnt to other farmers in Lima. "Graduate farmers" begin to give farmer-to-farmer training about six months after the establishment of the UFSA and after they themselves have received different kinds of capacity building training. They also increasingly participate in demonstration and commercial fairs organised by municipal authorities and Urban Harvest, which is another type of horizontal sensitisation of peers and other stakeholders.

ACHIEVEMENTS AND CHALLENGES

The main achievement is the establishment of two stable and sustainable UFSAs for producing and marketing organic vegetables, known as Cosecha Sana SAC (COSANACA) and the Asociación de Productores Agropecuarios Orgánicos de Huachipa (APAHO) (Urban Harvest 2007; Alegre et al. 2006).

Other specific achievements include the following:

- Producers are experts at organic production and know the technical information.
- Producers are now able to negotiate for themselves sales to different markets, without the intervention of intermediaries.
- Currently 2.5 ha of urban land is managed by the two associations, which are officially certified as organic production areas by an independent certification organisation.

- A diversity of market outlets has been established for organic products.
- A second-level organisation, "Organización de Productores Orgánicos de Lima y Callao" has been established, linking producers in the Eastern Cone with other production areas of Lima.
- There is an increase in the farmers' own consumption of healthy organic vegetables and increased local sales to neighbours.
- The original group of organic producers is beginning to train other farmers.
- Organic production has restored farming as a profitable means of earning a living. Data from 5 farmers growing on 0.25 ha show that they now sell S/.2,800 (approximately \$930) monthly during the lower demand winter period (vegetable consumption increases in summer). Nevertheless the participating organic producers identify several issues still to be dealt with. The farmers need to:
 - Better exploit their proximity to diverse city markets
 - Improve their organisation and crop planting planning to respond better to increasing demand. (The SWOT analysis conducted by producers themselves points to communication, perseverance and responsibility as weaknesses.)
 - dedicate themselves full-time in the future, to respond to developing markets, with part-time producers supporting production from small plots
 - continue to develop production technologies, such as installing more efficient irrigation and crop protection practices
 - Use more widely those technologies which have already been locally tested and implemented to improve poor urban irrigation water quality.

Notes

1) The Consultative Group on International Agriculture Research (CGIAR) is a unique global partnership that works to promote food security, poverty eradication and the sound management of natural resources throughout the developing world. The International Potato Center, which is one of fifteen Centers sponsored by the CGIAR, convenes the Urban Harvest System-wide Program.

References

Pumisacho, M., and S. Sherwood. (Eds). 2005. Escuelas de Campo de Agricultores en América Latina (Farmer Field Schools in Latin America). INNIAP-Fortipapa, Republic of Ecuador
Urban Harvest. 2007. Agricultores en la Ciudad. Informe 2006. Urban Harvest. Lima
Alegre J., D. Escudero and O. Tesdell. 2006. Agricultural Business Associations in Urban and Periurban Areas in Lima, Peru. In UA-Magazine no.16

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Group photo of the organic producer organisation of Huachipa after the school



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was less severe than in the rural areas, pig breeders managed to prevent their pigs from contracting African swine fever, and the federation has been active in joint breeding and the exchange of feeding and breeding innovations. The city even has a livestock bank that supports the reactivation of animal breeding in the rural areas. In December 2006, the federation of pig breeders organised several exchanges with rural animal breeders and offered them 117 female piglets of good stock.

Encouraged by these results from farmers' action research on endogenous practices in breeding and prevention of African swine fever, the federation, which currently has 112 members, further embarked on the fattening of piglets (purchased at 2 months and sold at between 5 and 8 months). Fattening piglets for sale will be a major activity in the forthcoming years and is currently taking place at three pilot sites in Bukavu.

Animal breeding in the city provides small incomes to households engaged in this activity. To reduce the constraints encountered by these households, urban breeders pooled their efforts and developed exchanges which resulted in the validation of feed recipes to prevent swine fever, with the backing of action research undertaken by the Diobass Platform. However, animal breeders need to further develop strategies to jointly access credits and be able to boost their viable micro-enterprise initiatives.

References

LAWAHIRA Ntagenwa Olivier, Etat de l'élevage porcin dans la ville de Bukavu, TFC, UCB, Faculté d'Agronomie, 2003.

Using Treated Domestic Wastewater for Urban Agriculture and Green Areas; The case of Lima

Gunther Merzthal
Ernesto Bustamante

Scarcity of water is one of the main problems in Lima, and there is increasing competition for the use of water, for human consumption, agriculture, industry, and green areas. The use of alternative sources is urgently required.

The city of Lima (1) has a surface area of 2,794 km² and a population of 7,765,151, with a population growth rate of 2.1 percent annually, and a poverty rate of 46.8 percent (INEI, 2002, 2005 and 2006). Migration from the provinces to the capital of people looking for new livelihood opportunities is high. This growth generates increasing demand for water. However, Lima is a desert city with almost no annual precipitation (around 25 mm per year). The main sources of water for the city are surface water (the Rimac, Chillon and Lurin rivers, which contribute a total of 39.1 m³/s) and underground water filtrations (from the Rimac, Lurin and Chillon Rivers, which contribute 8.3 m³/s).

There is some wastewater treatment, but this is relatively limited: 1.6 m³/s only, representing 9.2 percent of the total (SEDAPAL, 2006). As a result, most wastewater (90.8 percent) is discharged into surface water and eventually to the Pacific Ocean, without any treatment, causing contamination of the surface water and of agricultural products. It should be noted that of the wastewater that is treated 54.4 percent is dumped into the sea, which is a

SWITCH LIMA

The SWITCH Lima demonstration project is entitled "Treatment and use of wastewater for urban and periurban agriculture and green areas". SWITCH Lima is being implemented by IPES – Promotion of Sustainable Development (Peru) and by the Ministry of Housing, Construction and Sanitation. The main objective of the project is to formulate policy guidelines for the promotion of integrated treatment and reuse systems for urban and periurban agriculture and green areas. The SWITCH Lima Learning Alliance facilitates up-scaling of the research results achieved, and allows the participating stakeholders to discuss and validate these findings with the aim of formulating policy guidelines and building capacities at the same time. An important part of the demonstration is the pilot project "Optimising water management to combat urban poverty: Developing productive and recreational areas through the use of treated wastewater", which seeks to improve food security and community participation of the poor population in the district of Villa El Salvador and generate complementary household income. Once validated, the experience will be used as example for replication in other zones of the country in collaboration with the Ministry of Housing, Construction and Sanitation.

waste of a scarce resource. There is a legislative vacuum at the national level with respect to treatment and use of wastewater for productive and recreational purposes, which complicates sustainable management of wastewater. It is in this context that SWITCH Lima operates.

Cases of wastewater use

As part of the SWITCH project, 37 cases involving the use of household wastewater from various secondary sources were identified. They include productive activities like agriculture, aquaculture and the development and/or maintenance of green areas of the



There is a need to search for alternative sources of water, such as the use of treated wastewater
Photo: IPES

city. They also include activities for which untreated wastewater is used. Seventeen of these are located in the southern area of Lima, where the availability of water is low compared to other parts of the city. The cases are located in periurban (54 percent) as well as intra-urban areas (46 percent). The 37 cases identified cover a total surface area of 985 hectares, and use a flow volume of approximately 1,478 l/s of wastewater, of which 716 l/s is used without treatment and 762 l/s is treated. The majority of the wastewater (almost 80 percent) is used small and medium-sized areas (up to 20 hectares), 11 percent of which are smaller than 1 hectare.

Wastewater is used for a variety of purposes. 44 percent of the cases involve productive activities (agriculture and aquaculture). These activities represent 77 percent of the total area irrigated with treated wastewater, and are predominantly located in peri-urban areas. Another 56 percent of the cases involve the reuse of treated water for recreational activities like green areas, sports fields and public parks, which make up just 23 percent of the total irrigated area and are located primarily in the city. 34 of the cases

involve the use of wastewater that has been treated in some way. The three cases of untreated use represent 40 percent of the total area irrigated with wastewater in Lima. The technologies used for treating wastewater have been grouped into five types: stabilisation ponds (29 percent), aerated lagoons (29 percent), activated sludge (24 percent), artificial wetlands (12 percent), and percolated filters (6 percent).

Action research

The SWITCH research team selected 19 of these 37 cases for a study of their institutional, social, technical, economic and environmental dimensions. Within this selected group, a significant variety of crops are produced, including fruits, vegetables, aromatic herbs, etc. Eight of these cases involve a total of 314 farmers who use wastewater to irrigate 653 hectares of farmland. The main crops are vegetables, which encompass 60 percent of the total productive land area. The largest area is in San Agustín, where 445 hectares of irrigated vegetables are grown using untreated wastewater. Among the most important crops are celery (*Apium*

Meeting with Ms Ricardina Cardenas, Director of the Office of the Environment of the Ministry of Housing, Construction and Sanitation

One of the responsibilities of the Ministry of Housing, Construction and Sanitation of Peru (MVCS) is the treatment of wastewater. The Ministry is implementing a National Urban Agriculture Programme which seeks to facilitate reuse of treated wastewater. As part of the SWITCH Lima Project, IPES and the MVCS are collaborating in action research towards the formulation of policy guidelines for the promotion of productive (urban and periurban agriculture) and recreational (irrigation of green areas) use of treated wastewater.

Ms Cardenas: The Ministry, through its Office of the Environment (OMA), promotes urban agriculture, in order to improve the quality of life of low-income residents, especially in peripheral urban areas, through training and support in income-generating activities. In addition, we are promoting the creation of sustainable green areas using treated wastewater. (...)

The Ministry collaborates with SWITCH, specifically in the formulation of policy and operational guidelines on wastewater treatment and reuse in urban and periurban agriculture and greening. OMA is dedicated to the preparation of these policy guidelines, which will formalise treatment, use and reuse and the construction of wastewater treatment plants that are more accessible to the poorer sectors of the population. (...)

Water is essential as a human right. So taking care of this resource is our civic duty. Wastewater is not just "waste" but it is a resource! And with proper treatment, enhanced aware-



ness among citizens and industries, and a legal-regulatory framework, wastewater can be used. (...)

The OMA is working on necessary regulations already, such as a maximum level of emissions from wastewater treatment plants when discharging into receiving bodies, like the ocean, lakes, rivers, etc.; and for the reuse of wastewater in agriculture, green areas, aquaculture and reforestation. (...) Other projects OMA is working on include the level of discharge into the sewer network (a controversial issue we have been working on for almost two years with CONAM, (now with the newly formed Ministry of Environment); regulations for solid waste management; an environmental classification system for projects in this sector; and guidelines for the preparation of environmental impact studies and environmental adjustment programmes for water and sanitation activities. (...)

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graveolens), onions (*Allium cepa*), wild leek (*Allium ampeloprasum*), radish (*Raphanus sativus*), tomato (*Lycopersicon esculentum*) and squash (*Cucurbita maxima* Duch). Nine cases use wastewater for recreational purposes like green areas, sports fields and public parks. They manage 116 hectares of grass for gardens and another 54 hectares of forests with ornamental trees, like the eucalyptus (*Eucalyptus* spp.), poncianas (*Caesalpinia pulcherrima*) and the Peruvian peppertree (*Schinus molle*). Irrigation techniques vary and include the use of gravity by flooding or furrows, sprinklers, and drip irrigation.

The size of the treatment systems depends on the volume that is being treated, the final quality of the effluent and the technology used. Aerated lagoon plants require the largest amount of space, followed by activated sludge plants and stabilisation ponds.

The quality of the wastewater being treated is monitored in only nine of these cases, which means that currently there is no adequate system of control for reuse activities operating in Lima. The parameters that are monitored are faecal coliforms and the biochemical oxygen demand. Only two plants had effluents with less than 1,000 faecal coliforms per 100 ml, which is the quality required for irrigating parks and sports fields. The rest had higher levels, and, therefore the effluent would only be useful for some crops. In only two cases was the presence of human parasites reported, since this is a variable that is not yet monitored obligatorily. The investment, operational and maintenance costs of the facilities were not well documented, so no conclusions can be drawn from this.

A legal and institutional framework has to be created at the national level

Using the information produced by the research, the SWITCH team in Lima drafted political guidelines to promote treatment and reuse of wastewater for use in urban and periurban agriculture and green spaces. These draft guidelines have a national scope, and will be validated through a series of meetings, workshops and a virtual platform, with different stakeholders like different local and national governmental institutions, universities, private sector and representatives from the civil society that participate in the Learning Alliance. It is expected that this process will be finished in 2008.

Conclusions

There is a need to search for alternative sources of water, such as the potential use of treated wastewater, water extracted from fog, etc., to cater for the high demand of water. Since 92 percent of wastewater currently ends up in the Pacific Ocean, there is a high potential for use (after proper treatment).

Because of the shortage of water, untreated wastewater is already being used for production in the city, and these farming systems have become important sources of food for the city. Treated wastewater is also used but this is still a minimal part of the potential that this resource has. Less than half of the total treated

wastewater is used for agricultural or recreational activities. Utilising this potential would require assessment of the quality of the effluent from treatment plants and development of guidelines for its use for different activities.

The use of treated wastewater for agriculture will reduce the stress on the supply of water, since there will be a constant and larger flow of water available. This will result in higher yields, better products and improved access to food in the city, as well as extra income and jobs. Using treated wastewater for green areas and urban forestry will facilitate more public recreational spaces, improve the city's landscape, capture carbon dioxide and other polluting gases, as well as lead to other environmental benefits.

A legal and institutional framework has to be created at the national level that will encourage integrated wastewater treatment and use for productive and recreational purposes. Thus, rather than wasting a valuable resource, a policy should be developed that recognises this waste as a resource. The guidelines elaborated by the SWITCH Lima team will allow the achievement of this objective.

A variety of wastewater treatment technologies are available, which have different investment and operational costs and which are appropriate to the physical characteristics of the city. However, only for some of these technologies, regulatory frameworks are provided by the Peruvian state. These regulations relate to treatment and disposal of wastewater into a receiving body, but do not take into account the option of reuse of the effluent.

For this reason one of the strategic actions identified in the SWITCH studies is the need to update these regulatory frameworks and to seek to include the reuse of wastewater for productive-recreational purposes. In addition it is essential to develop a governmental system that links the different stakeholders and sectors involved, in order to define the different roles and facilitate the implementation and management of Integrated Wastewater Treatment and Reuse Systems.

Finally, the access to information and capacities of these stakeholders need to be improved, so that they are able to implement and manage integrated wastewater treatment and reuse systems. This activity is supported by SWITCH in Lima through the Learning Alliance.

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End notes

1) Throughout this article we refer to the "city of Lima", assuming, for simplification purposes, that it includes Metropolitan Lima, with 43 districts and the constitutional province of Callao, with 6 districts.

References

INEI, 2002
INEI, 2005
INEI, 2006

The Role of Urban Agriculture in Building Resilient Cities: Examples of building resilient neighbourhoods in London

Elisa Peduto
Dilyara Satdinova

The concept of resilient cities is increasingly heard today. Whereas in southern countries access to food is a major motivation for people to engage in urban agriculture, in northern cities, such as London, people are driven more by environmental reasons such as the damaging effects of excessive food miles. Regardless of the motivation, urban agriculture is a positive step toward greater resilience.

In his publication *Growing Better Cities*, Mougeot (2006) presents an ideal situation of urban agriculture integrated in a resilient city. He imagines a city as an ecosystem. The International Development Research Centre (IDRC) listed a number of key aspects of such a self-sufficient city: 1) urban agriculture integrated into urban management (governmental recognition), 2) self-reliance through local food systems (local markets and food security through cooperative of local producers), 3) available green spaces that provide ecological and social benefits to both the rich and the poor and 4) well-established resource recovery, in which waste is reused as bio-compost.

Forest Gardening course, April 2009. Distributing seeds
Photo: (Source: London Permaculture 2009) James Taylor



A Transition Town (or village / city / forest / island) is a community that comes together to respond to the challenges and opportunities of peak oil and climate change and kick off a Transition Initiative. A Transition Initiative seeks to address the question: "For all those aspects of life that this community needs in order to sustain itself and thrive, how do we significantly increase resilience (to mitigate the effects of peak oil) and drastically reduce carbon emissions (to mitigate the effects of climate change)?"

This should result in a coordinated range of projects across all areas of life that strives to rebuild the resilience lost as a result of cheap oil and reduce the community's carbon emissions drastically.

This ideal situation has not yet been fully attained by any city in the world. However, some areas in London have already advanced quite far, especially since the launch of the "Capital Growth" initiative in November 2008, which aims to turn 2,012 pieces of land into green spaces to grow food in the capital city by 2012 as part of the Climate Change Action Plan.

Transition Town in Brixton (TTB) seeks to develop a community working together towards local sustainability, and in the wake of peak oil and climate change towards drastically reducing its carbon emissions (see box). Hopkins, founder of TTB in 2000 explains: "The concept of resilience is central to TT, and is seen as the ability of a system, from individuals to the whole economy, to hold together and maintain their ability to function in the face of change and shocks from the outside."

The Abundance Project of TTB, which was started in 2007 in the Guinness Trust Estate (off Loughborough Park Road), is a demonstration project on community allotment gardening. Its first products were harvested this year. Residents of the estate have become involved in the project, which is a big achievement for the organisers. All crops have been consumed on site except for some rocket that was donated to a box scheme to be sold.

Even though Brixton is still not much more self sufficient than when the project started, interest and discussions have been generated and the food growing is seen as sensible and beneficial. There is still not enough participation on the estate, but about nine growers have claimed space so far. In addition, over 50 community members engage in all kinds of other activities, such as a green mapping project to identify other green spaces for more agriculture, development of a local currency (the Brixton pound), and the Energy Descent Action Plan to decrease Brixton's energy use. This is the strategic goal for the year 2009. TTB aims to create a local food system that decreases food miles and offers green spaces that will provide ecological and social benefits for the whole community (thus already satisfying two aspects of Mougeot's self-sufficient city).

While TTB is still exploring how to improve local production and consumption, another grassroots organisation, **Growing Communities** in East London, already supports local food production by community members that benefits the local economy. This organisation based in the London borough Hackney involves 25 small-scale local organic producers and provided 450 households with fresh vegetables in 2007. The organisation has an annual turnover at the local market of £600,000 and an organisation turnover of £290,000, thanks to the work of 17 part-time employees and 48 volunteers. In the local community gardens 230 bags of lettuce are produced per week. Other products come from local farms. A survey showed that 89 per cent of members walk or cycle to pick up their bags each week, in order to reduce carbon emissions and food miles.

The organisation offers a weekly farmers' market and vegetable box schemes of products which are produced in the local community gardens and by local farms. Growing Communities also seeks to address the urgent problem of climate change: *"Since food and farming account for at least 30 per cent of worldwide greenhouse gas emissions, the high dependence on fossil fuels needs to be reduced. People need to connect again to the understanding of growing, preparing and cooking food, so that their fragility towards the dependency on the food system can be reduced"* (Brown, 2008). This is why the organisation focuses on ecological production and distribution: *"the distribution should involve environmentally friendly and low carbon resource use, foster the community, promote knowledge and strive to be economically viable and independent"* (Brown, 2008, Growing Food for London Conference).

Even though Growing Communities seeks less extreme adaptation to peak oil than TTB, it shows how people gradually can be convinced to buy locally produced and organic food. Growing Communities aims to produce enough to feed Hackney by 2040, such that the import of European and other global products will be significantly reduced, and urban and periurban food provision increased (Brown's presentation, Growing Food for London Conference, 2008).

The above-mentioned two examples seek to **apply ecological agriculture as an alternative to conventional agricul-**

ture. Permaculture (permanent agriculture) as developed by the Australian ecologist Bill Mollison goes further and seeks to design integrated ecological human habitats and food production systems by learning from the natural regenerative process in nature and by emphasising the synergetic combination of multi-purpose plants to provide sustainable year-round production.

This approach has been applied in **Hornsey Rise in Islington, London**. Alpay Torgout and other members of Naturewise converted empty green space of the Margaret McMillan Day Nursery school into a *Forest Garden* (permaculture), which is designed to be a low-maintenance system. Naturewise focuses on environmental awareness and enabling people to move towards more sustainable lifestyles (Burnett, 2008). The land was designed as an edible landscape based on the seven layers or niches identified by Robert Hart from his observation and replication of the structure of a natural forest (Agroforestry Research Trust, 2009; Burnett, 2008).

There are many of these examples in London

The main users of the space in Margaret McMillan Nursery are 200 young school children from diverse backgrounds, who use the space on a daily basis. They learn to produce, and are eventually allowed to eat, the fruits and vegetables. The teachers use the garden for education, and some administration staff make compote from the apples and plums or take the fruits and vegetables home. During open days visitors from the neighbourhood and other parts of London come to learn. Two to seven volunteers per month assist in the management of the Forest Garden (Claire White, 2009). The Forest Garden in Hornsey Rise is a model in the city environment that offers medicinal and edible produce and permaculture courses to the community². This and other Forest Gardens in London, including Organiclea and Hackney Edible Forest Garden (a community operation run by volunteers on Hackney Marsh), are all part of a growing network of London permaculturists (Naturewise, 2009).

Resilient cities

Luc J.A. Mougeot imagined the city of the future as a resilient and self-sufficient city that reaches the stage of 'ecosystem' through an extensive use of urban agriculture. The provided examples show how local initiatives are striving to achieve this ideal, how agriculture benefits the local community through the provision of locally grown fresh food and how it benefits the environment by reducing waste through the promotion of composting. Local initiatives are also tackling the problem of pollution by increasing local biodiversity and reducing transport. However, to make greater strides towards to the city of the future, it is necessary to reach more citizens. What is needed is to enhance the understanding of citizens on how to grow diversified, ecological food in a productive way, and assure stable and year-round harvests. It will also be necessary to recognise the potential of the urban spaces

London's unsustainable Food system

- 2,400,00 tonnes of food are consumed in London each year;
- 29 per cent vegetables and 89 per cent fruits are imported;
- 883,000 tonnes of organic waste are produced per year;
- 11 per cent of total jobs are in the food industry
- 0.04 per cent (3000 people) work in agriculture;
- 13,566 Ha farmland in Greater London (mainly in Lea Valley area);
- 30,000 active allotment holders on 831 Ha of land, of which 111 Ha in inner London;
- 65 City farms in UK of which 8 in London since 1970;
- 77 Community gardens in London;
- 8,400 tonnes of vegetables produced commercially, 7,450 tonnes from allotments and 27 tonnes of honey from bees;

More information :

<http://www.londonfoodstrategy.org.uk/>

available in the city.

Given the fact that Londoners' eating habits produce nearly 19 million tonnes of greenhouse gas emissions³ per year it is important for a city the size of London to become a more sustainable environment with ecological human habitats and food production systems. The three examples given are part of the bigger picture that includes the Capital Growth campaign and many other emerging initiatives that are working towards reducing harmful emissions, saving money and also throwing away less food. The London's Food Sector - Greenhouse Gas Emissions report estimated that Londoners throw away a third of the food they buy. London's food waste alone results in some 6.3 million tonnes of greenhouse gases a year - more than the entire national output of Iceland.

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Spadework during Forest Gardening Course organised by Naturewise

Photo: James Taylor

Note

- 1) The Capital Growth campaign is run by Sustain's London Food Link - a network of organisations and individuals with members as diverse as farmers, food writers, caterers and community food projects (Sustain, 2009).
By following the link <http://www.projectdirt.com/page/capital-growth> it is easy to discover the locations of suitable land patches and current urban agriculture projects in London, as well as information on the organisations involved.
- 2) Naturewise workshops: Grafting and pruning of apple trees and creating a forest garden; Forest Garden principles and application - redesigning and succession (Naturewise, 2009).
- 3) The first report to examine the impact of what London eats on climate change was commissioned by the Greater London Authority and the London Development Agency, supported by London Food, compiled by Brook Lyndhurst and published in February 2009.

References

- Agroforestry Research Trust (2009) Forest Gardening, Agroforestry Research Trust, [online] Available from: <http://www.agroforestry.co.uk/forgndg.html> [accessed: 22 May 2009]
- Brown, J. Growing Communities, Presentation for "Food for London" conference, June 2008
- Burnett, G. (2008) Nature's wisdom regenerates London: Forest Gardening in the City, Spiralseed, [online] Available from: <http://www.spiralseed.co.uk/naturewise/> [accessed: 10 May 2009]
- Mougeot, L.J.A. (2006): Growing better cities - Urban Agriculture for Sustainable Development, IDRC.
- Naturewise (2009) About Naturewise, [online] Available from: <http://www.naturewise.org.uk/page.cfm?pageid=nw-aboutus> [accessed: 28 June 2008]
- White, C. (2009) interview. [Conducted at Margaret McMillan Nursery School by Dilyara Satdinova, 9 May 2009]

The Elephant and the Castle; towards a London Edible Landscape

37

Mikey Tomkins

Many urban agriculture and food-growing projects are currently being adopted by government and regional organisations within the UK¹, which seek to reconnect people to a sense of place through food-growing. However, authorities seem to have no clear and concise record of the volume of open public space and therefore grossly underestimate the potential of agriculture in the city.

There is a gap between the government's expressed desire to instigate urban agriculture activities and available knowledge on how urban agriculture could be retro-fitted into urban plans and integrated with current dominant food production and consumption patterns. Urban agriculture also needs to be linked to a reduction of GHG emissions beyond the usual "food miles" discussion.

One of the primary quantitative issues that need to be investigated is how much space is available for urban agriculture within UK cities and how many people it could feed. Such research is complicated by the fact that public space, beyond the municipal park, has an ambiguous function and is often under-recorded by local authorities.

As a first step, a 191 hectare test site was selected in the area locally known as the "Elephant and Castle" in central London². This area is characterised by large-scale housing, shopping and road developments erected in the 1960s, with an average density of 85 persons per ha (the average in London is 69 persons per ha).

Over a 21-day period, all public spaces in the test site were mapped using a seven-stage quantitative methodology. This consisted initially of walking through the area and recording land use on paper maps, and eventually resulted in the creation of a digital map³. Other areas, such as private gardens or disused sites were mapped on paper, then cross-referenced using Google Earth software. Both the local authority (Southwark Council) and the regional Greater London Authority (GLA) were then asked to supply data on open public spaces in the same 191 ha site, in the form of digital Geographical Information System files (GIS).

The site visits revealed that slightly over 21 ha of the 191 ha test area consisted of grassed public spaces, with few or no obstacles to access - all of which could support urban agriculture. By comparison, the Southwark Council GIS data



This photo shows the dominant Elephant and Castle: large scale post-war housing and shopping
Photo: Jamie Barra

showed only 14 ha of total open grassed public area within the test site, while the regional GLA GIS data showed an even smaller area of only 5 ha - a difference of 60 per cent. Neither authority could supply data on private gardens. It could be concluded that the further an institution operates from the local scale, the more it relies on remote sensing and the less detail it records.

Potential food-growing plots were distributed empirically throughout the 21 ha of grassed public area, based on the decision not to disturb current patterns of leisure or recreation. As a result, 6 ha of the 21 ha were deemed suitable for food production or 4.5 per cent of the total 191 ha.

In order to assess site yields, a basic unit for vegetable production was designed using yield data from the Royal Horticultural Society's (RHS) research on growing 22 varieties of vegetables for home consumption⁴. From this research, a figure of 31 tonnes per hectare was extrapolated.

At 31 tonnes per hectare, the yield from 21 ha would be 179 tonnes. When this is combined with estimates from other land types within the site (see table), the total figure for potential urban agriculture rises to 9 ha with a combined yield of 267 tonnes.

Based on the neighbourhood population of 16,245 persons and the average UK weekly vegetable consumption of 1,600 g, it can be estimated that the urban agriculture yield of 267 tonnes would provide 26 per cent of the average domestic vegetable requirements for each resident in the test site.

Table Land use types, their potential for UA and possible yields

Area Type	Total (ha)	UA as % of Total ¹	UA area (ha)	Potential Yield per (ha) ²	Total Yield for UA (tonnes)
Public Space	21.39	26.75	5.72	31.28 tonnes	178.99
Private Gardens	11.88	14	1.66	31.28 tonnes	52.05
Allotment	0.39	100	0.39	31.28 tonnes	12.20
Dog Exercise	0.44	14	0.06	31.28 tonnes	1.93
Private Sq	0.32	14	0.05	31.28 tonnes	1.40
Derelict	0.50	100	0.50	31.28 tonnes	15.64
School	0.09	14	0.01	31.28 tonnes	0.40
City Farms	0.52	25	0.13	31.28 tonnes	4.07
TOTAL ha	35.53		8.53		266.63

Calculations on what impact this urban agriculture production would have on CO₂ emissions were based principally on removing the corresponding transport from the food system. To calculate these “food miles”, the 22 varieties of vegetables included in the RHS yield data were bought at the local Tesco supermarket. Using country of origin labelling on each product, a CO₂ emissions calculation was made for a supposed transport mode – lorry, boat, long haul flight (Jones, 2001). This gave an estimated total CO₂ per km for the 267 tonnes of vegetables. The results show that, theoretically, the locally produced vegetables could eliminate 162 tonnes of CO₂ through total localisation⁵.

Although the calculation of food miles is not an exact science and fails to encapsulate the complexities of modern food-delivery systems (Weber and Matthews, 2008), the results demonstrate clearly that urban agriculture can and should be used to reduce the ever-increasing transportation of food, provided that local models are adopted which stress carbon-zero transportation. Urban agriculture could also seamlessly slip into the urban landscape, without dominating current land uses, and help to feed cities.

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Photos: Jamie Barra

“Land can be given a value by translating it into food-energy production”

Discussion

Within the test site there is noticeably an abundance of highly atomised and undocumented spaces, often with little or no identity⁶. Demonstrated by the disparity between the GIS data obtained from Southwark Council and the GLA, any investigation into productive urban agriculture based on local and region authority GIS data alone would indicate a marked lower potential yield.

Within the food-security debate, a provision of 26 per cent of weekly vegetable requirements represents a significant contribution, especially when considering that this was using only 27 per cent of the total potential space. This figure aligns well with research done in 2000 by Viljoen and Bohn (Viljoen *et al.*, 2005). The results also demonstrate that accurate land quantification can create a critical mass of landscape, which can be given a real value by translating it into food-energy production. The ability of this dormant space to provide a substantial percentage of a primary urban energy need in the form of food should allow for a fuller discussion of food as part of the “essential infrastructure” in cities (Viljoen and Bohn, 2005). Furthermore, the work identifies mapping for urban agriculture as a powerful tool in transforming the discourse of urban planning⁷.

Note

- 1)For instance, Capital Growth in London (www.capitalgrowth.org), The National lottery food fund (www.localfoodgrants.org) and, in 2007, Design of the Times in Middlesborough (www.dott07.com) are three high-profile examples.
- 2)Two secondary control sites were also selected for mapping: the first, measuring 107 ha, was adjacent to the primary site, while the second 23 ha site was located 1.5 km further South.
- 3)For extensive information on the mapping process see Tomkins, M. 2006: An Edible Urban Landscape available at www.cityfarmer.org/
- 4)The RHS research was conducted in 1975 on a 10 foot by 30 foot vegetable plot.
- 5)The research also looked at calculating the emissions from petrol lawnmower use.
- 6)Within degrees of magnitude, the two other control sites confirmed the results of the primary site for all results.
- 7)For research into mapping all rooftops in greater London see a thesis by Oscar Rodriguez (available at www.fcrrn.org.uk/research/library)

References

- Jones, A. (2001) Eating oil: food supply in a changing climate, Sustain. Organisation.
- Viljoen, A., Bohn, K. & Howe, J. (2005) Continuous productive urban landscapes: designing urban agriculture for sustainable cities, Oxford: Architectural, 2005.
- Weber, C. L. & Matthews, H. S. (2008) Food-Miles and the Relative Climate Impacts of Food Choices in the United States. Environmental Science & Technology, 42, 3508-3513.

Adapting to Climate Change and Building Urban Resilience in Australia

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Increasing urban production of perishable foods can increase diversity in the food system, adding new products, producers, techniques and systems that will resist different threats and meet different needs. As Australia continues to struggle with water scarcity and increasing climate extremes, food production in and around its cities can contribute to healthy and resilient communities.

The majority of Australian cities have some level of permanent water restrictions, and under climate change, South East Australia (home to Adelaide, Melbourne and Sydney) is predicted to have even less rainfall, higher evaporation (due to higher temperatures) and more unpredictable and extreme weather events. There were significant agricultural losses in the bushfires and heatwaves of early 2009, and continuation of the worst drought on record has seen the near depletion of Australia's most significant irrigation system and "food bowl" - the Murray Darling Basin.

Australians also reflect the current worldwide trend towards urban living, with two thirds of the population living in state capital cities. Rapid low-density population growth in Melbourne continues to drive urban sprawl over highly productive agricultural land. Australians have a very large environmental impact - we have the third highest per capita water consumption amongst OECD countries and the highest per capita emissions of greenhouse gases globally. Fewer than 7.5 per cent of inhabitants in the south-eastern state of Victoria meet the Healthy Eating Guidelines for fruit and vegetable consumption (DHS, 2006), contributing to significant health problems such as heart disease and stroke.

Australia now imports more fruits and vegetables than we export, and while access to imported food is an essential component of a resilient food system, continuing degradation of domestic supply capacity increases vulnerability to future shock. We have already seen the impact of local environmental factors on food prices, with the increasing cost of critical foods like fruits and vegetables exacerbating food insecurity in vulnerable communities.

Changes to how we produce our food, particularly urban production of fruits and vegetables, offer significant opportunities for reduced environmental impact (particularly

through the reduction of greenhouse emissions and the use of wastewater) and increased resilience in Australian cities as we adapt to climate change.

Food-sensitive urban design

Australia plays a key role in world food supplies, as a key exporter of agricultural commodities (we are the second largest exporter of beef, consistently one of the top five for wheat, and contribute about 13 per cent of global dairy exports). However, environmental and resource pressures are already constraining increased food production. Recent drought conditions resulted in less than half the average wheat yield (contributing in part to record global grain prices) and substantial reductions in Victorian horticultural production (50 per cent reduction in tomatoes and 10 per cent reductions in apples and potatoes; ABARE, 2008 and ABS, 2008). There is an expectation that agricultural systems must continually produce more exportable commodities to feed more people, but doing so in a sustainable way requires choices about: what foods we choose to produce, how (and where) we produce them, how we make the most of the resources we have, how they are distributed and how much is wasted.

Food-sensitive urban design is a new approach to urban development that takes food provision and access into account right from the outset in designing urban settlements. The forthcoming design of new precincts and developments in and around Melbourne's outer suburbs, and retrofit of existing urban areas to adapt to climate change, provides opportunities for a new approach that recognises the critical contribution of integrated food production to resilient urban settlements.

The concept of water-sensitive urban design is also gaining significant traction within Australian urban developments as the need to improve urban water management is critical.



Westwyck multifunctional communal space
Photo: Fiona Barker Reid

Extending this approach to include food is opening up dialogue and opportunities for the active design of food production and access in urban spaces. This can include: resources and infrastructure for production and processing, distribution, jobs, amenity and public space, and community health and wellbeing.

Food-sensitive urban design contributes to urban sustainability and provides the conditions for attractive, living environments through integration of urban planning and design with the production, distribution of and equitable access to healthy food. This means:

- *Trying to make use of urban productive capacity and resources to provide secure, healthy and sustainable food;*
- *Optimising synergies between food, energy, water and nutrients; and*
- *Reducing the need to transport food (hence water and energy) by producing it closer to where it will be eaten.*

Resilient people and communities

Resilient cities of the future will have the ability to provide food to their inhabitants in the face of shock and change, and will have the capacity to reorganise and create new solutions as operating conditions change either gradually or suddenly. These cities will have a diversity of food sources, and processing and distribution systems, with sufficient redundancy within the systems to withstand substantial shocks.

Resilient cities will also be dependent upon the resilience of the people who live within them. As the world grapples with the current economic crisis and the reality of climate change, it is clear that human mental and emotional resilience is already severely strained. Mental, behavioural and social health problems are an increasing health burden in all parts of the world and both poverty and food insecurity contribute to physical and mental health problems, particularly in children.

“Resilient cities have the ability to provide food in the face of shock and change”

As people become aware of the enormity of the challenges posed by climate change and peak oil, despair and disempowerment can be a natural response. However, the rapid rise in both home food production and participation in community food innovations suggest that active involvement in individual and community food production may provide a means of re-empowerment. Food production and exchange is emerging as a tangible, positive and enjoyable activity that people can do for themselves and their communities in the face of seemingly insurmountable challenges.

CERES (Centre for Education and Research in Environmental



CERES commercial garden beds
Photo: Serenity Hill

Strategies) is a long-standing example of the integration of community education and food production within Melbourne's urban environment. Set on 4.5 hectares of land, it is the most visited community environmental centre in Australia, and plays a critical role in both educating about sustainability and pioneering innovations that work within the city bounds. CERES has now successfully established a working urban farm in the heart of a densely populated residential area, and achieved organic certification despite being established on an old landfill site. It also manages an adjacent section of land for food production and runs a market of its own (supplemented with additional external produce) twice a week. In addition to the farm and market (which employ 4 people full-time and another 22 part-time), CERES commercial operations include an organic seedling propagation centre, a nursery specialising in bush foods (indigenous food-producing species) and other permaculture plants, and an organic café (60 per cent of whose produce is grown at CERES). With a continuing commitment to creative community food solutions, CERES has also been a partner in establishing a range of social enterprises, including a mushroom farm and a catering business, which are now becoming established commercially. A new aquaponics operation uses nutrients from fish production to grow greens for the market. Seventy-five per cent of CERES' income is generated by these and other enterprises.

Many Melbourne suburbs contain well-established fruit trees, which often produce far more than the current residents require. This has led to new arrangements for exchanging surpluses. The first Urban Orchard (at CERES) now has 140 households as members, who exchange surplus fruit and vegetables weekly at the market. This model has now been taken up and adapted across Melbourne, with at least three more groups operating regularly.

'Permablitz' emerged in Melbourne in 2006, initially as a small group of people helping each other to 'make-over' suburban gardens for food production using the principles of permaculture. This model of volunteerism – contribute to the work in three other gardens and you earn support for your own – has rapidly expanded to include workshops, lunches and social activities. The model itself has now been

successfully replicated in other Australian cities and internationally (including in Uganda).

Resilient water systems

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Food grown in urban areas can make use of appropriately managed greywater, as well as rainwater and stormwater that currently run off impervious surfaces and return to the ocean. A recent study of water availability and use in the City of Melbourne found that more than 80 per cent of Melbourne's current water needs could be met with the rain that falls on the city (if it was captured) and that approximately 12 per cent of all water is used to irrigate open spaces and private gardens. A conservative redistribution of some of this water to food production could produce between AU\$5.7 and AU\$29.4 million of fruits and vegetables (2001 and 2005 prices, respectively, and reflective of average and best practice water use efficiency).

Urban effluent is a widely under-utilised resource that could contribute significant quantities of water for agricultural production. Wastewater can be treated in small, decentralised systems, appropriate for inner-urban use, or in more traditional treatment plants on the urban periphery. In Melbourne 23 per cent of wastewater is recycled, of which more than 30 per cent is used for off-site agricultural production, while a number of small regional centres recycle all of their effluent for local agriculture. There are issues with reusing wastewater for food production, but with focused



Conversion of inner-urban Melbourne front garden to food production
Photo: Kirsten Larsen

research, development and appropriate management, Victoria's 448 GL/year of effluent could be a valuable resource for food production.

Westwyck is an eco-housing complex in inner-city Melbourne that incorporates on-site water collection (rainwater), water treatment of both grey- and blackwater, and water reuse in the garden and within the residences (for toilet flushing, clothes washing and showering). A communal vegetable garden is a focal point of the shared space and provides an opportunity for residents to participate, learn and propagate and consume fresh produce. Elsewhere in Melbourne, a new project is under development by a local water authority that will install urine separated toilets to 25 homes, with the urine provided as a valuable fertiliser for local horticultural production.

Conclusion

Maintaining capacity (land, resources and skills) for food production and provision in and around urban centres is a

Barriers to urban food production

There are barriers to Melbourne's urban food production that will need to be overcome. These relate largely to skill levels and institutional systems (restrictions on outdoor watering, centralised water infrastructure and control, planning conventions and widespread but poorly mapped land contamination). Overcoming these barriers will be central to unlocking the potential of the physical resources within city bounds.

critical part of a resilient food system. Production of a significant proportion of fruits, vegetables, eggs and even some dairy within urban areas could reduce reliance on long supply chains, make use of resources in urban areas, and potentially reduce price exposure for these essentials in a healthy diet.

A range of scales should be implemented for urban food production systems, from current large-scale periurban vegetable production, to small, intensive areas within the city. We need to re-think the food production landscape to include rooftop production, hydroponics, aeroponics, aquaculture and possibly even vertical farms. Australia has a strong history of agricultural research and these skills are needed to design food systems that are feasible, sustainable and productive.

Urban food production represents a rare convergence of available resources, community interest, scientific knowledge and enterprise and knowledge export opportunities. It is not "the solution" to the problems we face in the food system, but it has the potential to help, while contributing to urban landscapes, making use of available renewable resources, reducing greenhouse emissions and increasing resilience of food systems, communities and cities themselves as we adapt to climate change.

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References

ABARE (2008). Australian Commodities – December quarter 08. Canberra.

www.abareconomics.com/publications_html/ac/ac_08/ac_08.html.

ABS (2008). Agricultural Survey, Apples and Pears, Australia. Australian Bureau of Statistics.

www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyCatalogue/3D5E98B22C97E16ECA256E620076EF4C?OpenDocument.

DHS (2006), Victorian Population Health Survey 2006. Department of Human Services, State of Victoria. www.health.vic.gov.au/healthstatus/downloads/vphs/2006/vphs2006.pdf.

Useful websites

<http://www.ceres.org.au/index1024x768.htm>

<http://www.permablitz.net/>

<http://www.westwyck.com/>

The Role of Urban Agriculture in Waste Management in Mexico City

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Agriculture in what is now Mexico City can be traced back to the great city of Tenochtitlán, one of the most important urban centres in Mesoamerica (Palerm, 1990). New forms of agriculture have recently emerged in and around Mexico City, which, like those in prehispanic times, can be categorised as urban ecosystems because the majority of the inputs are obtained from the bioregion.

Mexico City has an average altitude of 2,200 metres, a mild climate with temperatures from 18°C to 24°C and annual rainfall that ranges from 700 to 1,400 mm. The Mexico City Metropolitan Zone (MCMZ) covers an area of 7,860 km². This area includes the Federal District and 54 municipalities, which together have a population of 22 million (INEGI, 1990).

The area's principal production systems can be categorised as urban (family gardens and backyard milk and pork meat production), suburban (vegetables, flowers, backyard and kitchen gardens, greenhouses and dairy production), and periurban (on terraces - *nopal* production, kitchen gardens, corn, silvopasture, milk and dairy production, bees and sheep; and in the valleys - livestock systems, with extensive greenhouses, amaranth and *tuna*-prickly pear production).

Nopal is an important production system
Photo: H. Losada



The inputs for these different urban production systems are either household wastes or by-products from the city.

Organic waste

In general, low levels of external inputs are used. Solid organic waste is an important source of food for animals and comes from markets, restaurants or homes. The amount of solid organic waste obtained from local markets and from the city's metropolitan food supply depot (CEDA) is considerable. Occupying 300 ha, the CEDA receives 60 per cent of the national harvest and distributes fruit and vegetables to the markets in and outside Mexico City. Losada *et al.* (1996) estimated the daily organic waste production (in 1996) to be 725 tonnes. At least 90 tonnes of this waste was used to feed approximately 2,500 dairy cows in the vicinity (east of the city), which produced about 37,500 litres of milk per day. The tomato waste was especially used to feed (about 50,000) pigs, while other waste was used to feed chickens and rabbits.

Organic solid waste from the food processing industry (tortilla factories, *nixtamal* corn processing, mills, bakeries, cookie/cracker factories and others) is used in stables as a food source with a high starch concentration, as well as for backyard livestock (for the production of milk and meat) and pig farming. The latter two systems also receive organic solid waste products from homes. Grass from the sidewalks and traffic islands, constitutes a secondary source of fodder for the dairy stables in urban spaces.

In the suburban and periurban zones, fresh or dry dairy cattle manure serves as an excellent input for agricultural activities. It is a good source of organic material, macronutrients (N, P, K) and water, and it protects crops against low temperatures. The latter two benefits are of particular importance in *nopal* cultivation on terraces. In the suburban *Chinampa* system and in the periurban valleys, excreta in dried form (20 per cent water) is used as compost (*Chinampa*) or added directly to the crops (corn). Unpublished data from Losada *et al.* (2000) show that the amounts of excreta used are equivalent to 730 tonnes per/ha/year in the *Chinampa* zone, 540 tonnes/ha/per year in the *nopal* zone and 50 tonnes/ha/year in the *tuna* (prickly pear) zone. Plant residues from *nopal* production (14 tonnes/ha/year) serve as an important input in the terraced area during the pruning season (March, April and May). In all cases the waste is obtained for free; only transport needs to be paid for.



Low levels of external inputs are used

Photo: H. Losada

Mass and energy flows

Other external inputs need to be considered in the city's energy balance (see also the next article). In the more advanced dairy systems these include externally acquired pregnant cows, medicines, semen (for artificial insemination), high-protein foodstuffs, mineral salts, vitamins and other supplements. In more commercial agriculture these are seeds, inorganic fertilisers, herbicides and insecticides, and material for the greenhouses.

Labour input is generally more intense in the production of vegetables, legumes, flowers and *nopal* (both in the *Chinampa* and terrace systems; Canabal and Torres, 1992) than in the livestock systems (with some exceptions, such as in stables). Water and energy use, however, is higher in livestock systems. The higher use of gasoline and transport for agricultural products results from transporting manure from the stables to the field and the harvested products to the market.

The waste consumed by the animals in urban dairy farms is predominantly local and the waste excreta coming from stables and pig farms forms an important input for agriculture in the suburban and periurban zones. Energy balances in these urban systems are not optimal. Research on *nopal* production (Losada *et al.* 1996) shows different degrees of efficiency in the capture of energy as well as in the use of macronutrients.

In contrast to conventional production systems that are highly dependent on non-renewable sources and fossil fuels, the energy and macronutrient flows in these urban and periurban systems depend on inputs of biological origin, which constitute a renewable resource. These systems also have a positive medium to long term positive effect on soil formation.

Urban agriculture

New urban production systems in Mexico City, such as the *Chinampa* system (which is considered more diverse -see the next article-) and the terraced (*nopal* vegetable) and *tuna* (Teotihuacan) production systems are well adapted to the urban environment. They make optimal use of local inputs, use local wastes as a source of nutrients and are interlinked. Like any production system, these systems need proper management (especially in the dairy systems the odour produced and the presence of flies need to be controlled), but they pose relatively little danger to the urban environment.

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References

Fenn, M E., 1996. De la Limitación del nitrógeno al exceso: saturación de nitrógeno en bosques de Norteamérica. 11th International Symposium and 111th National Meeting on Sustainable Agriculture.

National Institute of Geographical and Computerized Statistics (INEGI), 1990. General Population and Housing Census. Losada, H., D. Grande, J. Vieyra, L. Arias, R. Pealing, J. Rangel and A. Fierro, 1996. A sub-urban agro-ecosystem of nopal-vegetable production based on the intensive use of dairy cattle manure in the southeast hills of Mexico City. *Livestock research for rural development*. 8(4):66-70.

Palerm, A. 1990. Prehispanic Mexico. Essays on evolution and ecology. National Council for the Arts and Culture. Mexico.

Energy Balance in a Suburban Chinampa Agroecosystem in the Southeast of Mexico City

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The *Chinampa* agroecosystem is a very diverse sub-urban production system (Jiménez et al., 1990, Losada et al. 1998) in Mexico City. Soriano (1999) described the whole *Chinampa* system as composed of five interlinked subsystems (*Chinampa* plots, dairy cattle units, backyard production, home gardens and greenhouses). A summary on an evaluation of energy flows and energetic efficiency of the *Chinampa* system is presented here.

Agricultural energetics involves the analysis of energy flows from all inputs and outputs of a crop or an animal production system, most often emphasising the efficiency of interlinked production subsystems. Usually an input-output ratio is calculated as an indicator of the production efficiency of a given product. It can also be used as an indicator of sustainability (Senanayake, 1991): the lower the energy ratio, the more expensive the system. The analysis of any production system depends on the boundary adopted. Energetic evaluations are important because they highlight the depletion of non-renewable sources of energy and the increasing effect this has on prices.

Four *Chinampa* subsystems and three dairy subsystems were analysed. Data on inputs and outputs was collected through interviews with the owners. The energy values of the different inputs and outputs of both sub-systems were determined using standard energetic values (Mega Joules per kg) from different literature sources, or were estimated using vegetables of similar chemical composition. The study looked at the energy required for the production of chemical fertilisers, improved seeds (a high percentage of seeds are locally produced), and feed for animals. Manure was considered to be an input to the *Chinampa* plots and an output for the dairy units. Maize is locally produced, hence only its energetic value was considered and not the energy invested in its production.

Among those studied, the most efficient production system turned out to be a dairy unit owned by Roberto Peña (RP in the table), while the *Chinampa* plots were less efficient. The most important factor affecting the efficiency was the use of external inputs, which increased the energy consumption. As manure is exchanged between the two sub-systems, modifications in the energy balance accordingly showed

better energy ratios for the *Chinampas*.

Vegetable production in the *Chinampas* is a low-energy system. The use of local seeds and organic fertilisers accounts for important savings of energy because these inputs do not require extra energy to be produced. *Chinampa* production units that used their own materials (internal inputs) were more efficient, hence, the sustainability of *Chinampa* agriculture depends on the system itself, i.e. on the use of the units' own wastes or recyclable materials.

The use of industrial by-products in milk production improves the efficiency of the dairy systems. Considering manure as an output rather than as a waste gives another dimension to the efficiency of such sub-systems. The use of industrial by-products (wheat bran, milled maize, maize dough, oats straw) is desirable in energy terms, since this uses energy sources that would otherwise be wasted.

Modified energy ratio in the seven production units studied.

	<i>Chinampa</i> plots				Dairy units		
Prod. unit	FR	SF	MF	H	AN	AS	RP
E. Ratio (I/O) MJ input/MJ product	122.48	26.06	3.9	31.9	0.54	1.011	0.19
Energy ratio modified	32.14	8.5	1.5	8.6	4.78	6.01	1.75

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References

- Jiménez-Osornio, J., T. Rojas, S. Del Amo and A. Gómez-Pompa. 1990. Past, present and future of the chinampas. Maya sustainability. University of California Riverside. USA.
- Losada, H., H. Martínez, J. Vieyra, R. Pealing, R. Zavala and J. Cortés. 1998. Urban agriculture in the metropolitan zone of Mexico City: changes over time in urban, suburban and periurban areas. *Environment and Urbanization*. 10(2):37-54.
- Senanayake, R. 1991. Sustainable agriculture: Definitions and parameters for measurement. *Journal of Sustainable Agriculture*. 1(4):7-28
- Soriano, R. 1999. The *Chinampa* system as a model of sustainable agriculture. PhD. Thesis. Wye College, University of London.

Organising Urban Farmers' Groups in the City of Nairobi and Environs

Various types of informal groups can be found in urban and rural areas in Kenya. One would expect farmers, livestock keepers and producers' groups to be located only in the rural areas, but they actually also exist in the cities and their environs, where they are engaged in urban and periurban agriculture.

Some groups in Nairobi

- Kabete Women Farmers' Group in Lower Kabete is interested in obtaining information on farming practices and marketing.
- Crop farmers in Soweto Kahawa West grow kale, spinach, onion, arrowroots and carrots, and their main interest is in obtaining information on increasing yields.
- Mathare Youth Foundation in Mathare grows crops such as spinach and other vegetables and rears cows, goats and pigs.
- Mathare Mbolea in the Mathare area is made up of compost makers and their interest is in marketing compost.
- Mwirimiri Mugunda Self-Help Group in Wangige area keeps livestock and would like to obtain more information on marketing.

The groups listed in the box above are mobilised in a multi-stakeholder forum – Nairobi and Environs Food Security, Agriculture and Livestock Forum (NEFSALF) – which has been operated by the Mazingira Institute¹⁾ since 2003.

NEFSALF

NEFSALF is a mix of actors from the community, government and market sectors. It promotes cooperation around the city and environs in matters related to food security, agriculture and livestock keeping. The Forum envisions creating a better way of enhancing food security and sustainability for the greater population rather than just a few in Nairobi and its environs through urban crop production and livestock keeping.

The goals of the Forum are to facilitate

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Farmers and livestock keepers from the Farmers' Network and members of NEFSALF Secretariat.

sectoral interactions; to acquire and target relevant knowledge; and to monitor process and evaluate outcomes. One of the key objectives of NEFSALF is to facilitate organisation at community level through group and network building. Other objectives are to:

- enable farmers and livestock keepers to exchange information through periodic meetings of NEFSALF and through the NEFSALF Bulletin (www.mazinst.org);
- facilitate access by communities to appropriate provincial and municipal services;
- provide knowledge on current research being undertaken by the Institute's collaborators;
- produce policy-relevant information and knowledge in collaboration with all stakeholders;
- facilitate interaction between the community and the market sectors; and
- track the process and activities.

NEFSALF FARMERS' NETWORK

The Farmers' Network was set up in January 2004 by Mazingira Institute. It consists of individuals and groups practicing agriculture, livestock keeping and composting in the city and environs of Nairobi. A Steering Committee of eight members of mixed gender from different locations in Nairobi and environs was elected in January 2004 by farmers present during the first NEFSALF meeting. Currently there are 32 groups,

with membership ranging from 5 to 1000 members (an average of 10 members per group) and 141 individuals from Nairobi and environs.

The members of the Network get together during the periodic meetings of NEFSALF, the annual International Trade Fair held by the Ministry of Agriculture and other events such as the World Food Day and the launch of the Nairobi Agriculture Livestock Extension Programme (NALEP).

NEFSALF provides the farmers and livestock keepers with an opportunity to interact with all stakeholders present during Forum meetings, which are usually held three times in a year. The participants are kept abreast of the latest happenings and information on urban agriculture, including progress on research being undertaken on zoonoses and brucellosis. The discussions and debates are lively, with the concerns of the farmers, the livestock keepers, the market sector and researchers being aired and discussed openly in order to enable and regulate urban agriculture and livestock keeping in Nairobi and environs.

SUPPORT PROVIDED

Training courses

The Institute organises training courses on urban agriculture and livestock keeping in collaboration with the Nairobi Provincial Livestock Production

Office of the Ministry of Livestock and Fisheries Development, Urban Harvest and Kenya Green Towns Partnership Association. Pre-training site visits are made to assess the type of training required by the farmers. So far, about 120 farmers, livestock keepers and compost makers have been trained on a variety of pertinent urban agriculture topics. Post-training site visits have indicated that 80% of the trainees have adopted skills gained from the training courses.

In the words of Sylvia Oluoch, a member of a women's periurban group, "Through the Forum we have learnt not to fight with our neighbours but to teach them what we know". Another farmer, Julius Mirara, a dairy goat keeper in the Nairobi environs commented, "Before the course, we were in the dark. By taking the course we have learnt what profit is and how to keep records".

Research on zoonotic diseases

The Faculty of Veterinary Science, University of Nairobi, in collaboration with NEFSALF, has conducted research on the risks associated with livestock keeping in slums in Nairobi. Currently a study is being undertaken on the prevalence of human brucellosis. The study on zoonoses revealed the possible existence of brucellosis among the livestock keepers.

Nairobi International Trade Fair

The Nairobi International Trade Fair is an annual event hosted by the Kenyan government. NEFSALF has taken part in the Fair for the past two years as a collaborator with the Nairobi Provincial Extension Service Office of the Ministry of Livestock Fisheries Development. Members of the NEFSALF Farmers Network represent the Forum. Their role is to explain the functioning and activities of NEFSALF and to register new members. The farmers say that they learn a lot through the exchange of information and by seeing new developments at the Fair.

Networking with other organisations in Kenya

Two other cities in Kenya, Nakuru and Kisumu, have replicated the NEFSALF approach. The Mazingira Institute participated in several meetings held in Nakuru and Kisumu. The Nakuru initiative "Local Participatory Research and Development on Urban Agriculture and Livestock



NEFSALF meeting in October 2005

Keeping", was undertaken by Urban Harvest, Kenya Green Towns Partnership Association, the Municipal Council of Nakuru and the Department of Soil Science, University of Nairobi. Several multi-stakeholder forums have already been held in the two towns.

NALEP

NEFSALF has been actively involved in the National Agriculture and Livestock Extension Programme (NALEP) of the Ministry of Agriculture, which is in its second phase. Its mission is "to provide and facilitate pluralistic and efficient extension services for increased production, food security, higher incomes and improved environment". The long-term objective is overall empowerment of farmers, sustainability of service delivery and a bigger role for the private sector. The implementation process follows a bottom-up approach.

Realisation of NALEP Phase II objectives are dependent on effective partnerships with other government ministries, the private sector, and other collaborators. When NALEP began its second phase (2006-2010), the Ministry of Agriculture realised that in order to fulfil its objective of pursuing a pluralistic approach, it was important that NEFSALF be involved, as it had already set up a Farmers' Network, had a strong relationship with other stakeholders and had built up networks in other cities in Kenya besides Nairobi. The Ministry formed a Provincial Stakeholders Forum, and an interim Steering Committee was elected with Zarina Ishani of Mazingira Institute as its vice-chairperson.

TOWARDS A POLICY FOR URBAN AND PERIURBAN AGRICULTURE IN NAIROBI

In the next phase, beginning January 2007, NEFSALF intends to collaborate with relevant institutions involved in the

formulation of policies for urban agriculture and livestock keeping. The policies and bye-laws currently in practice are outdated and disjointed. The process began in July 2004, when a stakeholders' meeting on "Urban and periurban agriculture policy prospects in Kenya" was held at the Kenya Agriculture Research Institute, which was attended by some NEFSALF members. At the meeting, it was resolved that the Ministry of Agriculture would be the most apt institution to carry forward the process of developing a policy for urban and periurban agriculture.

In March 2006, the Nairobi Provincial Agriculture Board hosted a two-day "Stakeholders' workshop on urban and periurban agriculture". The meeting adopted a road map for the development, regulation and enabling of a legal framework for urban and periurban agriculture. It concluded that the PAB would appoint a Steering Committee on urban and periurban agriculture to spearhead the roadmap. A technical committee would be formed to guide and implement the recommendations. NEFSALF members are keen to push the matter forward and are working on the modalities for doing so.

Mazingira Institute has been campaigning for just reform and against land grabbing and corruption since 1996 in its "Operation Firimbi" (Blow the Whistle) Campaign. The campaign has a national support base, with over 165 local chapters in Kenya. The Institute also advocates for women's equal right to land and property, particularly at the regional and international levels.

NOTES

1) Mazingira is a Kenyan NGO that has pioneered research, advocacy, and organising on urban and periurban agriculture for the past two decades. For further information contact: mazinst@mitsum-net.com

Creating Market Opportunities for Poor Women Farmers in Kenya

African leafy vegetables (ALVs) are traditionally an important element in the diet of many Africans, but the market has remained underdeveloped due to the lack of any successful efforts to commercialise the crop. The sources of a few bunches of vegetables in a Nairobi market were traced back mostly to wild harvesting by small-scale women farmers in western Kenya – 400 km from Nairobi. It appeared that brokers and traders packed the vegetables in sacks that were transported to the city in night buses. This drastically reduced the quality of the vegetables. Interventions initiated in 2002 by FCI and its partners have dramatically reversed this trend.

CIP/Urban Harvest



Discussions with a periurban farmer

The intervention programme seeks to help farmers achieve a reliable source of income and improve nutrition. The programme aims at increasing the commercialisation of ALVs through improved production, enhanced collective marketing systems, increased value chain efficiency, increased demand, increased consumption, improved image of leafy vegetables and new consumption linkages. It operates in several villages in Kiambu, Kenya, and works towards satisfying the ever-increasing market demand for ALV in Nairobi.

FCI is a market development agency that develops marketing models and strategic alliances to enhance economic growth among poor communities. It implements market-oriented programmes across Eastern Africa and offers technical backstopping to several development projects in Sub-Saharan Africa.

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Urban Harvest is a system-wide initiative launched by the Consultative Group on International Agricultural Research to direct and coordinate the collective knowledge and technologies of the Future Harvest Centers with the aim of strengthening urban and periurban agriculture (UPA).

The programme is co-funded by the Rockefeller Foundation, USAID Horticulture Development Programme and IDRC for three years, and it is being implemented by Farm Concern International (FCI) in collaboration with IPGRI-SSA, AVRDC-World Vegetable Centre, CIP, Urban Harvest, the Kenyan Ministry of Agriculture, Kenya Agricultural Research Institute, and value chain players.

Before the programme began in 2002, most of the farmers growing vegetables were not organised, which hampered access to any technology, credit, information, markets or extension services from the government. Their farms were weakly developed and they produced mainly for subsistence. They were selling to informal markets but only in small volumes. Most of the poor farmers were surviving on less than

a dollar per day. Intermediaries were not interested in trading African indigenous vegetables, because there were no (identified) consumers willing to buy them.

SOCIO-ECONOMIC IMPACTS

Enhancing market access for ALVs has produced enormous market growth, as ALVs have evolved from an underutilised crop to a commercial crop, with monthly market turnover increasing from 31 tonnes in 2003 to 600 tonnes in mid 2006. This amounts to 10 tonnes of seed valued at USD 430,000 annually (Nekesa and Meso, 1994).

ALVs are largely referred to as women's crops, because approximately 60% of the producers in the commercial villages are women. A study conducted by FCI in collaboration with Urban Harvest also revealed that ALV informal trading is dominated by women, who account for 75% of all the value chain players. ALV-based transactions targeting the supermarkets and local markets are an enormous source of income to large numbers of households in the rural, urban and periurban areas. ALV smallholder commercial farming currently generates USD 2 million in rural incomes annually.

This is by far one of the most promising crops for poverty eradication owing to its large demand (a gap of demand over available crops of over 40%), the large role played by women in the ALV trade, the plants' relatively high resistance to diseases and pests and the lower cost of production compared to many other crops. Most of the farmers in the FCI programme have shifted cultivating cut flowers to cultivating ALVs.

In addition to continuing growth, the interventions aimed at improving health, nutrition and the incomes of vulnerable groups, including those infected with and affected by HIV/Aids, through stimulation of production from home gardens and commercial farming systems. The programme focuses on progressive economic development, enterprise promotion related to the mainstream activities of the target group and an improved socio-economic environment conducive to the needs of poor women.

FCI and CGIAR partners and their respective roles and contributions

FCI works together with Urban Harvest for market research of urban vegetable trading systems; with AVRDC and IPGRI for multiplication and distribution of clean base seeds of selected micro-nutrient-rich ALVs; with the Ministry of Agriculture and KARI for farmer training; with value chain players for market entry; and with over 100 producers' groups to enhance commercialisation of ALV seeds and products. The research organisations AVRDC and KARI have been building the capacity of farmers through training on seed multiplication and agronomic practices. The Ministry of Agriculture offers extension services to farmers. Urban Harvest has been crucial in mobilising and empowering farmers through training on all husbandry practices for these vegetables.

APPROACHES, METHODOLOGIES AND INNOVATIONS

Market research was conducted using the 'Value Networks and Marketing Systems' tool, which is a hybrid private sector and pro-poor development research tool developed by FCI for identifying production practices, the size of the market and market dynamics. The research identified an enormous potential market demand for over ten species of African leafy vegetables.

The VNMS has six steps, but FCI used only the following five in its research on ALVs:

CIP/Urban Harvest



ALVs for transport to a supermarket

- analysis of the size of the market demand;
- analysis of consumer and market behaviour;
- identification of market segments and selection of target markets;
- analysis of value networks and marketing channels (including value chain analysis, supply chain analysis and marketing channel analysis);
- integration of the target group in value network profiling, business viability analysis and product value analysis.

Since low product awareness and the image of ALV as a 'poor man's food' greatly inhibited market growth, FCI began mobilising the communities in the various target sites to adopt the ALVs. Most of the communities were new to the production and marketing of ALVS.

Production technology dissemination

The producers' groups had very little knowledge on general agronomic practices related to the production of ALVS. FCI therefore disseminated information on production technologies through on-farm training, on-station training, distribution of ALV production manuals, dissemination of leaflets on specific vegetables, training of trainers, and Multifaceted Technology Dissemination Forums (a technology dissemination tool developed by FCI). It engaged trained and practicing farmers through exchange visits, field days and farmers' forums to train other farmers and demonstrate the adopted technologies. Over 3,000 farmers received technology training directly, while by using Radio FM

station and a local national radio broadcasting station, it is estimated that over one million households have accessed information about ALVs' production technologies.

One of the challenges highlighted by the farmers was lack of enough quality seeds, so FCI designed seed distribution channels that reached the smallholder urban and periurban farmers. FCI identified seed stockists and linked them to seed companies and other seed-multiplying farmers to supply seeds via rural – urban linkages. Farmers were trained on seed-multiplication techniques, which turned out to be an excellent business opportunity for two medium-scale farmers and over 300 smallholder farmers, who eventually sold over 10 tonnes of seeds since the project started in 2002.

Smallholder farmers' simultaneous production and supply to markets has been a major drawback to negotiating prices along the value chains and at the marketplace. A production strategy was designed to ensure that a consistent supply of vegetables to the market could be achieved, which is paramount to sustained demand in the markets. The schedules and production calendars are made in tandem with market demands and every farmers' group has the members plant over the same period. Production schedules and calendars are developed by production sub-committees in a participatory manner.

Commercial village approach

A commercialisation phase set up

according to the Commercial Villages Approach (CVA) helped FCI and its collaborating partners organise 1,700 smallholder farmers into four commercial villages in Kiambu District, 50 Kilometres from Nairobi. The CVA is a concept that involves commercialisation of various farmers' groups clustered in a village to ensure that the highest numbers of members are practicing commercial farming. Farmers from similar social backgrounds are organised into Market Support Units (MSUs) and their capacity built as a commercial unit which can effectively and sustainably market their produce as a group. The MSU designs production schedules which ensure that they are able to sell ALVs consistently to both formal and informal markets. This model of organising farmers into groups is vital for a collective approach to markets for the urban smallholders whose volumes are too low to meet orders from big chain stores and institutions.

Market channel systems and value network development

Market access was achieved through a systematic approach to Value Networks Development, which included informal and formal value chains and Business Development Services (BDS) like transportation, seed supply, and distribution networks to various consumer segments. FCI identified many players including high value markets, supermarkets, institutions, grocery stores and informal market traders, who were linked to the MSUs whose schedules allowed them to consistently meet market demand. Market entry for ALVs has been extremely high, with supermarkets offering prices for ALVs that are 20% higher than other conventional vegetables. MSUs were linked to supermarkets and given transaction documents, such as invoice and receipt books, and taken through the transaction process on the market. FCI holds contracts with supermarkets and farmers, which ensures favourable prices throughout the year.

Market Access Financial Services

Formal buyers generally purchase produce on a 30–60 days' credit, which excludes smallholders from supply systems since they cannot afford to sustain the credit period. FCI developed Market Access Financial Services (MacFis), which acts as a catalytic fund available only until the MSU builds enough capital from sales to stop using the system and is selling collec-

tively. The groups are required to deposit 10% of their earnings. This approach has allowed over 50% of the initial groups to finance the process. They receive support in the form of a transport van hire payment, local authority levies, input discounts and invoice discounts.

Capacity building

FCI has designed training packages and training modules to enhance capacity, create cohesiveness among members and make the MSUs competitive. FCI has used 15 of the 30 training modules for ALV farmers.

Creating demand

Consumer preferences and demand for ALVs have been enhanced through a systematic promotional strategy targeting all consumer classes. The strategy includes a series of ALV in-store and outdoor promotional campaigns, distribution of leaflets, flyers and booklets, live radio and television talks, exhibitions and trade fairs. Promotional approaches are benchmarked to the private sector approach, raising more awareness across various target markets of the nutritive and medicinal benefits of ALVs. A Rapid Market Appraisal conducted by FCI in collaboration with value chain players revealed the current supply level is only meeting 60% of the demand.

SCALING UP AND SUSTAINABILITY

The farmers are being encouraged to save up to 10% of their sales to wean them off of MacFis funds. MSUs are being introduced to the market where they are identifying market opportunities and their capacities are being built to maintain established linkages and identify other markets.

To scale up the intervention, FCI has combined resources from various sponsors to empower more farmers in urban centres of Kenya and Eastern Africa to commercialise vegetables and other products. One of these products is orange fleshed sweet potatoes. An impact study will be conducted to determine the gains achieved so far and engage in further intervention. Groups are being formed and registered by the Ministry of Culture and Social Services in Kenya and can continue until dissolved by two thirds of their members. Over 90% of the groups that have passed through the commercialisation process have been growing and

marketing African leafy vegetables collectively for the last four years, driven by the existing demand gap of over 40%.

CONCLUSION AND RECOMMENDATIONS

Sustainable access to the market for smallholders requires products for which there is a high to intermediate demand growth. Large-scale farmers, companies and medium-scale farmers are known to shut smallholder farmers out of the market more often than not. Any strategy aimed at reinforcing the smallholders' chances of remaining in business ought to further integrate products that offer competitive advantages, such as lower production costs. ALVs, for example, are easily grown with no inorganic chemicals.

A collective approach plays a vital role in increasing the participation of the poor. In order for smallholder farmers to compete effectively in all market segments, their capacities to access markets have to be built, they have to become organised into MSUs and linked to markets. Before their products can penetrate market, the products' image and value have to be built through a private sector approach in awareness creation. Credit as a stand-alone product may not necessarily increase incomes, but micro-credit embedded in a market access programme increases rural incomes and thereby contributes to increased rural savings and reduced poverty levels.

Poor farmers in urban and periurban Africa are earnestly longing to get market support through such interventions, which can create a quantifiable income for them and emancipate them from poverty. A lot of technology has been disseminated, but it can only help if it increases their incomes.

References

Nekesa and Meso, 1994

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The fact that handicapped children are involved in urban agriculture is an innovation



Rebecca Rutt

Community-Based Urban Agriculture in Two East African Capitals

Urban agriculture is commonly a solo endeavour practiced by individuals and households in search of fresh food. The benefits of urban agriculture activities are well-documented, so the search for ways to realise its valuable societal contributions is a vital issue particularly within the developing world, where urban farming is frequently the main livelihood activity and has the highest potential for impacting daily lives.

farmers are now better able to unite in order to address common problems and needs. Alice Tebyasa of the Kawempe Division of Kampala is a community leader and organiser of one of many successful collectives.

One of the ways that city farming may contribute exponentially to a developing urban centre is through the collective action of farmers. Repeatedly, groups will form when community members are faced with an overwhelming social crisis or need that is felt by a number of a neighbourhood's residents. Shared struggles give birth to teamwork and cooperation. In two capital cities of East Africa, Kampala, Uganda, and Nairobi, Kenya, evidence of the achievements of community-based urban agricultural ventures abound. This article focuses on creative farmers and their achievements, which came about through hard work and collaboration. Furthermore, it will elucidate some of the distinct differences experienced by farmers and farmers'

groups based on the legal or illegal status of urban agriculture. Illegality can often be equated with a lack of confidence in urban agricultural activities due to the greater risks involved.

This article presents several community-based agricultural endeavours in Kampala, Uganda, and Nairobi, Kenya, as encountered in mid-2006 during research on local innovation in urban agriculture by the author. Involving marginalised groups such as women, physically and mentally disabled as well as at-risk youth, these projects have revitalised impoverished areas and improved the overall health of people in many small neighbourhoods.


KAMPALA, UGANDA

Now that it has been legalised (as of 2005), urban agriculture in Kampala, Uganda, has become a valued addition to the urban livelihood mosaic, and it has been enhanced by governmental recognition and supportive urban policies. Kampala's

In 1997, Alice was elected councillor. In this role she searched for a way to involve her female neighbours in some kind of agricultural activity. She invited extension workers, poultry, fishery and agricultural experts to participate in a workshop to educate women in the community. The women then prioritised their personal needs and abilities and came up with the idea of establishing a catfish pond. This idea was chosen because the pond would provide a nutritious dietary supplement for the neighbourhood families as well as profits from the sale of surplus catfish. The Chairman of the Local Council 1 donated the land, and over a six-month period the women constructed the pond.

About 900 catfish, each with a market value of 5,000 Shillings (USD 3), are now harvested every seven months. The capital for this endeavour originated within the community and maintenance costs are shared, including upkeep, feed and eggs. If a member is unable to pay her portion she will earn less when the profits are divided.

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Alice considers the community and social improvements to be the most important aspects of the project. Forty women and two youths (boys who are paid a small wage for their help) maintain this venture. She has noticed a change in the community atmosphere. Women are better able to negotiate with their husbands and there is a heightened sense of cohesiveness. She notes that people are not leaving for “greener pastures”, but rather have made an investment and seek long-term growth and development.



Gardening activities by students of the school for disabled in Kampala

Women have become more empowered, are able to contribute to household costs and school fees, and in general are more active and organised. One may wonder what the husbands of these women think about their activities. Alice advocates the project in discussions with the men, and she notes that some of them are “feminists and love the idea”. “Men now see their wives as resources.” Some of the families were struck most by their increased ability to pay their children’s school fees. Income generated from the fish pond has eased this financial burden, resulting in extended education for their children. The families also value the training and cooperation aspects. One further shared benefit, which is not directly linked to the fish pond but rather to the group’s overall success, is a donated water tank. Previously, the community did not have water access of this kind, and now the water can be distributed for irrigation and pond maintenance.

Other local groups and communities have tried similar projects in the wake of the successful fish pond, yet they have not achieved the same results. The secret to Alice and her community’s accomplishment is “openness”. They refuse outside funds and government grants whenever possible in order to maintain a non-politicised atmosphere. This also allows a

greater sense of ownership in which each person is a “stakeholder” and has a deeper commitment to the success of the project. The group even avoids holding meetings during elections in order to allow individuals their political preferences and to circumvent discussion on the hot topic. The group wants to come together when the only thing on their minds is mutual progress and development. Alice’s future plans include expanding her market as well as increasing the pond’s capacity in order to increase the amount of fish each family can receive per month. This is testament to the project’s greatest objective: improved nutrition. Currently, each household receives one fish per month. In addition, each household receives 50,000 Shillings (USD 30) every seven months from sales.

Other community-based urban agricultural cooperatives in Kampala can be found within area schools. Thanks to a project promoting the cultivation of orange-flesh sweet potatoes from 2004 to 2006, in which schools were utilised by FARM-AFRICA as training centres to reach local farmers, relationships were forged and ideas generated for the continuation of cooperation. In the Lubaga Division, the Kampala School for the Physically Handicapped is home to 100 youths who suffer from both mental and physical disabilities. The school maintains a productive garden that contributes to feeding the student body. The pupils range in age from 6 to 24 years and are divided into eight groups. All of the groups participate in some way in the growing of crops and the maintenance of the gardens. The youngest learn about agriculture through observation. Older students maintain class plots, and during the wet season they grow cabbages, carrots, kale, maize, amaranths, and the popular orange-flesh sweet potatoes. The harvested crops go directly into the school nutrition programme, as students reside there permanently.

Agricultural extension agent Pross Owino commented, “Just the fact that handicapped children are involved in urban agriculture, with the weeding and planting, is an innovation! Being able to grow their own food, means that some day they will be able to earn an income and feed themselves, all because of a skill they learned in school.” The community benefit of this programme must be viewed in terms of the future of these children.

In Uganda, physically and mentally handicapped people have a “very, very low chance” of finding employment in the formal sector. These disabilities severely limit their opportunities to achieve stable and secure adulthoods. Florence Tweyambe, a teacher at the school, explained that urban agriculture is an integral part of the school curriculum because it will enable the students to support and feed themselves in the future. They may eventually be able to sell the surplus, and they therefore practice selling techniques with the teachers. They will also have a greater chance of staying healthy and less likelihood of relying on begging or worse for survival. Some of the difficulties the school experiences include land restraints and insufficient labour. Some of the garden maintenance is too difficult for the children; therefore the teachers are obligated to take part. When even they are unable to perform certain necessary activities, such as tilling the soil, they hire outside help and this can become expensive. Nevertheless, the benefits do outweigh the costs.

NAIROBI, KENYA

Urban agriculture is a popular activity in many if not all urban centres of the country, but is not always allowed. In the capital city of Nairobi, community-based agricultural ventures not only provide food but also contribute to youth employment, area safety, and generally enhance the city’s productive capabilities.

For eight years, the Mathare Youth Foundation Centre has run a community-based agricultural project in the slums of Mathare. The project is comprised of 15 young men between the ages of 20 and 30, who used to be petty thieves but are now prosperous farmers and have thereby regained the respect of their neighbours. The Foundation provides a stable income for the young men through crop sales to the local villagers. This money allows them to attend evening adult education courses at the Mathare Hope Achiever Adult Education. With school fees taken care of, they have turned their lives around completely. “We used to mug people in the village. We came together to change that life, and also to support each other,” says Chairman James Karaoke, age 26.

The farm, which includes around ten goats for meat and six dairy cows, and which produces kale, spinach, and many other



Tebyasa fishpond in Uganda

local and exotic vegetables, is located on what was once a regional dump. The land is now fertile and productive, revitalising this part of Mathare and providing a fresh source of food to the community. In addition, it has eliminated the idleness (and joblessness) of some local youths, thus helping them steer away from a life of crime. Some of the problems experienced by the Foundation include struggles with the local gangs. Some of their counseling programmes had to be shut down due to gang resistance to positive change. Gangs also occasionally steal their goats and crops. Other issues arise from the illegal status of urban farming and livestock keeping in Nairobi. When the City Council threatened to confiscate the farm's cows, the group successfully appealed to the officials, telling them, *"We don't want to mug people!"* The Nairobi City Council then told them to keep their animals where they are not visible and the group has tried to follow this rule.

Finally, the farmers fear they might lose their land. Father Frederick from the neighbouring Catholic girl's school, St. Theresa's, gave them the initial idea and support, including the first acre of land, to get this project up and running. They have been expanding slightly, and some neighbours have grown jealous of their success, even though it has been achieved on previously wasted landfill space. They also lack some inputs such as water pumps.

CONCLUSIONS

The uncertainty faced by urban farmers in Nairobi are in sharp contrast to the confident standing of Kampala's community groups. The catfish pond and other community-based agricultural projects visited by the researcher in Kampala receive clear rewards such as land grants

provided by government authorities. Private organisations also commonly provide support to urban farmers who use sustainable practices. The Heifer International Project, for example, is active in Kampala offering not simply dairy cows to members but also training for hygienic livestock keeping in the city. The support, training and rewards successful projects receive can only occur once leading authorities recognise the benefits of, or *legitimise*, urban farming within their urban centres. Legality is the crucial element for the enhancement of community-based agricultural endeavours, allowing for specialised, progressive urban agriculture policies and strategic support mechanisms. With regard to policies, de Zeeuw *et al.* (2006) commented that "In this way, municipal policy makers and support institutions can substantially contribute to the development of safe and sustainable urban agriculture." Although some of Nairobi's urban farmers' collectives have stood up to local authorities throughout the years with various degrees of success, it is still possible that everything could be taken away from them one day. Legitimisation, promptly followed by legalisation and well-formed policies, will encourage these commonly poor farmers while significantly augmenting their returns.

Introduction to many farmers' groups within Kampala and Nairobi was made possible thanks to kind, helpful extension staff provided by the local governments in both cities. In Kampala, the activities of these specialists were clearly legal while in Nairobi the existence of government-employed agriculture and livestock professionals was paradoxical. Although urban agriculture is illegal, Nairobi (unique in Kenya as a municipality, capital and province in one) has provincial represen-

tation of the Ministries of Agriculture and Livestock and Fisheries Development. Indeed, these bodies have extension agents on staff and as one employee explained, *"We have to justify our activities with the farmers, so we focus on the safety of the consumer."* Regardless of the reason, their activities help Nairobi's urban farmers daily by improving their technologies and practices.

Urban agriculture provides an excellent means of social inclusion for many marginalised sectors of society. In the stories above we see the empowerment of poor women, improved futures for handicapped youth, and at-risk young men who have turned from a life of crime to a life of farming. Collectives not only offer a way out of poverty but also allow farmers to build up social capital in the urban environment. Stronger examples of community-based urban agriculture will be found in locations where its contributions to the city as a whole are recognised, where it is permitted by the government and supported by active NGOs and other regional bodies. The examples described above are testament to the life-changing possibilities of community-based urban agricultural projects for women, youth and those who suffer from mental and physical disabilities. Furthermore, urban farming collectives can also provide a major contribution to families afflicted by HIV/Aids. With a healthier community comes peace and prosperity. These examples may provide inspiration for other individuals to unite, regain their sense of community and improve their lives through empowerment and self-determining cooperative action.

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References:

De Zeeuw, H., Dubbeling, M., Wilbers, J. & R. van Veenhuizen 2006. Courses of Action for Municipal Policies on Urban Agriculture. In: Urban Agriculture Magazine 16. Leusden: RUAF.

A Garden in a Sack: Experiences in Kibera, Nairobi

Peggy Pascal
Eunice Mwende

More than 60 percent of the population of Nairobi lives in the numerous slums located around the city. Kibera slum is one of the 146 slums of the Kenyan capital and the second biggest slum in Africa (after Soweto in South Africa). Around one million people are currently living in Kibera and the population is increasing daily. In the slum, landslides are frequent and the unemployment rate is very high. Most of the land is dedicated to housing, and agricultural land remains scarce.

In December 2007, Kibera was one of the two slums struck by the post-election violence that hit Kenya. These riots were the result of various factors compounded by the high level of poverty and increasing vulnerability. Most of the families living in the slums had recently settled there, after leaving the overpopulated rural areas. During 2008, food and non-food prices rose by up to 50 percent in six months¹. Resulting dietary changes are evident, including a reduction in the composition and frequency of meals, which could lead to a rise in malnutrition and susceptibility to disease.

The French relief NGO Solidarités supports the communities in Nairobi's slums, including in Kibera, with its "garden in a sack" project.

Objectives of the project

The project implemented by Solidarités and funded by the French government involves planting vegetable seedlings on top of and around the sides of earth-filled sacks, which are placed on doorsteps. Solidarités' strategy is based on two major objectives:

- To increase access to food using the garden in a sack concept.
- To increase the income available for household use through the sale of vegetables from the garden in a sack.

The target groups are low-income populations and those affected by HIV/Aids (who need better nutrition)². The inhabitants of the slums have the appropriate know-how to cultivate vegetables. The main problem preventing the development of agriculture is the lack of land and cash to buy agricultural inputs.

During the first phase of the programme in Kibera, over 11,000 beneficiary households adopted the technique and



Woman cultivating kale in Kibera
Photo: Solidarités

produced vegetables on their doorsteps. The current phase targets 32,000 households, some of which are now cultivating tomatoes, onions, kale or spinach. Over 18 nursery beds have been established in the Kibera slum. Some selected community members are responsible for the management of the nursery, whereas another group is in charge of training the beneficiaries.

According to Francis Owino Waneno, the area chief, the project has boosted food security in the slum. "People can now eat and in some cases sell their own produce and that means a lot to dwellers of this slum", he says (*The East African Magazine*, June 2-8, 2008).

Preparation

Small plots were voluntarily given by the communities (without compensation) for the establishment of nursery beds. Solidarités provides the seeds, and community mobilisers support the community members in management of the nurseries.

It takes at least three weeks for the seedlings to mature enough to be transplanted into the sacks or kitchen gardens. And already at this stage community participation is important. It is important to explain that the seedlings will be distributed for free to community members who qualify as per the selection criteria.

In the context of a slum, crops with a short growing period and long-term benefits are needed. For instance, in the first phase of the programme it was noted that (crop bulb) onions took too long to mature, so the participants opted for leafy onions. Furthermore, the quality of the soil and water for irri-

gation present challenges. However difficult, it is important to ensure that hygiene and good sanitation are practiced, especially near the seedbeds, to prevent contamination.

Training and community mobilisation

Having a demonstration farm proved to be crucial for training; and community mobilisers were instrumental to the success of the first phase of the programme because of their effective communication, monitoring and follow up. It is important to have community members as mobilisers. The local administration and village elders assisted in the identification of these individuals; but to prevent political interference, the role of the local administration should be clear and the names given need to be well verified.

The team of mobilisers was composed of varied age groups (between 25 years and 80 years of age) and was balanced in gender. This increased the group cohesiveness and the level of acceptance by their communities. It also proved to be important that these community mobilisers were adequately paid (with a monthly salary and any other benefits) to ensure full commitment without the need to supplement their salaries.

Preparing the sacks

Each sack has a volume of 0.1 to 0.5 m³. The most appropriate crops for the bags are leafy vegetables since they keep on growing even after the leaves have been harvested. Vegetables are planted at the top of the sack and through small holes on the sides. On average, one single sack contains 30 to 40 seedlings of kale or spinach and 20 tomato plants. These are crops that the communities were already familiar with; but other vegetables, such as capsicum, leafy onions, and coriander, were also introduced.

Two models of vegetable sacks have been tried out: one with a stone spine and one with layers of stones. The latter appeared to be less interesting since the planting area is smaller than in model 1, which offers planting area for seedlings all around the bags.



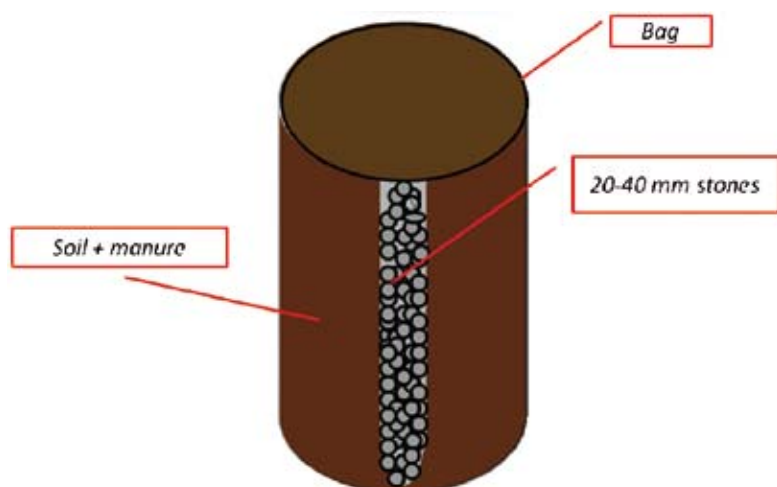
Ongoing training in seed bed
Photo: Solidarités

The sacks are prepared by the households, which have to find or buy a sack (which are inexpensive (Kshs.10) and easily available) and find the soil and stones before receiving the seedlings. Once the bags are ready, Solidarités provides the seedlings. This approach helps select households that are really motivated and strengthens ownership.

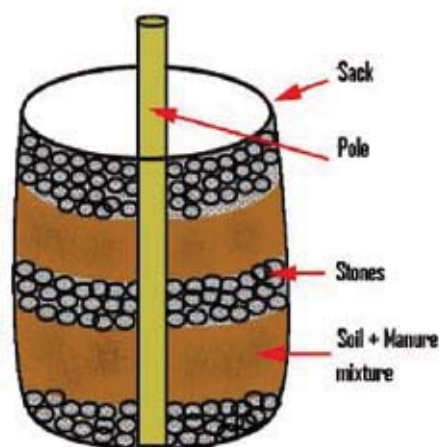
In some slums, good soil for planting is difficult to obtain. In some cases, beneficiaries had to buy their own soil to be able to participate in the programme. This demonstrates the household's commitment, but it also leads to additional costs to the beneficiaries and might limit the number of beneficiaries of the programme. A second challenge is access to water, as there are no reliable water supply systems in the slum areas. Some sacks and kitchen gardens withered during the dry periods of July - November as a result of lack of water. Most slum dwellers purchase water from water vendors, who are not subject to any regulations in setting the price of water.

Impacts

Vegetables from the sacks are used for consumption or they are sold, thereby increasing a household's access to cash for other needs and for education of the children. Families that are producing vegetables are able to prepare a full meal two to three times a week. On average, each household also increases its weekly income by 5 USD. Given that house rental in Kibera costs around 6 USD/month, this additional cash represents an important source of income. Households with access to three or more sacks have an estimated revenue of



Model 1: Vertical spine made with stone to facilitate the infiltration of water



Model 2: Layers of stones



Spinach in a bag in Kibera
Photo: Solidarités

around 33 USD per month, which is more than the average monthly income per family (June 2008)⁴.

The approach is cheap and readily embraced by the slum inhabitants, most of whom practiced agriculture in rural areas before coming to the city to look for jobs. It is a self-sustaining programme in which Solidarités is responsible for initial capacity building, general management of the programme, and the initial purchase of seeds. The other activities are taken up by the communities themselves. However, the presence of dedicated and diverse (in culture and age) community mobilisers plays a significant role in ensuring that the programme is well embraced by the communities. Solidarités started its work with WOFK (Women Fighting Aids in Kenya), which has been active in Kibera for ten years dealing with HIV/Aids-vulnerable people in the community and KENWA (Kenya Network of Women with Aids).

Conclusion

People living in urban areas are particularly vulnerable to soaring food prices. The garden in a sack concept is an effective,

simple and sustainable method of ensuring food security for slum dwellers. The households are either able to earn an income or save on costs that they would otherwise incur to buy food. The biggest challenges identified by the beneficiaries of this programme are the presence of pests (and lack of access to pest control), access to water, vegetable diseases and the theft of vegetables³. Solidarités assists the communities in implementing pest control measures.

Solidarités strongly believes that urban agriculture should be one of the pillars of food security strategies in the coming years. The organisation has therefore extended the project to other areas in the Kibera and Kiambiu slums and is also introducing it in two other slums: Mathare (also near Nairobi) and Juba (southern Sudan). Juba is a big slum with very poor access to safe water and sanitation facilities, but very little NGOs work in the city.

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Notes

- 1) The price of maize, the main staple food, even increased by 100 percent in just a few months.
- 2) The HIV rate in Kenya is 6 percent and the disease is a major problem. At least 1.3 million people are currently living with HIV/Aids in Kenya, 65 percent of whom are women between the ages of 19 and 45, according to NACC statistics.
- 3) Interviews and data collection were done in three primary villages of Kibera and in Kiambiu village as a whole. The villages selected in Kibera were Makina, Lindi and Kisumu Ndogo. 200 questionnaires were completed by beneficiaries of Solidarités intervention; 183 of which were considered valid for further analysis of the impact of the intervention.
- 4) This information does not consider income generated from onions, which were mostly grown in kitchen gardens and not in sacks, in order to allow for growth of the bulbs.

A nursery bed in Kiambi slum

Photo: Solidarités



Low-tech Innovations in Vertical Farming: Nairobi, Kenya

65

Randall Coleman

This article describes the further development of small-scale, “low-tech” vertical farms at the individual and neighbourhood level in informal settlements. These vertical farms are adapted to suit small urban spaces. They increase the density at which food can be produced and keep the growing medium independent of potentially contaminated ground. They require little maintenance and are more easily accessible to the elderly and the disabled by virtue of their vertical nature.



Can YA Love (CYL) is an American NGO that works globally on sustainable agriculture, with a focus on environmental reclamation, aerobic composting and vertical farming methods to spur economic development. CYL works primarily with orphanages, schools, women's groups and youth groups, because these reside in the community and contribute to its long-term improvement. In Kenya, CYL has worked on an urban agriculture project in Nairobi.

The vertical garden

The vertical growing systems used by Can YA Love were inspired by practices in the slum of Kibera, in Nairobi, Kenya. Women were taking burlap sacks, filling them with soil, puncturing holes across the entire three-dimensional surface of the sacks, and growing leafy greens from those holes. Bearing in mind the lack of sanitation services in this environment, the “sack garden” was a crucial innovation because it was independent of the contaminated ground. Several organisations have reported working with these sacks (see UAM 21). Many also credit this innovation with saving lives during the period of post-election violence Kenya experienced in 2007-2008, when the community suffered massive food shortages.

However, the “regular” sack garden is limited in terms of what can be grown, due to soil depth and the amount of growing surface: only half a square metre. CYL's intention was to use a similar concept, but to increase the size and solidify the structure in order to realise the additional benefits detailed below and to grow enough food to support an organisation or family.

Innovation

CYL's extensive R&D coalesced into two main types of vertical garden, the “Growing Pillar” (GP) and the “Growing Wall” (GW). Both utilise simple welded-wire fencing for the structure, fabric for the inner lining, and high-quality compost or some combination involving soil as the growing medium. Like the sack garden, the entire surface can be used to grow food. In its most common form, the GP is a cylinder that takes up about half a square metre of ground space. It stands just under two metres tall and provides a minimum of nearly five square metres of growing surface, which makes the growing surface ten times greater than the occupied ground area. The growing surface can be further maximised by using trellises up which vining plants can climb from the surface of the GP. The GW uses many of the same principles and stands as an elongated rectangular prism. In its most common form, it measures 50 cm in depth and 1 metre in height while the length may vary.



Crop production in dense urban spaces as part of the CYL project in Nairobi. Photo: Can Ya Love



CYL works with orphanages, schools, women's groups and youth groups. Photo: Can Ya Love



The vertical growing systems with a solidified structure by CYL. Photo: Can Ya Love



A growing pillar for household production. Photo: Can Ya Love

In addition to saving space, these vertical gardens have the following advantages:

- They can be built on nearly any surface (e.g., pavement or contaminated ground) or in areas with low-level flooding;
- The design can be adapted to suit people with a range of physical limitations (e.g., the elderly and physically disabled);
- They require much less maintenance than a conventional garden or farm, involving no tillage and virtually no weeding;
- A water-capture system at the base of the garden collects for reuse any water not absorbed by plants or soil;
- The centre of the structure is insulated to reduce evaporation, thereby increasing water efficiency as roots penetrate deeper into the structure;
- The materials are inexpensive and readily available in most parts of the world;

And, of course, these systems increase food availability, which contributes to food security in urban food deserts. In addition to food production, the GPs may also be used to recycle food waste into a usable growing medium. To facilitate this usage, a vermicomposting component is added to the design. Worms are placed in the bottom of the GP and fed three days' worth of food. Once the worms have eaten the food scraps, a layer of growing medium is placed in the garden along with another three-day helping of food. This process is repeated until the garden is full of a rich, fertile growing medium. By this time, the worms will have multi-

plied about two or three times and can be easily extracted to start the vermicomposting method in other GPs, creating more growing medium. This method creates a self-perpetuating system.

Experience in Nairobi

In conjunction with Can YA Love Kenya (CYL-K), CYL hosted a three-day seminar at which the leaders of many community-based organisations were invited to learn essential sustainable agriculture methodologies such as the construction and utilisation of the vertical farms; ecological practices and understanding; aerobic composting; safe food handling; and soil microbiology. This was achieved using a combination of lectures and the hands-on experience of building a vertical farm for a primary school. During the seminar, together with the Kawangware Urumwe Youth Group (KUYG), the Parents of Children with Special Needs Association (PCSNA), and the Kabiro Primary School (KPS), CYL started a vertical urban farm at KPS. The small urban farm provides food for consumption by pupils at KPS, and also serves as an educational tool for them to learn about composting and agriculture. The implementation concluded with a GW and seven GPs, two of which used the vermicomposting method discussed above. Kale, spinach and chard were the three primary foods grown, as decided by the community members.

Challenges

The project team faced several challenges. The first was the availability and quality of compost. The GP vertical garden requires a significant amount of soil but structurally does

not support the weight of heavy clay, which in addition is difficult for roots to penetrate and does not absorb or distribute water sufficiently. Compost-rich soil is far more preferable. This emphasised the need for compost creation at the farm site. In view of this, of the seven GPs that were built at KPS, two were dedicated to compost production using CYL's vermicomposting method. However, the red wiggler worms used are expensive and difficult to source in Kenya, and temperature monitoring during composting was difficult for the community members. Other challenges faced in food production were water access, and organising the sale of any surplus.

Impacts and future plans

Members of CYL-K report that the gardens are still producing food for consumption and sale. The more exciting impact, however, has been the spread of the vertical gardens throughout Kenya following the seminar, which has happened *without direct implementation by CYL*.

CYL and CYL-K will develop a central farm with medium-scale aerobic composting as well as an education centre that will offer two new courses: best practices in community gardening, and simple data collection practices. Any CBO wishing to have CYL fund a garden for their organisation will be required to file a proposal that includes a written plan for allocating profits, and to file progress reports at certain intervals with CYL. Of course, any CBO wishing to build a garden on its own may do so without any such proposal and can ask CYL-K for technical support. CYL continues to be engaged in research and development at CYL headquarters near Washington, DC in the United States. It is working in areas that support its mission, such as filtration systems for salt and contaminated water.

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One member of CYL-K built a GP at his home in Nairobi for the purpose of feeding his family. Within three months, the food that the garden produced had covered the cost of building the GP.

A Report from New Orleans: Growing food in a recovering city

Martin Bailkey

Over three years have passed since Hurricane Katrina flooded 80 percent of New Orleans in August 2005. While the population of the metropolitan region is close to the pre-Katrina total, that of the city itself is approximately 70 percent of its former level. Flooded neighbourhoods, such as Hollygrove, Gentilly, and particularly the Lower Ninth Ward, are far from their former vibrancy.

Those who have returned, however, are preparing the paths for others to follow. With large government-funded rebuilding projects slow to begin, the physical restoration of New Orleans is being driven by the efforts of many non-governmental organisations. In this context of grassroots activism, urban agriculture advocates have seized the opportunity to create a healthier, better-nourished city.

The New Orleans Food and Farm Network (NOFFN), a small organisation created before Katrina, has become a particularly prominent urban agriculture actor, with projects across the city. In a neighbourhood once under two metres of water, NOFFN has partnered with the Carrollton Hollygrove Community Development Corporation to develop the future Hollygrove Growers Market and Farm. The 0.5-hectare site of a former nursery business will soon contain greenhouses, composting areas, training areas, and a "Green Grocery" store to sell food to Hollygrove neighbours, restaurants and other outlets. Students and staff from Tulane University and Louisiana State University have engaged in renewal projects throughout New Orleans.

In New Orleans East, the MQVN (1) Community Development Corporation is laying the groundwork for an ambitious farm and market project amidst New Orleans's active community of Vietnamese refugees. The Vietnamese were among the first to return to New Orleans post-Katrina, quickly re-establishing a self-sufficient system of urban agriculture based on growing traditional fruits and vegetables in residential yards and along protection levees. To encourage economic development around food production, the Viet Village Urban Farm will transform 11 hectares of undeveloped land at the community's edge into small garden plots, structures to house weekly markets and special festivals, commercial farming plots, and a livestock farm.

The Lower Ninth Ward experienced great devastation in 2005, and remains largely empty after three years. Urban



Laurentine Ernst community garden in New Orleans
Photo: Martin Bailkey

planning proposals to leave the flood-prone land green and open have been ignored in favour of restoring the Ninth Ward to the tightly-knit neighbourhood it once was. Urban agriculture advocates are working to integrate food production within a fabric of physical and social renewal. Under the auspices of the two-year-old grassroots organisation, lower-nine.org, the Lower Ninth Ward Urban Farming Coalition is taking a community-based urban agriculture approach by uniting individual backyard gardeners into a working unit, and creating a community-supported agriculture operation across several dispersed vacant parcels instead of a single farm site.

Despite these positive efforts, urban agriculture has not been established as a vital and necessary mechanism in the recovery of New Orleans, where urban agriculture projects and community gardens did exist, but not to a significant degree compared to other US cities. In the crisis days of autumn 2005, efforts to restore the food system focused on re-opening existing grocery stores, and not on establishing emergency food-growing sites. Concerns about contaminated soils in flooded areas played a role, and there were early efforts at bioremediation.

What urban agriculture does represent is the resiliency of New Orleanians – best exhibited in the speed with which the Vietnamese re-established their gardens, and their expansion of the role played by urban agriculture in the community through the Viet Village Farm. Similarly, those who have returned to Hollygrove and the Ninth Ward are acting on the opportunity to employ urban agriculture in the collective effort to create a better New Orleans.

1) An acronym for "Mary, Queen of Vietnam."

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An Update from New Orleans

Martin Bailkey

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Of all American cities, present-day New Orleans best exemplifies the concept of resilience in its ongoing struggle to recover its position as the urban centre of the central Gulf Coast region, and as a city of national significance in tourism, shipping and biomedicine. Two trips to the city in autumn 2008, more than three years after 80 per cent of the city was under water and the entire population had to flee for weeks or months, convinced the author (a New Orleans native) that much that was once considered “normal” has returned.

Streets and expressways were clogged with traffic, popular restaurants had long been reopened, the major annual festivals had returned stronger than ever. And schools in the city of New Orleans itself, many reopened under the independent, charter school model (in which a new school is created and managed independently of a local school district, but under a state-granted charter), have shown marked improvements in student performance over schools run under the pre-storm (pre-Katrina) model. Although local politics again display the dysfunctional character that characterised the pre-K city, many residents are heartened by improvements in other aspects of urban life.

Resilience in New Orleans is commonly marked by comparisons of post-K counts of various social and economic indices with corresponding pre-K numbers. Few of these indices are at or above what they were before the storm in mid-2005. The city's food system, along with its medical infrastructure, has been especially slow to rebound. This is particularly true of the most evident representative of any US city's food system – full-service supermarkets. In spring 2008, 18 full-service markets (down from the pre-K number of 38) served an average of 18,000 residents per store; the national average in the US being 8,800.²

In this context, it would seem that urban agriculture advocates and practitioners would see a unique opportunity to establish urban farming as a critical part of a rebuilt food infrastructure. But urban agriculture has not necessarily been the sole focus of the activist organisations – working outside of government – that started envisioning a new food system for New Orleans in late 2005. An early leadership role was assumed by the New Orleans Food and Farm Network (NOFFN), a small non-profit organisation formed not long before Katrina. By early 2006, NOFFN had created the NOLA Food Map Project, an attempt to help the residents of particularly hard-hit neighbourhoods simply access food – whether from grocery stores, farmers' markets, reopened restaurants or emergency food providers. At this point, urban gardening



Back yard Villere View
Photo: Brennan Dougherty

sites were inactive, either because gardeners had not returned to New Orleans or because of contaminated soils. Later, in spring 2007, a consortium of stakeholders began meeting to study food access issues in the city. No one in this group directly represented urban agriculture and community gardens, and the subsequent March 2008 report offered recommendations to city government related to food retailing, but not inner-city food production. This reflected a primary focus on food retailing as a mechanism to support both food security and commercial economic revitalisation in the most distressed neighbourhoods.

It did not take long, however, for a growing urban agricultural scene to become evident in neighbourhoods all across New Orleans. This occurred not through any focused government renewal policy, but through the energy of numerous individuals and grassroots organisations seizing on urban agriculture as a tool of empowerment and community self-determination – in a context of slower progress in areas involving governmental intervention; for example, the return of public services like libraries. Through the following examples, organisations are channelling community interest in urban farming into several new projects.

NOFFN, for example, now incorporates urban agriculture into its leadership role by building the production capacity of urban farmers and gardeners. It directs them to practical resources such as compost, conducts a series of well-attended public workshops on various urban farming topics, and has promoted the attendance of urban growers at community meetings where locals seek input into the city's post-K master plan. NOFFN staff member Pam Broom reports that NOFFN is further extending its reach by partnering with other organisations involved in the city's recovery, such as the Make It Right Foundation, founded by actor Brad Pitt to build sustainably designed homes in the Lower Ninth Ward. Now that houses are being completed and more are on the way, Foundation representatives are looking for other approaches to promote a sustainable recovery, and have identified urban



Macon Fry pulls up a bunch of beautiful red radishes at Gathering Tree
Photo: Brennan Dougherty

gardens as an important dimension of a green, socially vital neighbourhood.

The focus of much of NOFFN's current efforts is the 0.5-hectare Hollygrove Growers Market and Farm, now well on its way to becoming an outlet for fresh food to the residents of this partially restored neighbourhood, as well as becoming a centre for urban agriculture education and practice. Amidst a collection of growing and composting spaces sits a new "Green Grocery," the headquarters of a 175-member neighbourhood buying club that will pool the resources of its members into a single market for food grown by small farmers in New Orleans and the rich farmlands outside of the city.

In New Orleans East, the MQVN (Mary Queen of Vietnam) Community Development Corporation is creating an ambitious farm and market project amidst New Orleans's active community of Vietnamese refugees. The Vietnamese were among the first to return to New Orleans post-K, quickly and independently re-establishing a self-sufficient system of urban agriculture based on growing traditional fruits and vegetables in residential yards and along protection levees. To encourage economic development around food production, the Viet Village Urban Farm is transforming 11 hectares of undeveloped land at the community's edge into small garden plots, commercial farming plots, a livestock farm, and structures to house weekly markets and special festivals for the region's Asian refugees.

The Viet Village site plan, jointly developed by the MQVN CDC, the Tulane University City Center outreach program (also a Hollygrove Farm partner) and the Louisiana State University Department of Landscape Architecture, contains a number of innovative practices, including bioswales to address the ongoing drainage issues across a site that was once wetland. According to Project Manager Peter Nguyen, once the neces-

sary permits are issued fundraising will begin with the intent of completing the farm and gardens by 2012, and the market structure a year or so later.

New Orleans is a city characterised by strong neighbourhood identity. Some neighbourhoods were devastated by the 2005 flooding. Others, such as those on high ground along the Mississippi River, were untouched by floodwaters. Thus, signs of resilience are not evenly spread across New Orleans. One can gauge overall resilience at a city-wide scale, but it is perhaps more accurate to assess the resiliency of New Orleans at the scale of individual neighbourhoods – the scale at which active, grassroots, non-governmental organisations are restoring homes and businesses. The new urban agriculture projects in Hollygrove and New Orleans East are part of this larger movement of neighbourhood self-determination.

Also evident within New Orleans neighbourhoods is the resumption of the more traditional role of community gardens in New Orleans. Parkway Partners, a local NGO and the city's long-time provider of community gardens, currently manages 29 garden sites across New Orleans. While this number is low compared to the number of such gardens in comparably sized US cities, Parkway Partners Executive Director Jean Fahr considers this a legitimate accomplishment in the city's overall renewal. She proudly notes that each garden has a waiting list, and is of "superior quality" – a testament to both the new value placed on gardening in post-K New Orleans, and to the fact that a number of gardeners are new, post-K New Orleanians with significant gardening experience.

Parkway Partners' Garden Coordinator, Macon Fry, himself a veteran local gardener, sees an abundance of new energy and ideas among the city's new urban farmers, but also wishes that his organisation had adequate resources to dedicate to this renewal. His concerns are echoed by others – with govern-

ment money earmarked for large-scale infrastructure and building projects, the high level of dedication to the incremental rebuilding of New Orleans on the part of individuals and small community organisations is not matched by the amount of available funding from private and philanthropic sources.

Along with community gardeners, the independent city farmer also has an important role to play in the return of urban agriculture to New Orleans neighbourhoods. In 2008, on a vacant 280 sq. metre corner lot in the city's Mid-City neighbourhood, NOFFN Program Director Marilyn Yank created, in her spare time, the Little Sparrow Farm. After determining that this corner lot which is located three blocks from her home and was formerly used primarily for drug dealing, was largely free of contaminants, Yank planted a variety of vegetables and edible ornamentals, bordered by a flowering fence. Pedestrians became interested and learned more about the garden from an explanatory sign Yank set up on the corner, and she began selling her vegetables to neighbours on Sunday mornings. The Ruby Slipper Café is conveniently located across the street, and it began purchasing whatever was appropriate to its menu.

When asked what motivated her to create Little Sparrow Farm, Yank quickly explains that she sees herself as part of "something bigger", an example for others to follow. And true to her hope, other entrepreneurs around town are creating a network of individual farms and gardens, accompanied by the slower development of an infrastructure centred on technical assistance, soil assessment and remediation, and wide availability of manufactured organic compost.

Perhaps the most interesting entrepreneurial example is the Lower Ninth Ward Urban Farming Coalition, which continues its efforts to act on the opportunity presented by the hundreds of vacant land parcels not likely to be developed in the foreseeable future. Neighbourhood landowners, many of them elderly, typically lack the resources to build on their properties and are unwilling to sell to speculators, but are open to leasing the sites to a community organisation at little or no cost. Recently, a 615 sq. metre site on North Villere Street, once the site of a "double shotgun" home characteristic of older New Orleans neighbourhoods, was acquired by the Urban Farming Coalition to establish the first in what Coalition member Brennan Dougherty envisions as a linked network of food production sites scattered among homes. The community-supported agriculture model, where stakeholders pay a farmer upfront for a season's worth of food, and which normally involves one or perhaps two farms, is being adapted by the Coalition to multiple Ninth Ward residential properties. A lease has just been established for a second site, and the Coalition has verbal agreements for eight others. Dougherty also hopes to join NOFFN in partnering with the Make It Right Foundation to create food-producing gardens across the Lower Ninth Ward.

Any city is a complicated web of interactive systems: ecology, economy, transport, education, public health, recreation, food, etc. Each of these was severely stressed in New Orleans

in 2005, and they have recovered at different rates over the past four years. This article has attempted to describe the role of urban agriculture in the rebuilding of the city's food system. Along with new or returning grocery stores, farmers' markets and the traditional vending of fruits, vegetables and seafood from small trucks parked on major avenues, the population is now also served by newly restored community gardens and urban farms and will soon, advocates hope, have access to an infrastructure of training, markets and composting sites. Certain local obstacles to urban agriculture practice – limited access to land, the need to raise needed funds to start and maintain projects, contaminated land, and limited availability of compost – are not endemic to New Orleans. But the opportunity exists for the city to become a national model for an increased role of urban agriculture alongside other distribution mechanisms for locally produced food. Urban farming

"Urban farming is strengthening the New Orleans food system"

is strengthening the New Orleans food system and creating in the process a healthier, more sustainable community. But the future of New Orleans remains dependent on the reliability of the network of protection levees and barriers now being strengthened by the US Army Corps of Engineers, and the restoration of Louisiana's coastal wetlands. Urban agriculture is not a means of protecting New Orleans from further catastrophe. But it is part of a larger blueprint for rebuilding and renewal.

City government has been slow to create a supportive environment for urban farming, such as allowing farmers access to the city's land bank of properties. Not surprisingly, therefore, ever since rebuilding began in the autumn of 2005 urban agriculture practitioners and advocates have not waited for municipal actions to proceed. They understand that the availability of needed philanthropic grants dedicated to renewal will lessen as time goes on, and that even a small grant to start an urban farm can be leveraged into multiple community benefits. As long as some funds are available – along with land and compost – the 12-month growing season in New Orleans promises to yield a rich harvest of fruits and vegetables to nourish the city's rebirth.

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Notes

- 1) In this article "New Orleans" refers to the city itself – Orleans Parish – and not the other five metropolitan parishes (counties) in the area. These incurred much less damage from Hurricane Katrina.
- 2) "Building Healthy Communities: Expanding Access to Fresh Food Retail," a report of the New Orleans Food Policy Advisory Committee, March 2008.

Urban Agriculture as Green Infrastructure: The Case of New York City

Nevin Cohen
Katinka Wijsman

Efforts to reduce storm water through innovative green infrastructure projects may provide unique opportunities for cities to finance urban agriculture. Since 2011, New York City has been able to provide funding to four urban agriculture projects, including a one-acre commercial rooftop farm, through its Green Infrastructure Grant Program.

New York's experience suggests that if productive landscapes are integrated into storm water management planning, cities may be able to both reduce storm water flow and resulting water pollution and at the same time support the creation of farms and edible gardens, at a lower cost than traditional storm water adaptation measures would require. The organisational challenge in New York and elsewhere is to affirmatively support urban agriculture projects in green infrastructure programs by prioritising the multidimensional benefits of edible landscapes, including their function as a climate change adaptation strategy as well as for their capacities for storm water absorption.

Combined sewer overflow

Most cities have combined sewage systems in which sewage and storm water are conveyed to water pollution control plants in a single pipe during wet weather. Because these treatment facilities are engineered to handle only dry-weather flows, during rain events the excess of the combined flow is often diverted, untreated, into nearby waterways to avoid inundating the facilities. In the case of more extreme weather events — which may occur more frequently due to climate change — heavy rains cannot be absorbed and may flood roads and properties. In cities with inadequate or poorly maintained sewerage infrastructure the flooding may be even more frequent and more severe. Both types of events lead to high social and environmental costs, including significant pollution of urban waterways with potential public health consequences (Walsh et al., 2009). Cities are under increasing pressure to adapt to climate change in general and to reduce combined sewer overflow (CSO) pollution in particular. In the USA the federal Clean Water Act mandates action to stem this source of water pollution (Adler et al., 1993).

A conventional strategy to address CSO is to invest in “grey infrastructure”: expanded water pollution control facilities; increased-diameter sewage pipes that hold larger volumes



Different forms of green infrastructure

Source: New York City Department of Environmental Protection

of storm water; or tanks to store sewage until it can be pumped back through the water pollution control plants after it stops raining. These options are both costly and politically unpopular in communities faced with the prospect of hosting this infrastructure. A potentially more cost-effective option that avoids facility siting conflicts and can offer host communities benefits beyond reduced flooding and pollution is to increase the permeability of the cityscape through diverse forms of “green infrastructure”: parks, landscaped median strips on roadways, permeable pavement, and agricultural sites. Green infrastructure not only absorbs and slows storm water to reduce the quantity that enters the sewer system; it can increase biodiversity, reduce the urban heat island effect and, in the case of urban farms and gardens, provide all of the benefits associated with urban agriculture.

New York City's Green Infrastructure Program

New York City is under a consent order to reduce CSO pollution. In developing a management strategy, the city evaluated the costs and benefits of grey and green infrastructure and found that investing in a green scenario that includes some grey infrastructure was significantly more cost-effective than a conventional approach (DEP, 2010). New York City's Department of Environmental Protection (DEP) committed to investing USD 192 million in green infrastructure by 2015 (DEP, 2012), including “blue roofs” that hold rain-water and release it to the sewage system slowly, extra-large street tree planters, landscaped storm water “green streets”, parking lots paved with porous concrete, and vacant paved lots and asphalt rooftops turned into gardens. Over 20 years, the green scenario would cost USD 5.3 billion, including the USD 2.4 billion for this green infrastructure. In contrast, an estimated USD 6.8 billion would be required for a scenario based solely on the types of grey infrastructure mentioned above (DEP, 2010). The green infrastructure scenario thus saves the city and the property owners who pay water and sewer fees USD 1.5 billion in costs over a 20-year period.

Land Use	% of Combined Sewer Watershed	Potential Strategies and Technologies
New development and redevelopment	5.0 %	Stormwater performance standard for new and expanded development Rooftop detention; green roofs; subsurface detention and infiltration
Streets and sidewalks	26.6%	Integrate stormwater management into capital program in partnership with DOT, DDC, and DPR Enlist Business Improvement District; and other community partners Create performance standard for sidewalk reconstruction Swales; street trees; Greenstreets; permeable pavement
Multi-family residential complexes	3.4%	Integrate stormwater management into capital program in partnership with NYCHA and HPD Rooftop detention; green roofs; subsurface detention and infiltration; rain barrels or cisterns; rain gardens; swales; street trees; Greenstreets; permeable pavement
Parking lots	0.5%	Sewer change for stormwater DCP zoning amendments Continue demonstration projects in partnership with MTA and DOT Swales; permeable pavement; engineered wetlands
Parks	11.6%	Partner with DPR to integrate green infrastructure into capital program Continue demonstration projects in partnership with DPR Swales; permeable pavement; engineered wetlands
Schools	1.9%	Integrate stormwater management into capital program in partnership with DOE Rooftop detention; green roof; subsurface detention and infiltration
Vacant lots	1.9%	Grant programs Potential sewer change for stormwater Rain gardens; green garden
Other public properties	1.1%	Integrate stormwater management into capital programs Rooftop detention; green roof; subsurface detention and infiltration; rain barrels; permeable pavement
Other existing development	48.0%	Green roof tax credit Sewer charges for stormwater Continue demonstration projects and data collection Rooftop detention; green roofs; subsurface detention and infiltration; rain barrels or cisterns; rain gardens; swales; street trees; Greenstreets; permeable pavement

New York green infrastructure plan: Opportunities, strategies and technologies Source: New York City Department of Environmental Protection

Green infrastructure absorbs and slows storm water runoff, increases biodiversity, reduces urban temperatures and can provide food and economic benefits

In addition to these benefits, green infrastructure simultaneously provides natural resource sinks that reduce air pollution and assist in urban climate control by cooling the city during hot summer months. It also provides important green networks in urbanised areas, enhancing the quality of life of urban dwellers and increasing their property values by an average of 2–5 % (NRDC, 2013). When the green infrastructure is a garden or farm, it supplies fresh fruit and vegetables and many other social and economic co-benefits to communities, including the health benefits of increased access to produce, the physical benefits of gardening, garden-based educational opportunities, job creation and the creation of

safe spaces (Cohen et al., 2012). Community gardens increase the value of nearby properties (Voicu and Been, 2008).

Urban agriculture as green infrastructure

As part of New York City's Green Infrastructure Grant Program, DEP provides funds to private property owners and organisations to build green infrastructure projects. In order for projects to receive funding, they must demonstrate feasibility and be designed to capture and retain a minimum of 1 inch (2.54 cm) of storm water from the impervious tributary area. In the first round of green infrastructure grants, the city provided USD 592,730 to the Brooklyn Navy Yard, a collection of industrial buildings on the waterfront that served as a shipyard during the Second World War, and the Brooklyn Grange, a rooftop farming company, for the funding of what the Grange calls "the world's largest rooftop soil farm". Covering approximately one acre (0.4 ha), the farm is located on the rented roof space of Building No. 3 in the Brooklyn Navy Yard. The Grange grows a variety of produce according to organic principles, including tomatoes (40 varieties), salad greens, carrots, herbs, peppers, beans, radishes, and chard. In addition, they keep egg-laying hens, and bees in a commercial apiary. Brooklyn Grange sells its produce to local restaurants and retail stores, to their community supported agriculture (CSA) members



Brooklyn Grange farm Photo: Brooklyn Grange (<http://brooklyngrangefarm.com>)

and to the larger public via weekly farm stands in various neighbourhoods. The Grange has expanded its farm business to include an educational non-profit (providing educational tours and workshops) and urban farming and green roof consulting and installation services to others interested in urban (rooftop) farming. As a result of its permeable rooftop farm and agricultural activities, the Brooklyn Grange manages over 1 million gallons (3,785,411 litres) of storm water per year, helping to reduce the amount of CSO flowing into New York City's East River.

The DEP has also provided more than USD 770,000 to support the creation of three additional farms and gardens (and two others that have been approved but not yet funded) with some edible landscaping (see table 1). The amount of food production of these sites varies significantly (from a vegetable garden to a plot for herb cultivation that is part of a non-edible landscape design for a recreational space), but they share a focus on multidimensionality in terms of the benefits stemming from the project. Although the DEP views urban agriculture or edible landscaping as a positive feature of a project proposal because of the co-benefits of food production, the focus of the Green Infrastructure Grant Program on storm water management dictates that a project's ability to retain at least one inch of water during rainfall is the primary criterion for funding. (The DEP actively monitors the retention capacity of green infrastructure interventions citywide, though individual projects are not necessarily monitored.)

Discussion

While the number of urban agriculture projects co-funded by the DEP Green Infrastructure Grant Program is small, the potential for supporting the construction of many more farms and gardens as part of this programme is substantial.

Municipalities should coordinate green infrastructure investments with municipal urban agriculture goals to most effectively support both

In the communities in New York City with significant CSO problems, there are an estimated 2,000 acres (809 ha) of vacant land with mostly impervious surfaces and approximately 3,000 acres (1,214 ha) of flat rooftop space on buildings that have the potential to accommodate farms and gardens. As in many other cities, funds for water and sewer infrastructure in New York come from bonds issued by a public authority and paid for by water and sewer rate payers rather than from the general municipal capital budget,

which makes it somewhat more politically feasible to finance these projects and makes them less subject to municipal budget cuts that result from fiscal downturns.

Nevertheless, there are obstacles to expanding urban agriculture's role as green infrastructure. Administrative agencies in charge of water pollution control, like New York City's DEP, focus primarily on the absorptive capacity of green infrastructure. This is in part because the consent orders driving green infrastructure are about managing storm water, and agency mandates do not include supporting urban agriculture. Benefits such as the nutritional value of fresh vegetables, the educational opportunities of urban gardening, or the creation of communally managed open space are valued, but are subsidiary to water retention capacity. While the DEP has been an innovator in supporting urban agriculture through its Green Infrastructure Program, its prioritisation of storm water management has meant that the onus is on the city's urban agriculture community to propose new farming projects for funding under this programme.

A second challenge to expanding the use of urban agriculture as a green infrastructure is that farms require active management to produce storm water retention benefits year-round, including a cover crop outside of the growing season, as bare soil retains less storm water than plant-covered soil and is also subject to erosion. Though this management is often provided by for-profit farming businesses like Brooklyn Grange or non-profit community organisations, thus lowering public management costs, public agencies need assurances that these entities are financially viable or, in the case of a non-profit, well-established within the community, and therefore likely to maintain site management over the long run. In contrast, other green infrastructure projects, such as landscaped median strips or porous paving stones, often require less intensive maintenance to reliably stem storm water run-off.

Finally, while New York City's Green Infrastructure Grant Program is a valuable source of funds for individual farm and garden projects, it is not yet part of an overall municipal urban agriculture strategy. Planning that addresses the urban agriculture system as a whole would identify opportunities to make available sites for farms and gardens, capital for their construction (including but not limited to green infrastructure funds), and opportunities for non-profit and for-profit farming ventures to secure operating revenue.

Table 1: Edible landscaping projects funded by NYC's Green Infrastructure Grant Program. (All sites are privately owned, yet most are accessible upon request.)

Year	Site	Funding GI grant program
2011	Brooklyn Navy Yard rooftop farm	USD 592,730
2011	Lenox Hill rooftop gardens	USD 40,000
2011	Carroll Street Community Garden	USD 244,920
2012	Natural Resources Defense Council	USD 485,132
2013	South Bronx Overall Development Corporation – The Venture Center	Under review
2013	South Bronx Overall Development Corporation – The Jasmine Court	Under review

Key lessons

- Green infrastructure interventions to prevent storm water run-off (or storm-water flooding due to extreme weather events) can be less costly than grey infrastructure interventions.
- Green infrastructure has the additional benefit of assisting in urban climate control and increasing the quality of life of urban dwellers.
- Urban agriculture as a green infrastructure has additional benefits of providing fresh fruits and vegetables and other social and economic co-benefits to communities.
- Urban agriculture can be a multi-dimensional productive strategy of climate change adaptation.
- Green infrastructure grants are valuable sources of funds for urban agriculture projects and an opportunity for cities to support projects that simultaneously address multiple public needs.
- Municipalities should coordinate green infrastructure investments with municipal urban agriculture goals to most effectively support both.

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References

- Adler, Robert, Jessica Landman, and Diane Cameron. 1993. *The Clean Water Act, Twenty Years Later*. Washington: Island Press.
- Cohen, Nevin, Kristin Reynolds, and Rupal Sanghvi. 2012. *Five Borough Farm: Seeding the Future of Urban Agriculture in New York City*. NY: Design Trust for Public Space.
- DEP (2010). NYC Green Infrastructure Plan. A Sustainable Strategy for Clean Waterways, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_LowRes.pdf
- DEP (2012). NYC Green Infrastructure. 2012 Annual Report, available at http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2013.pdf
- NRDC (2013). The Green Edge: How Commercial Property Investment in Green Infrastructure Creates Value. Available at <http://www.nrdc.org/water/files/commercial-value-green-infrastructure-report.pdf>
- Voicu, Ioan, and Vicki Been. 2008. "The Effect of Community Gardens on Neighboring Property Values". *Real Estate Economics* 36 (2): 241–283.
- Walsh, C., Fletcher, T. and Ladson, A. 2009. "Retention Capacity: A Metric to Link Stream Ecology and Storm Water Management". *Journal of Hydrologic Engineering* 14: 399–406.



Innovations in Urban Agriculture and their Impacts: a Study Tour to the USA

Régine Berges

Growing Home Chicago. Photo: I. Hartmann

Members of the INNSULA research project (Innovation and Sustainability Analysis of Urban Agriculture: www.innsula.org) analysed several innovations in urban gardens and urban farms in the USA in order to provide inspiration for activists and governments in Germany. Six of the projects are presented here, along with the areas they impact, ranging from environmental, social, and economic areas to gardening issues.

In 2012, researchers of the INNSULA research project, funded by the German Ministry of Education and Research (BMBF),

visited urban agriculture projects and interviewed persons involved with urban agriculture in the USA. The USA was chosen because North America has a very active and progressive urban agriculture community and is thus considered to be at the forefront of innovation in this field. Community gardens and urban farms in particular have been present there longer than in Germany. The assumption is that the innovations found in the USA are transferable to and supportive of new projects in Germany.

Urban agriculture innovations

In urban agriculture, gardeners have to adapt to the spatial, economic, environmental and social conditions of the city. For example, land availability, soil contamination and water availability influence the activities in urban agriculture projects. Often, standard solutions from rural agriculture are



Water collection system Green Thumb NYC in Phoenix Community Garden Photo: I. Hartmann

not applicable in a city or to the size of the project. Therefore urban agriculture projects are prone to the “do-it-yourself” approach, resulting in the development of new products, concepts or practices by experimenting and testing (Hartmann et al. 2013). For better comprehension we grouped the innovations analysed during the study visits according to the areas of main impact: resource efficiency, education, food security and health, enabling business, and enabling gardening. These categories are still very open, and some of the innovations can fit into several of them; this demonstrates the multifunctionality of these innovations.

The study visit

In a pre-study, we first searched the literature for innovations and interesting projects. Based on this, 19 gardens, farms, organisations and enterprises in New York City, Amherst (Massachusetts), Philadelphia and Chicago were visited, and representatives were interviewed on the topic of urban agriculture and innovations. One of the results of the study is the compilation of particularly outstanding projects selected as best practice examples (Hartmann et al. 2013). Their innovations are presented here. Something was considered to be an innovation if we could put it into one of the categories of innovation sub-processes marking the innovativeness: something brand-new (invention – highly innovative), adjusted innovation (adaption – medium or moderately innovative) or utilized innovation (adoption – innovative).

The innovations and their impacts

In the six projects presented here we found sixteen innovations, of which ten are highly innovative and can thus be classified as inventions, three as adaptations and three as adoptions. This shows the high innovativeness of the selected cases. The largest group of innovations applied in the urban agriculture projects addresses the environmental topic of resource efficiency. Availability of space is less of an issue for traditional agriculture, but within cities even buildings become a production opportunity. Especially innovative

in this field is The Plant in Chicago (www.plantchicago.com). This social enterprise has established a food-producing and processing company-consortium in an abandoned meat-packing facility. The people behind this initiative have invented a recycling concept for the building with a planned reuse of 80% of all materials found in the building. In addition, they developed a concept for combining waste and energy flows to close loops and produce electricity and heat. Finally, they adapted an aquaponic production system by which they reduce water consumption.

Likewise, Green Thumb (www.greenthumbnyc.org), a publicly funded program supporting community gardens in NYC, strives to reduce water consumption by promoting an adaptable rainwater collection system. This also turns the constraint of access to water for open spaces in urban areas into an opportunity by using the omnipresent roof area. In contrast, waste reduction and compost production are goals of the compost toilet at Greensgrow Farms (www.greengrow.org) in Philadelphia. Innovators there accelerate the composting with the help of solar energy, thus improving the existing concept of compost toilets. The resulting compost is used for ornamental plants only. Another exemplary path to resource efficiency is taken at Growing Home in Chicago (www.growinghomeinc.org). This social enterprise operates two urban farms and a third farm in the countryside. The operation is certified organic, bringing this label to urban agriculture and thus guaranteeing that mineral fertilisers and chemical pesticides will not be used.

Education is an important social issue addressed by innovations in urban agriculture. Here urban agriculture takes advantage of its proximity to the people and of the educational potential associated with gardening. Into this category falls the participatory university concept found in the permaculture garden (www.umasspermaculture.wordpress.com) of the University of Massachusetts (UMass) in Amherst. The creation and operation of the edible campus garden is based on a university course which is prepared by

teachers and students in a participatory manner. Another best practice example, focusing more on the education of the public, is the pop-up garden established each year by the Pennsylvania Horticultural Society (PHS) (www.pennsylvaniahorticulturalsociety.org) in Philadelphia. The publicly accessible edible garden occupies a prominent inner-city open space for one gardening season. It offers information materials, and workshops are held there. The produce is used by local chefs in their restaurants. Opening up new opportunities for young disadvantaged people is the aim of the vocational training program of Growing Home in Chicago. The training takes three months, and includes theory and practice of agricultural production, processing and marketing, and also touches on associated topics like healthy nutrition.

Food security and health are important challenges in cities and are addressed by urban agriculture. Gardeners do not intend to help only themselves; they also share their produce. One very innovative example of this sharing, formalised in a complex system, is the City Harvest Program of PHS in Philadelphia. Participating gardens and farms receive materials, seeds and seedlings and other support and, in return, donate a certain part of their harvest, which is passed on to needy people. The concept is also special in that the seeds and seedlings are produced by prisoners as part of a rehabilitation program. Similar donation schemes have been adopted by community gardens and NGOs in other cities. For example, a part of the Phoenix community garden in New York City is grown for a nearby soup kitchen.

Urban agriculture includes not only non-profit, but also for-profit initiatives. In the latter, urban farms and social enterprises create innovative concepts or tools which enable their business to access financial support or reduce expenses. One innovation in this category is the Canteen Supported Garden at UMass in Amherst. The student-run Franklin Permaculture Garden provides the university's cafeteria with some of their produce and, in return, gets financial support. To save money, Greensgrow Farms developed a low-budget cool room by integrating an air conditioner into a shed where the harvested produce can be kept fresh for some time before it is sold. Furthermore, Greensgrow Farms also enables other local entrepreneurs to go into business, by building a community kitchen certified for food processing that can be rented by companies. The kitchen is also used by the farm itself, for processing and for cooking workshops. Another way to receive funds has been adopted by Growing Home in Chicago. They raise money for certain assets via crowdfund-

ing, enabling small online donations and transparency regarding the collected sum.

Enabling gardening is also an issue addressed by various innovations found in urban agriculture, two of which are presented here. The first is the development of a multi-functional garden shed by Mees Weis architects for Green Thumb in New York City. The "gardenhaus", for which the construction manual is publicly accessible, is a greenhouse and tool shed in one, and costs less than USD 1000. Green Thumb also created a concept to better provide for well-functioning community gardens, by requiring a functional gardening group and an elected representative for support and advice in each of their gardens.

Lessons learned

The urban agriculture projects presented here all apply several innovations. The fact that most of these are inventions signifies that urban agriculture is highly innovative. On the one hand, the high percentage of inventions is due to the case selection, but on the other hand it shows the necessity of adapting to the urban setting – necessity being the mother of invention. Mostly the need derives from a shortage of resources, or from their high costs. Space, water, energy and nutrients are precious goods in our society, especially from a sustainability perspective. Thus the urban agriculture projects use methods to provide these resources themselves, or to tap unused sources. Through the innovations presented here, new networks are formed and new stakeholders are involved in urban agriculture, such as universities, canteens or underprivileged youth. Furthermore, there are now social enterprises combining urban agriculture with various social aims. This illustrates that introducing urban agriculture into a new setting, like a university, or by using it as a means to achieve goals other than vegetable production, is a basis for innovations, too. Moreover, it is remarkable that the innovators are not necessarily gardeners, but can also be supporting organisations, as in the case of Green Thumb NYC.

The innovations found on the study visit have been published in a best practices brochure available online in German and English (Hartmann et al. 2013). We hope the examples will be a stimulus for existing and developing urban agriculture projects as well as for governments wishing to support urban agriculture. This would broaden the possibilities for urban agriculture in Germany.

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Franklin Permaculture Garden Amherst. Photo: R. Berges

References

Hartmann, I., Berges, R. and A. Pierr [2013] Innovation Processes in Urban Agriculture. Best Practice Examples. Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg. Available at: http://project2.zalf.de/innsula/publikationen_en.php

Community Supported Agriculture: French approaches

The first forms of agriculture in Europe seem to have been community-based, as is still the case in many rural societies of the South. But, in the vicinity of modern cities, farmers have found it difficult to resist the processes of individualisation and increasing urbanisation. This article will highlight two recent phenomena taking place in France, which respond to and sometimes even counterbalance these processes. The phenomena both illustrate initiatives that try to restore local urban-rural relationships.



C. Stacchetti

Children are taking part in clearing a site; branches are grinded and used as mulch by farmers

The growing openness of the food market has created a situation in which only big players are now left in the chain, varying from cooperative farms to wholesale markets and industrial food processing and distribution companies. Simultaneously, urban as well as rural consumers have distanced themselves from food production processes, hereby also losing their ability to influence them. These two processes have instigated the discussion on “food miles”: the increasing physical distance between producers and consumers has contributed to increased transport and more advanced food processing and conservation systems, ultimately resulting in increased greenhouse emissions.

RENEWED LINKAGES

As a response and counterbalance to these developments, consumers and small producers have started to join hands again in a variety of ways, one of which is through Community Supported Agriculture (CSA). In France this takes place in the form of *Associations pour le Maintien d'une Agriculture Paysanne* (AMAPs) (literally: Associations for the Maintenance of Peasant Farming). The goal of these associations is to recreate a joint community of producers and consumers. This goes beyond a mere commercial relationship

between consumers and producers as the consumers agree in advance to buy a certain amount of agricultural products, e.g. in the form of a basket of vegetables. The producer is thus guaranteed a more stable income as well as increased abilities to cope with risks, such as a harvest failure. In this system, producers and consumers jointly share the risks of farming. In some situations, community support can also result in a higher security of land tenure for the farmer. The consumer benefits of CSA (or AMAPs) are the rapid supply of high-quality fresh and seasonable food products as well as increased insight into the production system used (whether organic or other), both resulting from the close proximity of the farmer.

In the discussion around AMAPs, it has been argued that they contribute to the development of a more united and integral economy and that they promote *in situ* fair trade. Consumers are called upon to demonstrate their solidarity and at the same time, they are once again given a voice in the choice of production methods. Producers are relinked to their communities, which also makes them individually responsible again for the quality of their products. Ultimately, this results in an enhanced quality of life for both groups.

The main challenge for AMAPs in France is recruiting producers. Many farmers are reluctant to participate as they fear city dwellers' rapid lack of interest and

unfamiliarity with cropping patterns. In Ile-de-France, more than 200 AMAPs exist, but so far without local farmers. This impels the consumers to turn to producers located farther away to fill their baskets, and in so doing to adapt the AMAP concept. This challenge could be overcome by trying to convince farmers who are also retail sellers to become involved in an AMAP. These farmers are already used to interacting with their customers, for example at farmers' markets, and would only need to package their products differently (e.g. in baskets). Other farmers with an interest in AMAP might prefer to set up a small collective of more specialised farmers and serve customers through this collective.

Another challenge for the AMAP system is that farmers see themselves and their production systems being questioned by the consumers, who are sometimes motivated by nostalgic and non-realistic ideas. The farmers need adequate communication skills to defend their technical choices, the complexity of which is unknown to city dwellers. An additional challenge is the need to set a fair price for the produce that truly accounts for the production costs involved. Unlike assessing automated production processes, for which numerous accounting references are available, determining the farmers' remuneration –to be set a priori– is a delicate process as it is a direct result of the existing social relation with the community. This actually places the farmers in a

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wage-earning type of relationship, which is unfamiliar to most of them. In effect, a CSA system will be weakened if it is only defined from a city dwellers' perspective. Its true strength is demonstrated when communities are recreated in which consumers have established a real partnership with the farmers, recognising their professional competence, their economic freedom as well as their choice of production system that includes modern aspects for greater efficiency.

An example of an AMAP:

'Lapereaux des Thermopyles'

This AMAP was created in Paris at the end of 2006 by a team led by Jérôme Dehondt and is supported by a regional network.

The AMAP's farmer is Jacques Frings, whose farm is located about 50 km east of Paris.

On a weekly basis, the farmer delivers food in baskets to the Châteaux Ouvrier, an old building devoted to social activities. The 90 AMAP members are mainly higher-educated people, who are strongly motivated to promote sustainable development and tighter social linkages. Its name – which can be translated as the 'Rabbits of Thermopyles' – is highly symbolic: in the same way that some hundred Greek soldiers gloriously resisted the huge Persian army in 480 BC, which allowed further development of Greek civilisation, the small rabbits of this AMAP will put up a fight to allow a sustainable future!

The farmer is a fruit-arboriculturist who adopted an organic farming system in 1975. He was the first farmer to sell his products at the wholesale market of Rungis, the biggest in Europe. However, he gradually shifted to selling his products on the farm. He has increased his product range (vegetables, eggs) and introduced new marketing channels, such as 'pick your own', and is also selling products from other organic farms in the Ile-de-France region (beef) or other areas of France (nuts from Grenoble, wines from southern France). In effect, he sells two different kinds of products: (1) local products that are grown in Ile-de-France, which have low environmental costs and high nutrition, and (2) so-called terroir products from different parts of France and Europe, which are strongly linked to local and regional identities and have a cultural value. The farmer started selling his products through an AMAP only a couple of years ago, but this has been successful as he now serves three of them.

C. Stacchetti



Mr Gilbert, market gardener, shows city dwellers his fields

Refitting agriculture in the urban

environment Another recent development in periurban agriculture has been the disappearance of agricultural functions from the city due to urban pressure. This development has not only been witnessed in France but in many urban regions in Europe. However, more and more city dwellers are aware of the benefits of having agricultural space nearby, as this allows them to enjoy rural amenities and observe and understand the food processing process. They increasingly recognise that farmland represents an essential infrastructure for the quality of their urban environment. Consequently, they have embarked on initiatives to restore periurban farming by integrating it into the management of their land. In France, this has resulted in an initiative called the *Agri-Urban Project*, or AUP.

AUP originated from a civil-conscious initiative aimed at maintaining open areas (around 1,000 to 2,000 ha), farming (often between 10 and 30 farmers) and natural spaces in urban environments. To achieve this, demographic growth must be under control (the city must not grow by more than a few tens of thousands). The initiative bears great resemblance to E. Howard's Garden City in which agriculture was to be part of a green belt encompassing "rurbanisation" and ensuring food autonomy. Agriculture is maintained close to the city because of its landscape but also its historical values. Additional benefits for the city are the availability of fresh produce as well as the possibilities for educational, leisure and social

activities and the creation of a buffer zone that counteracts the negative impacts of external influences such as floods, highways and illegal human settlements.

In order to ensure sustainable land development projects, such as AUP, a clear-cut legal framework is necessary. Hitherto, nature conservation has been the main argument in France, which however, in its truest form, was found inappropriate for open spaces located too close to the cities. This resulted in open urban fringes that did not fall under any management programme and from which farmers were moving away. Fortunately, environmentally conscious citizens came up with a local public farming policy.

The main challenge for AMAPs in France is in recruiting producers

Planning action

The local public farming policy was initiated through the formulation of the Agricultural Charter, which is based on a participatory approach. The charter is signed by the different stakeholders involved and highlights each stakeholder's role; for example the city council is in charge of city planning, while the farmers are expected to ensure that their activities are performed in a sustainable manner and do not harm the space used. The charter is concretised in a programme of action, which shows that agriculture is really supported by the communities involved. This programme defines the

different actions to be taken and facilitates their implementation. In this stage of the planning process, the focus has been on the farmers and on enabling and stimulating them to perform their activities without the possible constraints of being close to a city (e.g. transport and distribution difficulties due to traffic, land insecurity). In a following phase, the entire community (farmers included) should set up a new policy, which enhances farmers' abilities to benefit economically, e.g. by improving their links to local markets. This could contribute to finding more people willing to take on farming as a profession.

Current challenges

Currently the Agri-Urban Project faces quite a number of challenges, an important one being the instability of local land policies. This instability poses a serious threat to local agriculture, as farmers need a clear long-term vision. So far, the AUP has remained subject to local electoral preferences; its sustainability would be greatly enhanced if a general framework, which includes regulatory and financial arrangements, would be created by political entities at higher levels (from district and regional councils to national and European governments, see box).

A dimension of the European Common Agricultural Policy (CAP) to be changed

The CAP policy is reputed to have set up hindrances to competition, which several member countries of the WTO are endeavouring to dismantle. The Commissioner in charge of agriculture alleged on 29 December 2006 that:

- (1) many European farmers shall have to look for a second source of income;
- (2) almost all the market imbalance measures will be abolished;
- (3) public funds shall be reserved for agro-environmental measures.

To oppose this development, PURPLE (PeriUrban Regions Platform in Europe) was created in 2004 as a lobbying association of European major cities to promote a common periurban agriculture policy, bringing especially point 3 up for discussion in order to support the inclusion of the living environment and landscape issues as priorities for a new CAP.

Another challenge faced by AUP is the continuous search for public support and therefore public financial means. In this effort, it is important that the multi-functionality of periurban agriculture for a local community be highlighted: not only does it lead to increased local food production, but also to the enhanced organisation of space, creation of opportunities for leisure, etc. In order to develop in a sustainable way, each local community needs its own agriculture, i.e. agriculture managed by a new governance system that recognises farmland as a common good used by farmers for their economic activity and by city dwellers to enhance their urban lifestyle. It is therefore also part of the community's task to defend its agricultural interests and ensure the development of the space for sustainable agriculture. The next box describes the example of the Green Triangle of Hurepoix.

Strengthened linkages, strengthened communities

The examples portrayed in this article highlight how communities are strengthened by improving citizen awareness and responsibility at the local level. The community members join forces and in so doing positively affect their living environment and its sustainability. AMAPs restore relationships between and among producers and consumers despite their different roles in the community, and enhance mutual understanding. AUP adds a new concept of common belonging to the local land: two groups share one unique territory. Through the AUP concept, agriculture is producing more than just foodstuffs, as it provides a development infrastructure for agriculture itself and for other urban and periurban functions.

ENDNOTE

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Tel. 33 1 39 24 62 73. Equipe agriculture urbaine (André Fleury, Roland Vidal), member of LAREP.

The Green Triangle of the Market Gardening Cities of Hurepoix (www.trianglevert.com)

Five communities south of Orly, France, have organised themselves to defend their agricultural space for the benefit of their living environment. The project owes its name to:

- its location: within a highway triangle encompassing 4,000 ha, 40 percent of which is either agricultural or forest land
- its history: the market gardening activity dates back to 1,800 and the area used to be seen as the open countryside of Paris
- its continuing agriculture.

Farmers were taken on board right when the project was initiated in 2001. At that time,

five farmer representatives were elected along with ten other representatives. Their election granted them the right of veto. The Charter has now reached completion and is to be signed in the spring of 2007. The communities pay the salary of a specialised worker, Christel Stacchetti, who has been trained in urbanism and urban agriculture at ENSP.

Actions underway include:

- A strict demarcation of the territory (Agricultural activity zone)
- Events (strawberry festival, etc.)
- Establishment or enhancement of short agricultural chains
- Educational activities.

This sign shows Triangle Vert city-dwellers they are entering farmland



C. Stacchetti

A Comparison of Urban Agriculture and Short Food Chains in Paris and Tunis

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Saloua Toumi
Roland Vidal

In general, the distance between producers and consumers is relatively short in urban agriculture. A comparative analysis between Paris and Tunis revealed significant differences in the economic, social and environmental impacts of these short value chains. The agro-climatic context, the social and spatial organisation of the city, and the nature of the distribution chains all influence the sustainability of urban agricultural projects and should be taken into account in their development.

Short distances

The concept of “food-miles” was introduced by British researchers in the early 1990s, as an indicator to measure the environmental impact of different distribution chains. The idea is simple: the more miles food travels between its place of production and consumption, the more it contributes to exhausting fossil fuels and polluting the planet. However, this simple idea has started to be questioned in a number of studies (e.g. Perez-Zapico, 2008), which have found that “the logistical organization of distributing produce in bulk/larger volumes appears to be an important element in reducing energy cost”. This means that marketing products through large-scale distribution channels, even when imported, may be more energy efficient than promoting short food chains.

Moreover, several studies conducted in the United States and Europe show that the energy cost of food depends much more on the way it is produced than on its transport, especially when transport is organised in an efficient way. (These studies do however question the subsidised (energy) costs of transport). Another example is given by DEFRA (2008), which showed that tomatoes produced in the London area have much higher environmental costs than those produced in Spain and transported to London – because of the energy requirements of producing this crop in the London climate. Minimising the environmental impact of agricultural production thus also means choosing the crops best suited to the agro-climatic conditions in the place of production. In the words of the German researcher Elmar Schlich (2006), “the ecology of scale joins the economy of scale”.

So, local food is not always a (more) sustainable solution. This is especially so for Northern cities, where climatic and soil condi-



Hot peppers produced and sold in periurban area in Soukra
Photo: Saloua Toumi

tions are less suitable for growing fruit and vegetables – the products that are in principle best suited for short food chains. For these cities, the notion of local production must be extended to several hundreds of kilometres if it is to better respond to achieving the optimal environmental impact desired.

But what is true for Northern Europe is not true for all regions of the world. The notion of “*locavores*” (people who prefer to eat local food) is becoming more and more fashionable in Paris, where local vegetable production and fruit cultivation is almost entirely maintained with support of the community (Community-Supported Agriculture). On the other hand, in Tunis, urban agriculture is increasingly threatened by urban expansion, while its real utility is not fully understood by its citizens and local governments. This form of agriculture, dominated by vegetable and fruit production (and unlike production around Paris), does not need any community support to be economically viable. Furthermore, its environmental balance, on first analysis, seems to be significantly more positive in respect of its ecological footprint than that of urban agriculture in periurban Paris.

To use the typology of André Torre (2009), we could thus say that in the case of Paris, the expressed desire of its city-dwellers for short food chains can be met by what we could call “organised proximity”, where direct producer-consumer relations are relatively more important than actual distances between places of food production and consumption. In the case of Tunis however, “geographical proximity” (where food is indeed produced close to the consumers) is more likely to be functional.

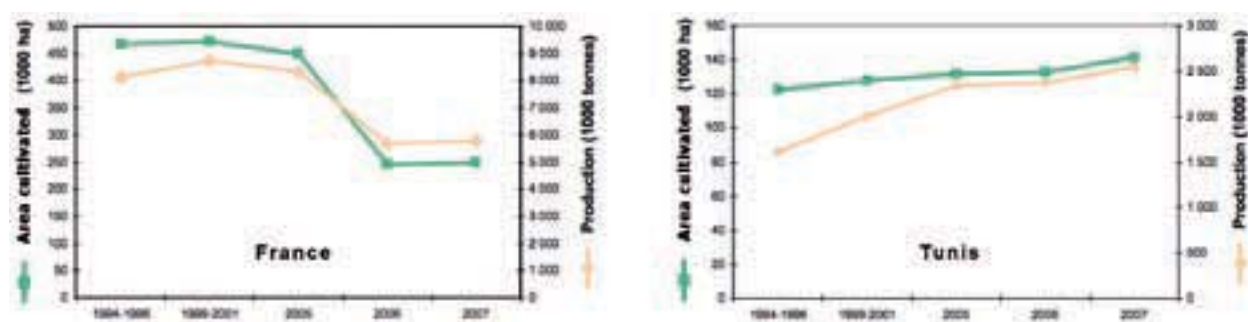
Agro-climatic context

Short food chains, as we saw, mostly involve fruit and vegetables. However, these are not the most optimal products for growing in Ile-de-France, where the land is actually best suited for growing grain. That is why the development of the railroad in the 19th century, which enabled food to be transported over greater distances, resulted in the disappearance of the food growing area surrounding Paris. Vegetable production was relocated to the Loire valley and Brittany, and fruit cultivation towards the sunnier regions of the South. The agricultural lands in the valleys surrounding Paris were gradually urbanised and hardly any are left today. Therefore, re-introducing local horticultural and fruit production in the Paris area cannot be done without significant economic and ecological costs.

Tunis, on the contrary, is located in the heart of a plain that is still dominated by fruit and vegetable production and is one of the most productive vegetable producing regions in the country. Despite rapid urban expansion, which has accelerated since independence, agriculture in Tunis still contributes to supplying the city with fresh products. Urban agriculture in the centre and immediate outskirts of Tunis produces much of the supply for local markets and small stores (e.g. fruit and vegetable vendors, street merchants). But this agriculture is constantly threatened by urban growth, which is causing fragmentation of farm/land holdings. This fragmentation mostly affects fruit cultivation, which is barely profitable on farms of less than three hectares. Vegetable production, in contrast to the Paris situation, is still being widely developed.

In a more general way, we can thus state that, for these reasons, short food chains based on local vegetable production are hardly viable in Ile-de-France, and in France as a whole, where vegetable production is steadily declining (see diagram). On the other hand, they do have a place in Tunisia, and their development would be strengthened if they were taken into account more in urban planning. This is not to say, however, that local/urban vegetable production should not be supported in Paris. It has a role to play, for example in the context of the need to maintain green, productive spaces in and around the city, and the need to promote more multi-functional land use (e.g. combining agriculture with water storage and recreation), but this should take more strongly into account the need to promote the use of land in accordance with its agronomic suitability.

Graph 1 Comparison of the development of vegetable production in France and Tunisia
(Source FAO)



Proximity between consumers and producers: short food chains, at what price?

Comparative studies conducted for several years by the Centre Technique Interprofessionnel des Fruits et Légumes (CTIFL) show that, in France, prices for fresh produce are higher in local markets than in supermarkets. This is not reflected, however, in the many surveys and reports on food habits, which fail to show that consumer preferences may be inconsistent with purchasing practices. Instead, respondents often declare that they prefer local agricultural produce, bought in the market or on the farm, but ultimately price remains their main concern. This is why they end up buying produce in super/hypermarkets, and specially discount shops, even if this means they lose out on quality.



Collection and sale at the Viltain farm in Yvelines
Photo: Saloua Toumi

This leaves local producers to sell their crops to a wealthier clientele that is more likely to be interested in other criteria than price alone. This clientele is found in the centre of Paris, and participates in various forms of short food chains, such as vegetable baskets or community supported agriculture (*Association pour le maintien d'une agriculture paysanne*, or *AMAP* in French). They may do so because they are interested in the preservation of old or rare varieties of fruits and vegetables, or because they want to support and preserve local agriculture. Rare examples of cross-subsiding produce for the less well-off population can be found in Chicago for example, where local produce is sold for higher prices to the better-off, and for lower prices to poorer consumers, but this kind of cross-subsiding is very rare in Paris.



Food production is primarily an educational activity

Photo: Roland Vidal

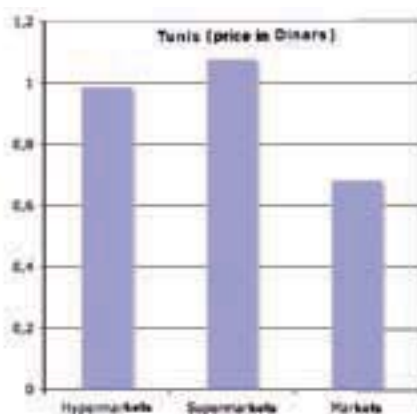
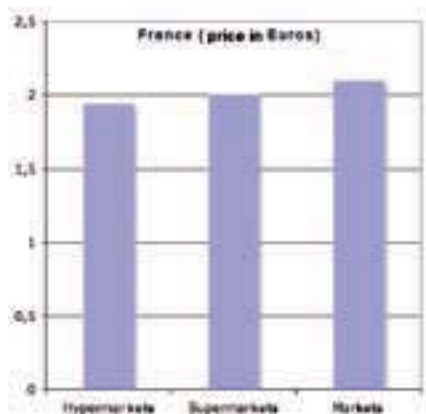
The consequence of this state of affairs is, however, that the desire for proximity is in fact translated into a disconnection between the places of production, with production inevitably taking place in distant suburbs, and consumption in the city centre. The distances travelled by small trucks – which return empty – result in higher energy costs than those incurred by a producer in the Loire valley supplying Les Halles de Rungis or by hypermarkets buying large volumes of various food products that are transported in big trucks. The difference in energy costs becomes even greater when it is the customers themselves who travel in their own vehicle to the farm to buy their food.

The reverse is true in Tunisia, where the distribution via short food chains is an ancient practice, and still in place and widely practised today. According to the data we collected in Greater Tunis, the prices of fruit and vegetables are much lower in local markets and in neighbourhood stalls, largely supplied by periurban producers, than in the supermarkets. The most disadvantaged reside mainly in the suburban

neighbourhoods, so the people interested in buying food for the lowest prices live close to the places of production. This results in a natural and geographical proximity between producers and consumers, and in a more positive environmental balance than in France.

Conclusions

The demand for local agriculture in European urban regions comes mainly from urban citizens who are (often) unfamiliar with the economic realities of farming (Vidal and Fleury, 2009). Short food and distribution chains are defended from the point of view of management of periurban areas, although – in the authors' view – they meet neither the requirements of a sustainable food policy, nor those of optimising the environmental impact of agriculture. At the same time, the short food chains in Tunis represent a form of distribution that is anchored in the local economy and in the habits of the city-dwellers. Tunis nevertheless is gradually losing its local agriculture as uncontrolled urbanisation continues.



In the cases presented here, we have two completely different types of short food chains. In the case of France, we are talking about local food production that the community claims to support, but in reality is only supported by an affluent and very small minority. This form of production and marketing of fruit and vegetables covers only a small portion of the agricultural land and only supplies a small fraction of the population (overall, this market represents just 3% of fruit and vegetables consumed in France).

Graph 2 Prices of the main vegetables consumed in France and in Tunisia according to distribution methods (on the left, data from the CTIFL, on the right, personal statement)

On the other hand, in Tunisia, we are talking about an existing form of distribution, which is managing to retain its



Market garden landscape in Soukra (Grand Tunis)
Photo: Roland Vidal

place in the market and reach a large part of the population. The viability of short food chains, in both cases, depends on the agro-economic and climatic conditions in which they operate.

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References

- Perez-Zapico, B. (2008) – FRCIVAM Bretagne – Programmes SALT/ CREPE
DEFRA (Department for Environment, Food and Rural Affairs) (2008) Comparative life-cycle assessment of food commodities procured for UK consumption through a diversity of supply chains, London, UK <http://defra.gov.uk/>
Schlich, E., Biegler, L., Hardtert, B., Luz, M., Schröder, S., Schoeber, J., Winnebeck, S. (2006) "La consommation d'énergie finale des différents produits alimentaires, un essai de comparaison". *Courrier de l'Environnement de l'INRA* 53, 111-120.
Torre, A. (2009) "Retour sur la notion de proximité géographique". *Géographie, Économie, Société*, vol. 11, n°1, 63-74
Vidal, R. and Fleury, A. (2009) "La place de l'agriculture dans la métropole verte. Nostalgies, utopies et réalités dans l'aménagement des territoires aux franges urbaines". *Revue Projets de paysage*, ENSP <http://projetsdepaysage.fr>

Innovative Forms of Value Chain Development for (Peri)Urban Agriculture in Central Italy

Historically, agriculture in the Umbrian Valley in central Italy was based on sharecropping. Large estates were divided into small farms corresponding to the working capacity of a peasant family, while the proceeds of the farm were divided between the family and the owner of the domain. The agricultural system mostly consisted of woody crops (vines and olive trees), grains and livestock (oxen). This type of agriculture has changed dramatically since the 1950s, affecting both family life (young people leaving for the city) and the organisation of farming operations (in terms of production and marketing systems). In addition, most farmers in the Umbrian Valley are aging, while few of them have the expertise required to make the changes needed to diversify their farms. Those that have been able to diversify have mostly looked for activities outside the sphere of (urban) agriculture.

However, recently farmers have started to add value to agricultural products by focusing on specific market niches – in this case local products (*produits du terroir*) – and establishing direct relations with consumers. Some farmers have inherited vineyards and/or olive trees, and have developed their business by exporting, particularly to North America. Faced with fierce competition from other producers, especially those in Latin America, they seek to upgrade their products by emphasising the origins of their agrarian landscape. They have understood that the countryside can be conceived of as a relationship between a social group (visitors and buyers) and a crop (olives and grapes). For example, the Lungarotti family, who own a vast estate in Torgiano, created a Wine Museum and a Museum of Olive Oil with the explicit intention of establishing an attractive image for the region of Umbria. Similar examples are found all over the world.

Another form of value chain development concerns internal financing between producers and consumers. Networks between city and countryside still exist, and these include traditional exchange practices (in oil and wine). For example a farmer, who owns an olive grove located on the hill under the Basilica of Saint Francis in Assisi, offers consumers the possibility to adopt an olive tree, pay in advance, and get paid in return in the form of the product (the olives or the oil). Furthermore they are offered the exclusive right to have a picnic under 'their' tree, which is not only about adding value to the product, but offering new services such as agro-tourism. Today, the rapid development of tourism and the recognition of the city and its agrarian landscape as a UNESCO world heritage site offer new possibilities to Assisi. The strategic objectives of UNESCO include agriculture as a vital link in the design of cultural and tourism development.

These new approaches, developed by farmers, can shape a type of local agriculture that is based on new and real economic prospects. Local public policies to enhance these are moving in this direction too, but are flawed because they are based on an outdated understanding of the specific identity of Assisi. The institutions involved focus more on the role of agriculture in preserving the landscape rather than the production aspect. However, it no longer makes sense to merely protect the countryside without considering the relationships that it creates. To preserve the landscape we must begin to think about its socio-economic aspects.

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Building the Resilience of Vulnerable Communities in Quito: Adapting local food systems to climate change

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Marginalized urban communities living in informal settlements or on fragile hillsides and slopes in Quito, Ecuador, are the most vulnerable to the impacts of climate change, as they are highly exposed to frequent floods and landslides, droughts, food scarcity and uncertain food supply chains. This is particularly true as many of these communities depend on urban agriculture to secure sustainable livelihoods and achieve food security.

Drawing on interviews in Quito with municipal departments, public officials, NGO staff, and local inhabitants, as well as official documents and reports, this article discusses whether the municipality of Quito is ready to adapt existing local food systems to the impacts of climate change and strengthen relevant policies and programmes.

Climate change in Quito

With its geographic position and mountainous topography, Ecuador is highly vulnerable to climatic changes, especially in the area of water resources and conservation (Primera Comunicación Nacional, Quito, 2000). Cities such as Quito are already experiencing higher average and extreme temperatures¹, a decrease in overall rainfall, but also more frequent extreme rain events, which cause landslides and mudslides (Dirección Metropolitana Ambiental y Fondo Ambiental, 2008). The melting of tropical glaciers and destruction of páramos – neotropical ecosystems in the Northern Andes which regulate hydrological systems – will also exacerbate the environmental and socio-economic costs of climate change. In the mid-term, this greater vulnerability to climate risks will worsen the problems of water governance in Ecuador and exacerbate conflicts over water resources (The Government of Ecuador *et al.*, 2008). The most vulnerable sector is agricultural production, mostly due to severe flooding and droughts affecting banana, corn, soy, and rice plantations in the lower Andes, Amazon, and coastal region (Primera Comunicación Nacional, 2000).

In Quito, the majority of poor, indigenous and migrant inhabitants living on the hillsides and slopes are practicing urban agriculture to improve their nutrition and have access to additional sources of income. In the 1980s and 1990s,

when Andean indigenous populations migrated to Quito, families established their houses and shelters on the 64 hillsides and ravines surrounding the city and often resorted to small-scale urban agriculture – growing corn and potato and raising guinea pigs and chickens – as a safety valve and social buffer.

Supporting urban farmers

Urban agriculture in the Metropolitan District of Quito is officially supported by the programme AGRUPAR², which was created in 2002 within CONQUITO, the metropolitan corporation for economic development. AGRUPAR agronomists provide seeds and seedlings, conduct technical training on agricultural production and commercialisation, and strengthen the management skills and micro-enterprises of urban farmers. However, AGRUPAR does not provide official land titles. It is the responsibility of the growers themselves to secure land and plots by engaging in direct negotiation with municipal staff and obtaining a lease to legalise their practices.

AGRUPAR supports two types of production units in urban and periurban areas: 1) *huertos demostrativos* (demonstrative community gardens) on communal land or on land that the municipality rents out for a minimal price to growers, and which receive an organic certification by AGRUPAR and 2) *réplicas familiares* (family duplicates) on individually owned land, when families are interested in applying the *huerto demostrativo* model to their plots of land. AGRUPAR's production is sold either in the neighbourhood, in "bio-ferias" (farmers' markets), or through a system of *canastas* – baskets of produce delivered weekly to consumers. A third type of production unit, which is not officially part of AGRUPAR but was developed by AGRUPAR families, consists of a small area of land in residents' backyards usually



Photos: Marielle Dubbeling.

converted into corn and potato fields. Here, families use part of the harvest for self-consumption and sell surpluses in local shops.

Two other types of urban agriculture projects exist in Quito, but they are not sponsored by AGRUPAR. First, communities in the less densely populated areas in the hills and páramos are engaged in periurban agriculture. Some of these projects are supported by the Environmental Fund within Quito's Environmental Office. Sponsored projects tend to prioritise environmental goals, such as sustainable resource management and fragile ecosystem protection, over socio-economic development. Second, a large number of low-income families in the Southern districts (i.e., Valle de los Chillos) and Northeastern districts (Las Delicias) grow produce independently in their backyards or on land they have occupied, but for which they have not received formal title.

In reality, urban agriculture is not officially recognised within the urban districts of Quito, and is only official and legal within the periurban districts. Even though the Territorial Planning Office "tolerates" urban food production, local farmers are faced with the risks of expulsion or termination of their leases. Overall, the systems most vulnerable to climate change are those located on the fragile hillsides and slopes around the city, or in periurban areas located at higher altitudes (above 3,500 m).

Adaptation to climate change

Changes in climatic patterns have already been affecting urban farmers in Quito. Frequent droughts and extreme weather events, resulting in intense rain and floods, are forcing families to grow more resistant crops and improve soil conservation. For instance, families who were used to only cultivating corn and potatoes must diversify their production and plant Andean crops that have greater nutritional value, higher soil protection potential, and lower water needs, such as quinoa, oca, apio or chago. In addition, urban farmers are learning to protect the fragile natural resources and environmental quality in Quito, especially those families living close to the páramos or using water from streams that originate in the glaciers around Quito.

In this spirit, the Environmental Fund has allocated small grants to environmental NGOs helping local farming communities improve the conservation and sustainable management of the páramos ecosystems and the degraded areas around the city (i.e., in the semi-arid Andean ecosystems of the Volcan Ilaló), while improving their productivity and diversifying their crops. For instance, the Environmental Fund is supporting the NGO Ecopar in its work to create an agro-ecological farm in the periurban area of Lloa, which will secure the livelihoods of isolated poor families through organic production, create a micro-enterprise of product commercialisation, and protect fragile soils against the use of chemical pesticides and fertilisers.

Since the lack of affordable land and housing in the city centre has forced indigenous and migrant populations to establish their shelter in the slopes and hills around Quito

Quito receives part of its potable water from the Antisana Glacier, whose size decreased 7 to 8 times faster in the 1990s than in previous decades – the Antisana shrank by 23 per cent between 1993 and 2005 (Franco et al., 2000; Cáceres et al., 2005).

and since many of them depend on urban agriculture land to meet their food needs, tackling climate adaptation will require thinking and re-thinking structural development planning in the city. This means evaluating current land-use decisions, improving housing and economic opportunities for poorer populations, and improving the coordination of municipal agencies working on climate change in the city.

Adapting urban food systems to climate change impacts also requires decision-makers, planners, municipal corporations, and NGOs to engage in large-scale concerted efforts to improve the protection of river, groundwater, and aquifer resources in Quito, increase the efficiency of water and irrigation systems, and address sensitive issues such as land tenure and growth policies.

Today, a main challenge in the further development of sustainable and equitable local food systems in Quito is the integration of climate adaptation into the reality of decision-making processes of all relevant municipal departments. Short-term economic interests, large-scale development projects, and abrupt political decisions are still marginalising environmental and social considerations. Even if urban agriculture in Quito is supported by projects within AGRUPAR and the Environmental Fund, local agencies lack the concrete tools, networking and coordination capacity, as well political power, to make climate change adaptation and urban agriculture a long-term strategy in Quito.

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Notes

1) Between 1939 and 1998, the Andean region saw an increase in average temperatures of 0.11°C per decade against a global increase of 0.06°C per decade (The Government of Ecuador, UNDP, and Ministry of Environment, 2008).

2) <http://www.conquito.org.ec/agrupar/>

References

- Cáceres B. et al. 2005. Glaciares del Ecuador: Antisana y Carihuayrazo, Informe del año 2004. IRD-INAMHI-EMAAP-Q.
- Comité Nacional Sobre el Clima. 2001. Primera Comunicación Nacional sobre Cambio Climático. Ministry of the Environment: Quito.
- Dirección Metropolitana Ambiental y Fondo Ambiental. 2008. Quito Strategy for Climate Change. Quito: DMQ.
- Franco, Bernard, Edson, Ramirez, Bolívar Cáceres, and Javier Mendoza. 2000. "Glacier Evolution in the Tropical Andes during the Last Decades of the 20th Century: Chacaltaya, Bolivia, and Antisana, Ecuador." *Ambio*, 29: 416-422.
- The Government of Ecuador, UNDP, and Ministry of Environment. 2008. Adaptation to Climate Change through an Effective Governance of Water in Ecuador. Ministry of the Environment: Quito.

Promoting Value Chains in Urban Agriculture for Local Development in Quito

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Alexandra Rodriguez Dueñas

Local government support to urban agriculture in Quito was born as a response to food insecurity in the poorest areas of the city, and was later expanded to the entire Metropolitan District. The production technology used has been adapted to the diverse climatic zones (between 500 and 4,800 metres above sea level, see also the article in UA Magazine no. 22).

The Participatory Urban Agriculture Project, AGRUPAR, has been working in the area since 2002, focusing on food security and promoting food processing, access to microcredit, microenterprise management and marketing and sales.

At first, the various products grown by the productive units promoted by AGRUPAR provided fresh and healthy foods to the producing families and generated surpluses that encouraged solidarity-based exchange processes and small sales at the gardens or in the neighbourhood. Over time, some urban farmers began to sell in specialised areas called Bio Trade Fairs, set up by AGRUPAR, or formed networks of farmers to deliver organic produce baskets.

In this way, a process of adding value to urban agriculture started. In addition to facilitating the Bio Trade Fairs, this includes the following aspects:

- Improved harvesting and post harvesting activities, to meet the quality standards for commercialisation, thus involving farmers in further processing and marketing. These activities include cleaning, washing, shelling, sorting, drying, processing and milling of the surplus product, as well as taking into account that a certain percentage of the product will not qualify for sale in the fresh market, due to its shape, size, colour or ripeness.
- The use of containers, packaging and labels identifying the enterprise, and business cards, price lists and recipes.
- The use of appropriate slaughter techniques (for animals) with emphasis on the application of good manufacturing processes, the cold chain and marketing controls.
- Obtaining organic certification for those production units that generate more surpluses and improved access to other markets (sales to embassies, private and public institutions). The cost of this is shared equally between AGRUPAR and the farmers.

- Supplying meals prepared with organic foods and animals from the farms in the productive unit, which contributes to the cultural recovery of certain foods.

Experience so far shows that there is a need to focus more on capacity building and supporting the value chain (development) processes: you cannot demand that the farmers “do well” at something that they “know nothing about” with resources “they don’t have”.

For this reason, it is important to consider the adoption of alternative technologies that reduce or eliminate dependence on external resources. AGRUPAR encourages productive units to rationalise the use of labour throughout the year by horizontally diversifying production and vertically integrating the agricultural process. This involves all stakeholders from the family, association or solidarity group that is in charge of the activities prior to the production process and the post-harvest activities, such as processing and marketing.

Microcredit

A critical factor that was incorporated in the value chain is access to microcredit for the urban farmers who had no credit to meet their specific needs. Starting in 2009, AGRUPAR implemented a self-managed microcredit scheme in the form of the Grassroots Investment Societies (*Sociedades Populares de Inversión*, or SPIs in Spanish)¹. This is adapted to the needs and characteristics of the urban farmers and gives an additional push to their business activity. To join the 35 SPIs currently in operation in Quito, the urban farmers each contribute between \$10 and \$20, depending on their financial situation. However, thanks to the high profitability of the sale of organic vegetables (especially the greenhouse-grown kidney tomatoes), the SPIs were able to raise enough capital themselves. A study carried out in 8 SPIs, which have 120 urban farmer members, shows that their accumulated capital for 2009 amounted to \$50,800.

Looking to the future

The use of alternative and appropriate technologies made it possible to process the surplus products, keep food longer, decrease losses and extend the sales period. The organisation of promotional events, such as trade fairs and business meetings, has allowed the producers involved in the value chain to learn about businesses, establish contacts with key members, and to make their own decisions.



Packed vegetables at the Bio Trade Fair
Photo: Jatun Ayllu, AGRUPAR 2010

The kidney tomato (*Solanum lycopersicum*) delivered the highest value addition, and was therefore considered the most promising product by the farmers. The productive enterprises supported by AGRUPAR include various certified vegetables such as carrots, radishes, beetroot or beets, lettuce and broccoli. These are marketed in organic produce baskets and at Bio Trade Fairs. In addition there is now a wide range of processed products, such as pickles, jams and jellies, sauces, tarts, sweets, nutritious cakes, snacks (such as broad beans, banana and potato chips), glazed fruit, toasted corn, granola, honey by-products, natural condiments, cookies, bread, cheese, yogurt, slaughtered or roasted guinea pigs, free-range slaughtered chickens and a healthy food catering service. In 2009, the Bio Trade Fairs marketed 28,675 kg of produce valued at \$69,500 and distributed 722 organic produce baskets worth more than \$5,000.

To date, 56 productive enterprises have been created, involving 228 urban farmers (165 women), who have gained recognition and consumer loyalty by diversifying the range of products available at the Bio Trade Fairs. By looking for ways to add value to their production, they have innovated and

strengthened their organisation, and have overcome many problems, such as the acquisition of sanitary registration certifications (these are very expensive) and occupancy permits for spaces where they can establish points of sale in secure areas. However, these types of problems require continued support from AGRUPAR and other authorities, in order to ensure the continuity of an activity that represents an important source of income for the urban farmers who, in a traditional and small-scale manner, process and market their production surpluses.

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Notes

(1) For more information on the SPLs visit
<http://www.cepesiu.org/38.0.html>

Community Supported Urban Agriculture: The *Orti Solidali* project in Rome

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Les Levidow

In Italy local food networks are mostly farmer-driven initiatives, with little consumer involvement. An exception is the *Progetto Orti Solidali* – solidarity gardens project – an ambitious example of Community Supported Agriculture (CSA) in Rome. Since its start in early 2009, the *Orti* has aimed to create a more sustainable way of producing and consuming food. Its slogan is ‘We don’t sell vegetables; we grow *your* garden’.

One of a variety of urban agriculture initiatives, CSA has become a means to create closer relations between producers and consumers. According to Henderson and Van En (1999) each CSA initiative is unique. CSA can be considered as a tool for change with which to take advantage of the current food climate to encourage more sustainable production with greater accountability to the consumer and fair returns for producers.

Urban land access

In Italy access to urban land is guaranteed only to citizens’ associations or companies (e.g. in town and country parks or urban gardens) or to particular population groups (such as vegetable gardens for the elderly or educational gardens for children). Access to land is not granted simply for general community use.

To expand land access in today’s urban spaces, some activists propose to revive and adapt the old concept of commons. These were the lands, forests and streams that could be freely used by the peasants in medieval Europe. For example, arable land can be seen as commons that should be preserved; likewise urban commons could have collective alternative uses.

***Orti Solidali* project as a partnership**

In the *Progetto Orti Solidali* the farm workers come from a semi-autonomous care home (*Il Tetto Casal Fattoria*), which hosts refugees and socially disadvantaged youth, with the aim of helping them to develop their full potential. One of their tutors working in the care home is also an organic agronomist and member of the *Free School of Synergistic*

Agriculture ‘Emilia Hazelip’. These activities gave her the idea of starting an urban local food initiative – which became the *Orti Solidali* project.

More than a producer-consumer relationship, the *Orti Solidali* aims to be an economically and environmentally sustainable initiative. It also aims to create social inclusion, both for the subscribers and the farm workers – who in this case are four young refugees from the care home. A direct partnership allows them to learn skills that they will be able to apply independently wherever they continue their lives. After a training course on synergistic agriculture, the farmers (together with the tutor) built 60 family-sized garden plots on about one hectare of land on the outskirts of Rome. The tenancy came from a social cooperative that produces organic food in the urban green belt.

Each garden plot is allocated to a family (or individual) who pays an annual subscription and receives a home delivery with a fixed amount of vegetables every week. Vegetables come from their specific plot, which can be customised according to the subscriber’s preferences, with a choice of several crops cultivated according to the seasonal sowing plan of synergistic agriculture. In this CSA all the necessary labour is provided by the four refugees. The yearly subscription is designed to cover the direct costs of the initiative (such as seeds, plants and tools) and the workers’ yearly salary, so that the activity is entirely self-financing. Many essential items – e.g. farm implements, irrigation material and seeds – were donated in response to appeals on the website, made so that the *Orti* could avoid or minimise financial debt.

This initiative combines three aims of sustainability. The environmental aim is to promote an agricultural method with low environmental impact. An economic aim is to create stable income for young refugees through low-scale agricultural activity. Social aims are to rebuild a relationship of cooperation between producers and consumers, to create social inclusion for the refugee farmers through work opportunities and to link subscribers through participation in a food community.

Synergistic Agriculture

The plots are cultivated according to the 'Synergistic Agriculture' method, refined by the Spaniard Emilia Hazelip, in turn based on the ideas and experience of Masanobu Fukuoka (1985; see also El Jardín de Emilia Hazelip). This method consists of an ecological approach that provides solutions to the problems of industrial agriculture and the environmental damage it causes. Synergistic agriculture improves soil quality by using permanent beds, with mulches to keep the ground permanently covered, and by planting different crop families together according to the principles of phytosociology. Synergistic agriculture allows no fertilisers and no tilling of the soil. Most of the work required by conventional agriculture is not necessary in this method, making it the best choice for such a low labour initiative, as well as for its environmental and economic benefits. Vegetables cultivated under a synergistic regime are top quality, completely organic and usually cheaper than organic products in farmers' markets or supermarkets because there are no costs for fertiliser and only low costs for labour. Although similar methods may be used also in permaculture, they are distinct systems.

Building subscribers' commitment

As seen in many similar initiatives around the world, CSA is more than just a short-chain supply model. It is also an instrument to create and strengthen social relationships in an urban context, by building food communities around common needs such as food quality and food security. Community links can be built through greater interaction between farmers and other participants, especially through sharing responsibilities and rewards. And this has many benefits beyond the CSA itself.

As one of the first steps for building the Orti initiative, the tutor organised public presentations to find committed subscribers. Initially 200 applications were received for only 60 available plots. The tutor carefully selected those who showed a strong commitment to the distinctive social aims of the initiative; no social, economic or age requirements were stipulated.

At the beginning of the subscription campaign, the tutor gave Synergistic Agriculture workshops free-of-charge to interested subscribers. This subscriber education campaign attempted to move from the consumer (*consumatore*) concept to the active consumer-citizen (*consum-attore*), a term which has been popularised in Italy (<http://consumattore.wordpress.com>, <http://www.altromercato.it>). In return for the workshop, subscribers were expected to do some volunteering in the gardens. Subscribers were asked to help in the initial establishment of the gardens, though this voluntary labour was not required to cover part of their share.

The *Orti Solidali* initiative is structured as a shareholder CSA, where subscribers and farm workers share responsibilities and rewards, unlike some CSAs. Subscribers have paid the

same fixed share from the start, approximately 300 Euros for 52 vegetable boxes per year. This has been enough for the 60 subscribers to maintain the salaries of the four farm workers, despite many difficulties in production. The farm workers receive less money than from conventional food chains, but they gain financial security. With payments at the beginning of the season, they can purchase seeds, equipment and other supplies. Subscribers receive more and better-quality produce for lower prices than at farmers' markets; they also have a personal, highly customised garden plot compared with other short supply chains.

As in all CSAs, the main strengths are the subscribers' trust, participation and long-term commitment, rather than lower prices of food products or other commercial benefits. This commitment has allowed the project to surmount many obstacles that could have undermined it.

Ways forward: a new ethic

The initiative encountered many misunderstandings and conflicts with the cooperative farm that provided the land and infrastructure, apparently because of different organisational aims. Furthermore, the *Orti* faced drought and strong winds; sheep entered the plots, eating and destroying everything. By autumn 2009 the initiative had to move to another site and rebuild the garden infrastructure from scratch.

These difficulties caused a great delay in producing and distributing food boxes, thus limiting the involvement of subscribers in the CSA network. Minimal participation of subscribers may also be due to the heavy time-burdens of urban workers and especially the periurban location of both garden sites, requiring a long journey from the city. Nevertheless the CSA subscribers maintained their commitment, partly thanks to the careful initial selection. Despite the long delays in providing food boxes, none of the 60 subscribers has complained: only one decided to end his contract.



CSA subscribers do volunteer work
Photo: Michele Vitiello

To investigate the subscribers' attitudes, especially their commitment to the *Orti* project, we gave them questionnaires asking about their motivations, satisfaction and involvement in the CSA initiative. In order of importance, their motivations were ethical, environmental and social. Most respondents emphasised their broad ethical commitment to such an initiative, though the answers also included 'economic' and 'food safety' choices. These responses illustrate the emergence of a new ethics which affects economic, social and environmental factors; this ethics gives rise to new alternative relationships for food production and distribution (Dalla Costa, 2007).

In the *Orti* project, communication between farmers and subscribers takes place mostly through the internet – via the mailing list and a blog. In subscribers' responses to the questionnaire, communication was seen as sufficient for the subscribers to feel involved in the initiative, despite the delays in receiving food boxes. When asked how these difficulties should be addressed, many suggested to 'wait for the obstacles to go away' and 'use group strength and resources' to continue the *Orti*. When asked how the project could be enriched, subscribers suggested the following activities: building a network, combining different types of knowledge, strengthening the group and its interrelations.

The table below summarises the main strengths and weaknesses of the *Orti Solidali* after one year of activity.

Based on this assessment of our experience, we would suggest that a CSA initiative could usefully begin with the following measures: a careful initial selection of the participants for their motivations to ensure an essential commitment; close spatial proximity between the field and the subscribers' community, and community activities around the gardens to improve social cohesion among subscribers.

Strengths	Weaknesses
<ul style="list-style-type: none"> - The agronomic method reduces pressure on environment and reliance on fossil fuels. - Economic benefits – both labour and net income per unit land area – are greater than in conventional agriculture. - Soil value increases due to the introduction of social function in agriculture. - Periurban territory becomes an everyday reference point for city dwellers. - Subscribers pay directly for the farming activity, with no intermediary 	<ul style="list-style-type: none"> - Potential employment, and therefore economic sustainability, is little developed. - Geographical distance deters involvement by urban subscribers. - Subscribers have little involvement, especially in the agricultural activities.

The *Orti Solidali* project shows that CSA initiatives can develop alternatives to economic growth, ever-increasing consumption and large-scale retail chains, driven by profit maximisation. Some alternative strategies have been conceptualised as degrowth – attempting to fulfil human needs with minimal use of natural resources, thus operating

outside of a rationally calculable economy (Fotopoulos, 2007; Fournier, 2008; Latouche, 2006, 2009). An example of degrowth, the *Orti* obtains resources and provides benefits that are not measurable by conventional value chains. At the same time, its methods have a broader relevance beyond degrowth objectives.

Acknowledgements

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References

- Consum-attore, <http://consumattore.wordpress.com>, <http://www.altromercato.it>
- Dalla Costa, Maria (2007) 'Food as common and community', The Commoner no.12, www.thecommoner.org
- El Jardin de Emilia Hazelip*, a video on Synergistic Agriculture, <http://nueva-era.es/el-jardin-de-emilia-hazelip/>
- Fotopoulos, T. (2007) 'Is degrowth compatible with a market economy?' International Journal of Inclusive Democracy 3(1), http://www.inclusivedemocracy.org/journal/vol3/vol3_no1_Takis_degrowth.htm
- Fournier, Valerie (2008) Escaping from the economy: the politics of degrowth, *International Journal of Sociology and Social Policy* 28 (11/12): 528-45.
- Fukuoka, Masanobu (1985) *The Natural Way of Farming*. Japan Publications (JP/US).
- Hazelip Emilia, *Agricoltura Ecologica – Ecologia Profonda*, http://www.agricolturasinergica.it/articoli/eh_agricolturaecologica.pdf
- Henderson, Elizabeth and Van En, Robyn (1999) *Sharing the Harvest: A Guide to Community Supported Agriculture*, White River Junction, Vt: Chelsea Green Publishing Co.
- Latouche, Serge (2006) 'The globe downshifted', *Le Monde Diplomatique*, <http://mondediplo.com/2006/01/13degrowth>
- Latouche, Serge (2009) *La città lacerata*, <http://www.altragricolturanorddest.it/dettaglio.asp?id=836>
- Pinto, B. and Pasqualotto, A. (2009) Community-Supported Agriculture as a Model of Local Food System, report of a workshop held on 7 November 2009, Rome, http://crepeweb.net/?page_id=204
- Progetto Orti Solidali, <http://ortisolidali.wordpress.com>

Farm City and Hortus Aquarius: A Modular and Synergetic Design Approach in Practice

Gilbert Curtessi
Maarten Feberwee

Farm City comprises a concept that can be applied for the creation of agricultural clusters with economical, ecological and social features, in order to create optimal economic and ecological performance. Several case studies have been created in the last 2 years. In this article the Farm City concept will be illustrated by 2 examples: the Rotterdam Zoo in the Netherlands and Hortus Aquarius in Oman.

Farm City is a design tool developed by Gilbert Curtessi (Happy Shrimp, Allcomm, Transmare & Energy Transformers) and Maarten Feberwee (Ecomimics, Revaho). Curtessi's background as an entrepreneur and researcher is related to the first tropical algae and shrimp farm (known as Happy Shrimp Farm) in the Netherlands making use of residual heat. In this project a 2-km infrastructural connection with a powerplant was realized to supply residual heat for the growth of shrimp, *Salicornia* and micro algae. The cultivation was based on a modular system design.

Feberwee finished his master's in Industrial ecology at the TU Delft by writing a thesis on the modular concept of Farm City. Curtessi and Feberwee identified a symbiosis with each other's projects and started working on the design concept from 2012. Nowadays, the aim is to actually find stakeholders

willing to design, finance and realize agro-energy cluster companies based on the Farm City principles.

Farm City is focusing on food production, in combination with education, recreation and health care. Farm City's ambition is the creation of balanced business cases. The target is to achieve a optimal level of social, economic and ecological results. Farm City applies modules according to a systematic (industrial ecology) view. Industrial ecology is the study of material and energy flows through industrial systems. Key principles are the analogy with natural ecosystems, a holistic and systematic approach and multidisciplinary collaboration. (Garner and Keoleian, 1995).

A module relates to a certain agricultural process, technology or physical space. By input-output flows of organic materials, energy and water, the modules interact with each other and with other external flows, in order to create a closed system to the greatest extent possible. This concept can serve as an example of "metropolitan agriculture" in Western Europe for other delta cities around the world.

Rotterdam; Blijdorp Zoo

The design of Farm City Blijdorp consists of a landscape park covering the existing parking area, a greenhouse and a vertical farm combined with research facilities and student housing.



The design of Farm City Blijdorp: aerial and street view. Photo: FarmCity

The proposition is based on high value products such as flowers, food, animal feed and bulk products such as biogas and fertiliser. Input of organic materials originates from the zoo and surrounding urban areas. The primary goal is to keep flows of organic materials, energy and water in the system as long as possible. Biodegradable waste from the zoo, households in the neighbourhood, private gardens, the landscape park and the vertical farm will be enough for conversion into valuable compost and energy.

The management of Blijdorp Zoo has a keen interest in sustainable development and an established Greenteam is managing and investigating possible interventions. The Zoo accommodates a large aquarium called the Oceanium. This building is located in the expansion area of the zoo, which includes a new entrance and parking area. This parking area (3.2 ha) can potentially be transformed into a multifunctional agricultural cluster. (see: www.blijdorp.nl).

In Blijdorp Zoo multiple flows are assimilated: mainly manure and various other organic materials. These flows consist of biodegradable waste (35,000 kg – 50-60% moisture) and wood residues (10,000 kg). The restaurants release frying oil, currently used to power a ship owned by Blijdorp for the transport of salt water. The zoo requires approximately 1.2 million m³ of gas for heating, of which the Oceanium consumes 30%. In addition, the zoo consumes large quantities of water from different sources, which amounts to a total of 219,300 m³ annually. Wastewater at the zoo is partly discharged to surface water (ponds etc.), partly

transported through filtration beds; both salt and black water are discharged to the sewage.

The high-rise vertical farm provides energy and animal feed. The system could contribute to a drastic decrease in food miles and reduced animal feed costs. The extensive landscape park could function as a natural filtration and collection system for rainwater. A combination of a biopowered CHP (Combined Heat and Power) and biofermentation plant can convert flows of manure, black water and biodegradable waste into heat and electricity highly efficiently.

The extensive landscape park functions as a natural filtration and collection system for rainwater. As this results in a water collection unit of 3.2 ha underneath drainage, the water is not transported into the sewage system. Another advantage is the cooling effect the parking deck could provide for parked cars during periods of heat.

The next step will be a detailed design to connect these flows of water, materials and energy. Development can be enhanced by a team of available stakeholders, e.g., a real estate company, the zoo itself, universities and a parking management organisation (see figure).

Oman; Aquapolis and the “Hortus Aquarius”

In the coming decades our world population is expected to grow rapidly. This development will lead to large amounts of sweet water being used for the production of food and drinking water, to supply households and industrial branches. A solution for water scarcity in line with the Farm City principles is the saline desert farm called Hortus Aquarius, which is currently being developed together with international stakeholders.

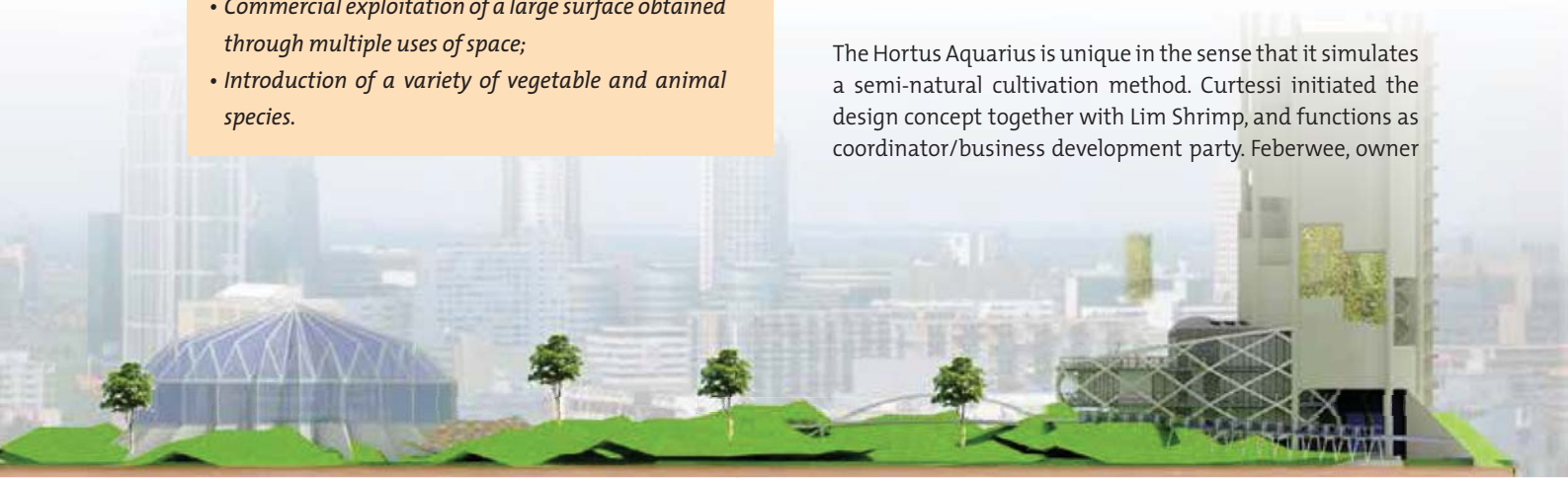
This project is part of the Aquapolis Centre in Oman, currently developed by Lim Shrimp. Construction of the Aquapolis Centre (2000 million tonnes shrimp production capacity) was started in 2014. The Lim Shrimp organisation is responsible for operational matters and necessary actions regarding the final business case. Analysis and discussions are currently taking place about how to integrate shrimp and vegetable production systems.

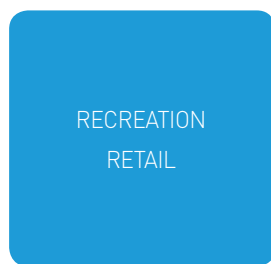
By cultivating, presenting and selling saline vegetables, consumer demand for culinary ingredients will be fulfilled within the United Arab Emirates region. Implementing a modular and phased growth in production capacity during the start-up keeps the company process controlled and reduces certain risks.

The Hortus Aquarius is unique in the sense that it simulates a semi-natural cultivation method. Curtessi initiated the design concept together with Lim Shrimp, and functions as coordinator/business development party. Feberwee, owner

Social, ecological and economic benefits for Rotterdam

- *Sustainability in agriculture; (re)circulation of energy, water and organic flows (e.g., nutrients);*
- *Establishment of parks for agriculture and cultural activities;*
- *Growth in real estate value by creating an aesthetic space over the existing parking lot;*
- *Local animal feed and food security and access to food reduces transport in a traffic dense area;*
- *Landscape park supports biodiversity and provides a habitat for plants and small animal species;*
- *Application of biological systems e.g., pollination services, water filtration, fermentation;*
- *Commercial exploitation of a large surface obtained through multiple uses of space;*
- *Introduction of a variety of vegetable and animal species.*





Farm City combines food production with recreation, education and health care. Photo: FarmCity

of Ecomimics, “a creative process and design engineer company”, assumes responsibility for a large part of the design and technical proposition of the Hortus Aquarius, together with Revaho, “a wholesale water and irrigation products company based in the Netherlands”. Feberwee and Curtessi, with the input of stakeholders, are responsible for the final design, business model and investment overviews necessary for implementation. The marketing and distribution will be executed by an existing and experienced stakeholder once the product is fully developed. Initial support for the Hortus Aquarius project in Oman will be given by IMARES, part of Wageningen UR.

Social, ecological and economic benefits for Oman

The Hortus Aquarius will be a visually attractive garden where edible saline products are produced using a durable, innovative and socially responsible method of production, without interference in the natural processes. The design will be based on a modular semi-controlled infrastructure and processing of nutrient water-effluent. The crucial factor of successfully creating a Hortus Aquarius is the availability of salt and a minimum of fresh water in a controlled environment. Additional nutrients from other agricultural processes rich in Nitrogen, Phosphorus and Potassium are available as a useful nutrient flow. This is beneficial to ecological and operational results.

The Hortus Aquarius is unique in this sense: it simulates a semi-natural cultivation method. Once the germination phase has taken place for about one week (using fresh water), there are four weeks left for the product to grow towards its desired size using daylight and salty effluent. This salty effluent is collected from a central point in the Aquapolis Centre, which is part of a circular aquaculture system. Using tidal irrigation systems, the saline vegetables will be irrigated in a semi-controlled environment. After irrigation the effluent from the saline vegetable lagoons is collected in a basin and stored for further re-utilisation. The system secures year-round availability of fresh saline vegetables.

Hortus Aquarius comprises certain innovative aspects that can provide a solution for current and/or future problems:

- Modular and symbiotic system production by industrial ecology principles – the residual water from the shrimp

is used for irrigation and contains a natural fertiliser for saline vegetables, reducing the use of external sources.

- The irrigation method for the saline vegetables acts as a biological filter that expands the technical and economic performance of the shrimp production system.
- Reducing waste flows – water and energy are used efficiently within both companies, reducing the waste flows and eliminating the need of extra water or another polluting energy source.
- Continuous production – the Hortus Aquarius solves the problem of seasonal availability and quality/freshness of saline vegetables.
- Provides labour opportunities.
- Natural development surrounding the Hortus Aquarius.
- Potential for market development, combining aquaculture and horticulture is both innovative and practical.

Bringing theory and practice

Currently the concept of Farm City finds itself in a stage where practical implementation of a theory is encountering design aspects. During the last decade many theories and designs were developed in the field of sustainable agriculture, industrial ecology and clustered modular agro-energy systems; now the step needs to be made to practical examples demonstrating the advantages of modular integrated agro-energy systems in our urban environment.

It is also evident that, to a large extent, location, climate and atmosphere define the modular system and its design. A desert climate in Oman is completely different than the Rotterdam climate. The input and output flows and demands differ completely. This fuels the authors’ confidence and motivation to continue with their mission to develop the concept of agricultural modular designs.

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References

Garner, A. and G.A. Keoleian. (1995). Industrial Ecology: An Introduction. Ann Arbor, MI: National Pollution Prevention Center for Higher Education



RotterZwam, Edible Mushrooms from Rotterdam

Siemen Cox
Mark Slegers

In his book *The Blue Economy* (See box), Gunter Pauli offers 100 business cases of things you can do locally with waste. Growing oyster mushrooms on coffee grounds is one of them. While we are both working towards more sustainable livelihoods, Pauli's book inspired us to start RotterZwam, an edible mushroom business in a former tropical swimming pool in the city of Rotterdam.

From waste reduction to food production

Coffee is, after oil, the most-traded commodity in the world. The Netherlands produces about 120 million pounds of coffee waste per year; Rotterdam alone produces 6 million pounds annually. Only 0.2 % of the coffee ends up in your cup, and the remaining 99.8 % is wasted. RotterZwam uses that waste as a main input for their production process growing oyster mushrooms on coffee grounds. It is our ambition to convert as much as possible of that 6 million pounds into food. We strive to do that partly through growing mushrooms in an abandoned swimming pool in the city centre, and we also developed and sell a Growkit that helps people to convert their own coffee grounds into food at home.

Besides coffee grounds, we also use coffee husk, another waste product, for growing our substrate. At first we used straw to mix with the coffee to give the substrate, and therefore the mycelium, more air. By focussing on reusing as much waste as possible, we found that instead of straw we could

also use coffee husk. Husk is released when roasting coffee beans, and roasters normally throw it away as they regard it as waste. The advantage of using husk over straw is that the husk is already pasteurised and is a by-product, whereas straw needs to be bought and requires additional processing and thus energy before it can be used. We have made supply agreements with the majority of the micro roasters in Rotterdam as well as with roasters in the surrounding region to collect enough for our production. We pick up their husk, stored in plastic bags, for free on a monthly basis. Instead of giving the bags to the municipal waste collectors, they gladly give it to us as it makes no difference in their operations and they like being part of our initiative.

RotterZwam's focus is very local because transport of food over long distances yields: a) high CO₂ emissions and energy costs, and b) a system that is very sensitive to disruptions, because it relies heavily on just-in-time delivery. Every supermarket clerk can tell you what happens when even two trucks are late: empty shelves.

The transportation of used coffee waste also brings challenges. We prefer to use fresh coffee grounds for the process, as otherwise we need to pasteurise it before we can use it, adding high energy input and costs to prepare it to be suitable for growing fungi. An advantage of small-scale local production is the short chains, so having fresh grounds is not an issue. We close a circle of raw materials to production and consumption in 3,7 km — On a cargo bike!

Furthermore, we do not see the oyster mushroom as an



Mark & Siemen from Rotterzwam. Photo: Rotterzwam

ultimate goal. We see opportunities for extracting enzymes from our substrate when we are “finished” with it, which could be beneficial for the paper industry. After extracting the enzymes, the residue is suitable to use as animal fodder and as a high-quality compost for farmers in the nearby Hoeksche Waard. These are just two examples of possible uses of the by-products we foresee in the near future.

We also compost a portion of our substrate with compost worms on-site using a system of Hungry Bins (see www.rotterzwam.nl/producten/hungry-bin-wormenbak-voor-thuis/ which is in Dutch, or go to www.hungrybin.co.nz/).

Market demand

We have found that it is not difficult to sell our mushrooms. We had orders coming in through Facebook without doing much (or actually any) marketing. People are very interested in our initiative because they like that we:

- produce food locally instead of transporting it all over the world;
- use coffee grounds for food production instead of burning it in a waste incinerator;
- produce mushrooms that transform nutrients to output 25 times more efficiently than meat does;
- grow gourmet mushrooms on the waste of the city (coffee grounds) in the waste of the city (abandoned real estate).

We earn about 50 % of our income from mushroom production. We sell them for 10 euros per kilo to restaurants and catering businesses and 15 euros per kilo to consumers. We want to



Oyster mushrooms. Photo: Rotterzwam

produce about 7,500 to 10,000 kilos annually in order to make around 100,000 euros per year. In addition, we developed and sell the Growkit for household use and we will soon be selling the Hungry Bin for worm composting. We also give workshops and offer work-placement opportunities, and have translated one of Gunter Pauli's fables into Dutch in order to inspire children to keep dreaming.

One of the challenges we face is upscaling our production. We sell mostly grey oyster mushrooms but we also grow yellow and pink ones, and we harvest twice to three times from a block. Many of the restaurants like to order large quantities of up to 5 kilos per week. Because our total production is currently about 20 kilos per week, we need to step up production. We recently finished our crowdfunding campaign; we received € 20,000 that we can use to grow

The Blue Economy as Inspiration

The Blue Economy is a new business approach that is receiving increased attention in debates on sustainable economic development and circular economy. The Blue Economy concept was introduced by Gunther Pauli, a socially engaged thinker and former CEO of the Ecover company in Belgium. The core of the Blue Economy is to focus on what happens with materials when they are thrown away. The strategy is based on the principles of nature: the waste of one system becomes food for another system. It may take a while and some complex processes, but in the end the materials (nutrients in nature) cycle back to their original form.

Gunther Pauli chose to name his concept and approach the Blue Economy out of disappointment, and as a critique of the Green Economy. The Blue Economy concept especially became known when Pauli, with his Zero Emissions Research & Initiative (ZERI) network of scientists and entrepreneurs, published the report "The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs". This report was written by ZERI for a project of the United Nations Environment Programme (UNEP) called "Nature's 100 Best" with the aim of finding sustainable, nature-inspired solutions for industry and society and in order to contribute to achieving the UN Millennium Development Goals. The hundred best solutions, which have the potential to change existing business models, were finally collected and published in the book "The Blue Economy".

The Blue Economy is a business and societal response to environmental, resource and social challenges and goes beyond sustainability as it is generally presented. It tries to find "disruptive" new ways for industry and people to work within natural systems, promoting and using cyclic, systemic, biomimicry-based regenerative processes that massively reduce impacts and consumption. More importantly, it claims to restore nature while dramatically reducing costs, maintaining profits and securing happiness and well-being. The most important elements of the Blue Economy approach are: (1) Cyclical economy, (2) No waste, (3) Upcycling, (4) Local & diverse, (5) Renewable energies, and (6) Creation of new companies and inspiring entrepreneurs.

Mushroom production from coffee waste was one of the successful business models presented by the Blue Economy approach, conceived because only 0.2 percent from the biomass harvested for coffee is ingested and the rest is simply left to rot. The Chinese scientist Shuting Chang demonstrated in his lab in Hong Kong that coffee serves as an ideal substrate for farming tropical mushrooms, while at the same time generating jobs, income and food security. Chido Govero, an orphan from Zimbabwe, was one of the first to set up her own business mushroom farming on coffee waste. Since then the model has been followed in many other places.

www.theblueeconomy.org

from start-up to the growth phase. We would like to grow first to 50 kilos a week and then on to 150 kilos a week. We are interested in collaboration and getting in touch with other producers, and we are looking for refrigerated containers to expand our business.

Impacts achieved

We have found that a lot of companies and NGOs want to talk to us. They would like to investigate ways of placing unemployed people with us so they can readjust to a work rhythm. Also, former convicts could seek a training position at our urban farm. People like to work with us and like to offer their knowledge and expertise on administration, marketing and business opportunities.

Interns from Sweden, France, Belgium and the Netherlands have completed our internship, working with us for one week to learn the process of preparing substrate. We taught them how to work with local government, and also other things we have learned over time about setting up the process, the techniques needed to adapt large-scale equipment for small-scale production, and so on.

Several companies are implementing the business case of growing mushrooms on coffee grounds, but few are willing to share the recipe. It takes approximately two years to master the process if you start from scratch. Because of the huge potential for job creation, the reuse of abandoned buildings, local food production and profitable small-scale urban farming, we want more people to know how this works. That is why we started the **Mushroom Learning Network** (www.mushroom-learning-network.org) together with Charles van der Haegen, Ivanka Milenkovic and Camila Amaya Castro, and the help of a few others. On that platform we share the business case and the details of the growing process. That way entrepreneurs all over Europe (and beyond) can learn about the business case, share knowledge and add their expertise.

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Urban Agriculture development in Minhang, Shanghai

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Urban agriculture development in China is still dominated by municipal and local government, and other stakeholders play a comparatively less important role. This situation is changing however. The MPAP (Multi-stakeholder Policy Development and Action Planning) and FStT (From Seed to Table) programmes of the RUAF Foundation have contributed to a fundamental shift over the last ten years, particularly in the RUAF China network cities, which include three pilot cities and ten dissemination cities. Minhang district in Shanghai is a good example of a newly emerging approach in China of government-led, but participatory urban agriculture development.

Urban agriculture in Minhang

Minhang is one of Shanghai's 18 urban districts and the city's second-largest economic entity. Located in the centre of Shanghai Municipality, Minhang has a well-developed traditional manufacturing and hi-tech industry, such as aerospace technology and biopharmaceuticals. Most of the district's farmlands are located in the southeast alongside the Huangpu River, and these plots have been reduced to a total of around 5,000 ha, accounting for less than 13.5 percent of the district's land area (farmland accounts for 32 percent of Shanghai Municipality as a whole). A total of 77,000 farmers in Minhang generate an agricultural output value of USD 70.5 million per year, accounting for only 0.4 percent of the district's GDP (the average for Shanghai districts is 1.9 percent). But the farmers' net income per capita in Minhang is much higher than for farmers in the municipality as a whole (respectively USD 2470 and USD 1890).

Urban agriculture in Minhang is facing both the constraints and opportunities of its location. Major constraints are: 1) decreasing availability of arable land (a reduction of 7.6 percent in 4 years); 2) relatively lower productivity on farmland compared to other land uses (the input-output rate in agriculture is only 1/6 of other economic sectors, while that of small-scale farming is even worse); 3) increasing labour cost and high competitiveness of other jobs (making educated young people reluctant to become engaged in farming); 4) general small-scale of production, which makes it difficult to attract (commercial) finance for investment (such as for upgrading technologies).

However, the context also provides some good opportunities: 1) The multifunctional role of urban agriculture in the urban system is increasingly recognised by the city government. 2) There is a huge market and high demand among urban citizens for fresh and healthy food and for other niche products such as tourism destinations. 3) The protection of farmland and the practice of urban agriculture provide employment for vulnerable groups such as migrants and the elderly. 4) Increasing financial support, particularly through government subsidies, makes multifunctional urban farming interesting for some young entrepreneurs who are willing to invest time and efforts in this potentially high-return business.

The intervention and implementation of MPAP and FStT programmes

At the time RUAF started its MPAP programme in Shanghai in 2005, it was recognised that a number of changes were necessary in order to develop urban agriculture. To start with, urban agriculture requires more and diverse actors than traditional (rural) agriculture. RUAF introduced the MPAP programme in Minhang to help the district government identify major stakeholders and encourage them to become involved in the development of urban agriculture. In Minhang, at least three categories of stakeholders should be included: 1) *government authorities*, at municipal, district, town/township, and village levels; 2) *practitioners*, such as farmers, collectives and enterprises; and 3) *support organisations*, including universities, research institutes and market organisations. District government, village commissions (including cooperatives and some key agro-enterprises), Jiaotong University and the Agriculture Service Extensions were selected as key players in the MPAP programme and formed the core team. Through the RUAF, external linkages were created to other cities in China, such as Beijing and



RUAF China and Shanghai team visiting FStT farm. (Photo: IGSNRR, China)

Chengdu, as well as to cities in Europe, Japan and Taiwan.

RUAF continued to support this multi-stakeholder process of action planning under the subsequent FStT programme, but added support to practitioners in improving their income and efficiency through technical and organisational changes. These changes were identified by a local team, consisting of RUAF China Regional Centre based in Beijing, Minhang Agriculture Commission, Jiaotong University, China Agriculture University and the two towns Maqiao and Pujiang, which have been intensively involved in RUAF programmes and government agro-schemes in the last five years. In Minhang, *five key areas of interventions* were adopted by district government departments, agro-focused towns, villages and cooperatives. These interventions were: 1) joint strategic master planning both in sectoral and spatial dimensions by inviting high-profile institutions and experts to become involved; 2) establishment of cooperatives (to realize economies of scale and gain government support for training, finance, insurance, technologies, and marketing); 3) provision of innovative technical assistance to urban producers, such as by introducing a system in which each technician takes care of 7-10 farm households; 4) innovative financing schemes for urban agriculture based on a diversification of financing resources, such as mobilizing more social capital into urban agriculture businesses by establishing some preference policies; and 5) introduction of a tracing system to improve food safety. This latter system encompasses the whole chain, including production, transportation, trading, and the consumer market. The tracing and certification commitments are usually carried out by a third party such as municipal inspection departments.

Major changes and progress

Through these RUAF programmes, participatory government-led urban agriculture in Minhang district has developed significantly in the last five years.

Strategic planning

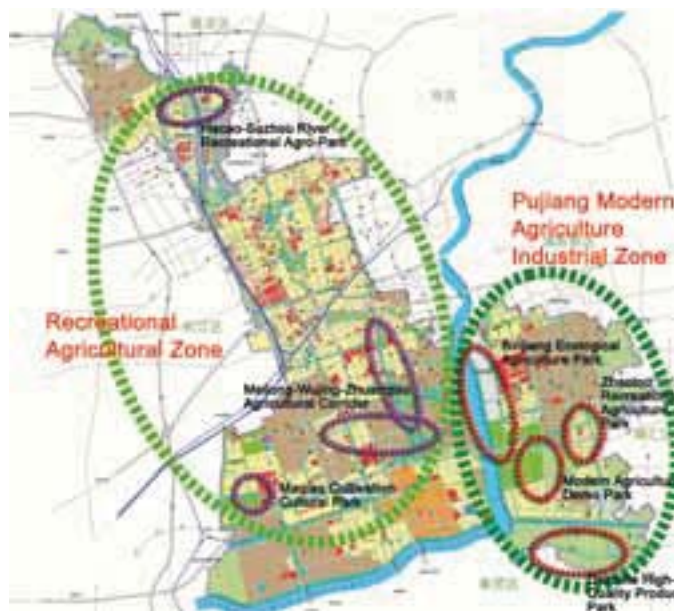
The government in China continues to play a dominant role in development; and strategic planning is therefore still important, particularly for urban agriculture in the relatively better-off district of Minhang. Unlike before, much attention is now given to the multi-functional role of agriculture in the peri-urban settings, its sectoral and spatial restructuring, and the participation of key actors in this process. In addition, external planners have been invited to participate in this planning process. Traditionally government planners focused predominantly on production and completely ignored the actors involved.

This change is demonstrated by the latest Minhang Spatial Plan for Urban Agriculture Development (2010-2020), which was jointly developed in 2009 by RUAF China at the Chinese Academy of Sciences and local government. The focus in this comprehensive development plan is on high-quality production, environmental protection and recreation, and on stakeholder participation. Two agricultural zones have been identified and designed (see figure 2): a recreational agricultural zone close to residential areas, with room for agro-tourism,

and a so-called “Pujiang Modern Agriculture Industrial Zone”, which incorporates both more intensive production and a modern design for sightseeing for urban residents. This large-scale green farming landscape is located close to the grounds of Shanghai World Expo 2010.

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Figure 2 Minhang spatial plan of urban agriculture development (2010-2020)



Planning is also well coordinated with other major policy frameworks and regulations, such as the *Agriculture Industrial Policy*, in which urban agriculture is seen as a way to enhance profit and farmers' income and facilitate the development of specific niche agricultural products, and the *Small Town (peri-urban) Planning Framework*, in which urban agriculture forms part of integrated urban-rural planning and development.

As part of these plans, a series of *infrastructural improvements* for agricultural development have already been carried out. By the end of 2010 more than 1,527 ha of farmlands had been improved in terms of increased production (through the use of machinery for paddy rice, which increased from 42 percent in 2008 to 98 percent in 2010), ecological production and the introduction of irrigation systems for vegetables.

Formation of cooperatives and agro-enterprises

The importance of cooperatives was emphasised during the FStT programme in Minhang district. They are seen as an effective organisational step in urban agriculture development. The formation of cooperatives was based on villages or on agro-practices. The government enthusiastically encouraged this development and provided support in capacity building related to management, organisation and technological innovation. As a result, the number of agro-cooperatives in Minhang more than doubled from 38 in 2008 to 84 in 2010. The income of farmers in the cooperatives was also 3-5 percent higher than that of the un-organised farmers. Overall farmer household income per capita in Minhang in 2010 reached 18,500 RMB (about 2,000 Euros), which was a 20 percent increase compared to 2008.

Besides the formation of cooperatives, the government also encouraged the development of large-scale agro-enterprises, and supported farmers especially in acquiring land and obtaining financial support. Many agro-enterprises were thus able to expand their businesses in Minhang. Some 9,000 additional jobs in agro-related activities have been generated in the last two years. Currently there are 26 large-scale agro-enterprises in the district, six of which are very large.

Thanks to the improved peri-urban infrastructure in Minhang and the relatively rapid increase in farmers' income, the growth in income disparity between urban and rural areas in Minhang has gradually slowed down. According to an independent third-party evaluation of the performance of local government in 164 counties in China (in strengthening urban-rural integration and reducing the gap between them), Minhang ranked No.1, and 81.4 percent of the farmers in Minhang are satisfied with the government services.

Provision of effective technical assistance

Currently in Minhang 88 agro-service stations with 288 extension teams provide **technical assistance** to farmers related to agro-technologies, marketing, food quality control and recordkeeping. Under the RUAF programmes an improved technical assistance scheme has been developed, in which each technician provides services to 7-10 farm households throughout a full production period. In the past, technicians were not specifically appointed to certain farm households, so none took responsibility for improving farmers' skills and performance. During the period 2008-2010, various training courses on agricultural planning and management were organised, and up to 8,000 cooperative farmers received technical training.

In collaboration with Shanghai Agricultural College, Jiaotong University and the Minhang Agricultural Institute, new farming experiments were developed and served as demonstrations for the farmers, on testing and dissemination of high-quality seeds for paddy rice, vegetables and horticulture.

Design of innovative financing schemes

A series of innovative financing schemes was developed under the RUAF FStT programme and suggested by the RUAF financing study, such as a guarantee fund and interest discount for a general agriculture production loan; an unemployment insurance and pension to farmers in cooperatives; financial institutions and relevant enterprises are stimulated to set up "small village banks" to provide financial support services to cooperatives, and cooperatives are encouraged to sell their products directly to communities and working units by giving a free ground rent.

Improvement of food safety

Based on the assessment conducted under the FStT programme and the high standards related to food safety set at the Shanghai World Expo 2010, Minhang established a good system for monitoring food safety in the production and supply of agricultural products for the Expo. Given its location near the Expo sites, Minhang was designated as the

food supply base in Shanghai during the event. The quality tracing system for all Minhang agricultural production and the certification system set up for entering the market in Minhang district are still in operation. Up to 20 percent higher income can be obtained by selling certified products.

In 2010, the satisfaction rate for quality vegetables was 99.8 percent for all the markets in Minhang. Green Certification increased from 400 ha in 2008 to 1,300 ha in 2010 and 39 cooperatives were approved to sell green products. Farmer collectives are encouraged to explore markets, adapt their production to the quality criteria in new markets and to establish or improve their marketing channels, preferably directly to consumers. The Minhang government assists in branding locally grown food (quality labels) and in stimulating consumers to eat locally produced quality food. The number of communities and working units involved in the former has increased from zero in 2008 to 30 in 2010.

Conclusions and some experiences

Minhang is a special case of urban agriculture development because of its natural and social settings. Its practices and approaches may not be fully relevant to other urban regions in developing countries, but the following lessons learnt may be relevant to other contexts.

- A strong government is critical for a government-led development approach. The local government must be consistent and transparent; and the integration and institutionalisation framework must be strong enough to assure fluctuation risks can be effectively avoided when changes take place in the local government.
- A systematic and comprehensive planning process is required to make sure the interests and benefits of various stakeholders can be guaranteed, and the initiatives and innovations of most stakeholders can be mobilised. RUAF's MPAP and FStT programmes were important in facilitating this process in Minhang.
- Policy formulation on multifunctional urban agriculture needs to take into account both sectoral and spatial dimensions, as well as other policy frameworks and get more support from external resources.
- A multi-stakeholder participatory approach can also be applied and implemented in a government-dominated society like China, as long as a common mission can be clearly identified and disseminated among various stakeholders.
- Close monitoring and evaluation of the activities and final products, including food safety tracing and certification as in Minhang, by independent third parties enhances the performance of local government and other actors, given the third-parties' neutral position and impartial judgement in testing and certifying, which in turn boosts fair competition among all the players.

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For over 30 years, The Stop Community Food Centre has been working to end hunger and build a healthy and strong community in the Davenport West neighbourhood of the city of Toronto. The Stop strives to increase access to healthy food in a manner that maintains dignity, builds community and challenges inequality.



One of The Stop's inner-city community gardens

Promoting Urban Agriculture through the Community Food Centre Model

As a grassroots, non-profit organisation, The Stop is committed to continuing to try to meet the need for emergency food support while developing innovative new food programming and sharing it with others. The Stop's programmes and services focus on the ways food can bring people together and break down social isolation while improving overall quality of life. All of The Stop's efforts are based on the belief that food is a basic human right. Current programming includes community kitchens and dining, urban agriculture, a food bank, drop-ins, civic engagement and pre- and postnatal nutrition and support.

CONTEXT

The neighbourhood we serve, Davenport West, is one of the poorest communities in Toronto. According to census data and surveys conducted at The Stop, over 66 percent of The Stop's programme participants spend well over one-third of their income on rent compared to 29 percent of the Toronto population as a whole.

This is largely due to stagnant and decreasing incomes (social assistance rates that do not reflect the cost of living, a low minimum wage and a loss of well-paying jobs) and increasing costs (high rents and rising food prices). While there is a significantly larger unemployed population among Stop users (37 percent) than among the general population of Toronto (7 percent), 38 percent of food bank users hold jobs.

The impact of poor food access is undeniably an increase in poor health. In our community, as across Canada, there is growing evidence of widespread child obesity and increasing accounts of diet-related illness. According to Toronto Public Health figures, 71 percent of deaths in the province of Ontario have "strong associations with diet" and one-third of Ontarians cannot afford a healthy diet. More and more research is linking food additives to higher incidence of cancer. Insufficient income affects people's access to healthy food on two levels: the individual (inability to afford healthy food) and the community (fewer retail outlets, reduced variety of foods and less fresh, unprocessed food). This is occurring in a larger context of threats to local food production from the farm income

crisis and loss of prime agricultural land in the Greater Toronto Area due to urban sprawl.

Many recent immigrants in our programmes express frustration because they can no longer find or afford the pesticide- and preservative-free produce that they were used to eating at home. Traditionally populated by Italian and Portuguese families, Davenport West is now home to a mix of people from Latin America, the Caribbean and some South and South East Asian cultures.

Low-income community members are also impacted more severely by environmental contaminants than people living in more economically stable neighbourhoods. Residents of poor neighbourhoods (such as Davenport West) with industrial facilities and a high proportion of poorly maintained, aging housing units have a higher rate of exposure to environmental toxins and a greater susceptibility to the resulting negative effects because the generally poor nutrition associated with poverty is a risk factor for greater uptake of contaminants. A diet low in calcium and iron, for example, will result in more efficient absorption of lead (Cooper, 2005).

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It may be a mixed blessing that many of the original industries have moved out and are being replaced with infill housing. While the hope is that pollution levels will drop, the immediate reality is that many jobs have been lost and the new housing is priced beyond what most community members can afford. Davenport West remains a neighbourhood geographically divided by railway tracks and awkward public transit.

THE COMMUNITY FOOD CENTRE MODEL

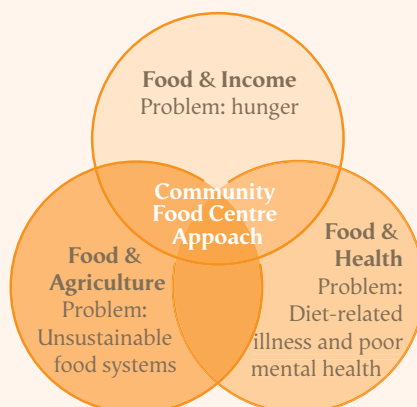
The Stop recognises that, in order to confront hunger, we must go beyond handing out food to people struggling on low incomes and find long-term, sustainable solutions. Our Community Food Centre model brings together a number of approaches in the field of food security, melding respectful emergency food delivery with community development, social justice and environmental sustainability. At the heart of this project is the promotion of community food security. This refers to a strategy where all members of a community, regardless of gender, race or social class, have access to adequate amounts of safe, nutritious and culturally appropriate food produced in an environmentally sustainable way and provided in a manner that promotes human dignity.

Traditionally hunger has been viewed as an issue of charity. The Stop is working hard to reveal the systemic causes of food insecurity that marginalise certain individuals and groups and to reduce that marginalisation through community development, food programming and systemic advocacy. Many personal accounts show that passively receiving food is not only demeaning to recipients but also perpetrates structural inequality.

Sunflower garden in Toronto



When people become actively involved in creating solutions to food insecurity in their community, they feel less stigmatised. They also develop their skills further, feel less isolated, build support networks and learn how to have a greater influence in making change. In the Community Food Centre model, food security efforts fall into three interconnected areas: **food and income** (inade-



Adapted from Hancock, Labonte and Edwards, 1999

quate income leads to hunger and food insecurity), **food and health** (lack of access to adequate, healthy food leads to diet-related illness and poor mental health) and **food and agriculture** (the way we grow, manufacture and distribute food has an enormous impact on food security and the environment). Solutions to food insecurity must be wide-reaching and take all three of these areas into account. This conviction is vital since most failed food security approaches tend to focus only on one or two of these issues, missing the important ways in which they interconnect.

URBAN AGRICULTURE – THE MODEL IN ACTION

The Urban Agriculture Programme has been a way to accomplish many integrated and mutually reinforcing goals, including healthy food production in the city, environmental protection, education on environmental and social issues, engagement of diverse community members and the development of strong social networks in the community.

In 1998, at the suggestion of a local city park supervisor, The Stop Community Food Centre joined with local schools and the Toronto Public Health Department to plant a vegetable garden in Earls Court Park, just a ten-minute walk from The Stop's main location. On a plateau that served as the shore of Lake Iroquois many

thousands of years ago, Earls Court Park was never used for industrial purposes and was thus very hospitable ground for growing food. It now contains a 9,000-square-foot vegetable and native plant garden that provides approximately 1,100 kilograms of fresh produce to The Stop's food programmes.

We estimate that 2,500 people experience our programme annually, either as volunteers, visitors, students or participants in festivals. This does not include the number of people who take the produce home from the food bank or eat vegetables prepared in our community kitchens! Volunteers include neighbours, people who use The Stop's services and children from local schools. In the winter, volunteers continue to grow greens and herbs in greenhouse space donated by a public school.

While all forms of community gardens provide marginalised people with agricultural opportunities, our collective approach to growing is particularly effective for people who cannot commit to tending a plot of their own for an entire season. There are many barriers to maintaining an allotment in a community garden, including the need to work multiple jobs to meet basic costs, unstable housing situations that force people to change location and physical or mental health concerns. Participants value the ability to drop in to a garden session as their time, health and outside commitments permit and learn about ecological growing methods from staff and other gardeners.

The programmes are structured so that volunteers and programme participants can develop the networks that link them to information, resources and social support. We actively promote the sharing of diverse backgrounds and experiences, where participants find commonalities and affirmations of their culture. Simply growing callaloo, a Caribbean vegetable also used in South Asian cooking, in a public park provides an opportunity to break down stereotypes by showcasing the positive contributions and knowledge of immigrants. For many recent immigrants with agricultural backgrounds but no access to land, The Stop's community garden is an opportunity to learn about agriculture in the Toronto climate and experiment with introducing crops that are familiar to them.

Work sessions, focused educational activities and public celebrations are all venues for talking about sustainable food systems with children, youth and adults who are marginalised by economic, social and health issues. Through educational activities integrated into urban agriculture programming we:

- show how environmental concerns (reducing waste, contaminants and fossil fuel use) can be linked to personal health through healthy food production (composting, organics, beneficial organisms and reduced food miles)
- make participants aware of the importance of maintaining healthy ecosystems through a subject close to their hearts and experiences: food
- incorporate information on every dimension of how food is produced, distributed and consumed
- provide hands-on learning that leads to active engagement in creating local alternatives to the existing food system.

The challenge of The Stop's education programme is to infuse each teaching moment with the powerful interconnections that come from addressing food from all dimensions of health, production, environment and income, and to do so in a way that both inspires action and leaves participants with the skills and resources to create change in their community.

BREAKING NEW GROUND – THE GREEN BARN

The Stop will be taking its Urban Agriculture programme to a new level in 2008 with the opening of the Green Barn, a sustainable food systems education centre that will actively engage people to grow, eat, celebrate, learn about and advocate for healthy, local food. The Green Barn will be part of a larger urban redevelopment initiative at a former Toronto Transit Commission streetcar repair barn led by Artscape (a Toronto-based non-profit organisation that specialises in creating affordable housing for artists). What was once an abandoned industrial site in a neighbourhood adjacent to Davenport West will become a vibrant community space with artists' studios, space for environmental and arts groups and a public park. Artscape aims to make the site one of the first heritage buildings in Canada to be certified by Leadership in Energy and Environmental Design (LEED). The Stop will be a vital part of this creative hub with a greenhouse for organic produce,

commercial kitchen, compost demonstration site, sheltered garden for extended-season growing and an outdoor wood-fired bake oven.

The Green Barn will be a place where everyone from children to seniors can learn about growing organic food in their own neighbourhood as well as hear about good food policies and innovative ideas from across the city and around the world. These new growing spaces will make it possible to stretch our idea of what we can grow locally and to extend the season for tender fruits and vegetables in protected outdoor beds. A year-round farmers' market will highlight the best of local produce, increasing connections between rural producers and urban consumers. The mix of incomes in the neighbourhood will make a market financially viable for farmers while making fresh produce more readily available for low-income residents. An indoor Covered Street will also make it possible to operate a market year-round, providing opportunities to educate about seasonality and preserving local produce.

Just as at The Stop's main site, a commercial kitchen and outdoor bake oven will bring people from diverse backgrounds together to cook meals and learn from each other. Social enterprises such as a café, produce sales to chefs and fees for educational materials and tours will support the long-term sustainability of Green Barn programmes. The Green Barn will also be a local hub for organising around food access and anti-poverty issues, where participants can learn about and become engaged in advocacy initiatives from local to international levels. We are excited about the possibilities for the synergies between food, education, community, environment, social justice, art and heritage that this unique project will create.

The Green Barn project is generating much excitement internally and externally, yet it will also present some interesting challenges. Obtaining funding for such a sizeable expansion of our work requires a shift in fundraising strategies. The Stop has been successful at funding its current



The Green Barn at the beginning of its re-development

programmes through a mix of individual donations, government funding, grants from foundations and special events. To raise money for both capital and operating funds for the Green Barn, The Stop will, for the first time, undertake a campaign to raise money. Our sense is that the compelling, innovative nature of the Green Barn will attract the support needed.

As a neighbourhood-based organisation, The Stop will need to do some careful thinking about what it means to operate a satellite site in a neighbourhood that is quite different from Davenport West. The St. Clair/Christie area, where the Green Barn is located, looks considerably more affluent than our current catchment area, although there are also many people living in housing co-ops, shelters and assisted housing. The challenge will be to balance our focus on those marginalised by poverty and social inequities while maintaining the Green Barn as a resource for the whole community.

With its balance of social justice, healthy food production and innovation, the Green Barn will be a powerful magnet in the neighbourhood and city. We hope to see that it attracts a wide range of people working together on solutions to hunger and poverty and building a more sustainable and just food system – an ideal extension of our current community food centre model.

References

- Cooper, K. 2005. Child Health and the Environment – A Primer. Toronto: Canadian Partnership for Children's Health & Environment.
 Hancock, T., Labonte, R. and Edwards, R. 1999. Indicators that Count! – Measuring Population Health at the Communities Level. Ontario: University of Toronto.
 The Stop Community Food Centre 2005. The Community Food Centre Model. Toronto: In-house publication.

Carrot City: Designing for urban agriculture

Diana Lee-Smith

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Resilient cities and buildings that work with nature instead of against it have to be designed by professionals who have been trained in and are focused on sustainability. The landmark Carrot City show at Toronto's Design Exchange brought designers, planners, architects and the general public up-to-date on developments in designing for urban agriculture.

Green vision in the stock exchange

Despite the fact that food production, processing and consumption together constitute perhaps the most basic aspect of resilience for human communities, recognition of this has been slow in the design and planning professions. This is now starting to change. For Toronto it all started when a few students at Ryerson University chose buildings that incorporated urban food production as subjects for their architecture classes in 2006. The idea really took off and the core group linked up with others in schools of architecture, planning, design and landscape architecture across the city, eventually across the country, and even in other parts of the world.

"Carrot City, Designing for Urban Agriculture" is an exhibition that ran at the Toronto Design Exchange throughout March and April of 2009, and was curated by June Komisar, Mark Gorgolewski and Joe Nasr of Ryerson University. It

Bagriculture: Growing bags for portable urban agriculture in small spaces, places with no or contaminated soil, or temporary locations.

Topher Delaney Artist/Landscape Architect 2009



*Parking Space Community Garden Plot by Hellmann's Canada.
Photo: Joe Nasr 2007*

brought the vision of a green city (in which vegetables are grown and even livestock are raised) into the heart of Toronto's financial district, symbolically perhaps into the old Stock Exchange building. There are also plans to show the exhibition elsewhere and to produce a book. The exhibition showed how increasing interest in growing food within the city, supplying food locally, and food security in general, is changing urban design and built form. Projects in Toronto and other Canadian cities illustrated how the cities and buildings are changing, while relevant international examples showed how ideas from other countries can be integrated into the Canadian experience. The Carrot City collection of displays is divided into four parts: city, community, building (home or work) and products.

Imagining the productive city

Despite the historical importance of food in cities, food production, distribution and related issues represent a new area of study for the building professions. Re-imagining the buildings and spaces within the city empowers designers to develop exciting and imaginative new proposals for what a future "productive" (and more resilient) city may look like.

The city level part of the exhibition looked at transformations of urban space that go beyond particular sites, pointing to new ways of imagining urban areas. An influential concept explored here was the idea of "Continuous Productive Urban Landscapes" (also see UA-Magazine no. 15), which link underused spaces such as riverbanks, median strips, public parks, schoolyards and boulevards for continuous urban food production. Large-scale public planning initiatives in Canada that incorporate urban agriculture within a larger master plan include the Mayor's Tower Renewal Project and Downsview Park in Toronto, and the Olympic Village of South East False Creek in Vancouver. The ambitious thinking

reflected in some of the concepts presented, such as Vertical Farms and Pig City, are purposely provocative, but other projects such as "Making the Edible Landscape" demonstrate that these ideas are not merely speculative but can be realized.

Food production in communities

The process of designing for food production in, and with, communities has the potential for strengthening community cohesion. Yet the emerging alternative food movement in Canada has only just begun to take advantage of the possible contributions that designers and the design process can offer. The built environment and food policy meet at the point where architects and landscape architects incorporate farmers' markets, greenhouses, edible landscapes, living walls, permeable paving, green roofs, and community gardens into architectural programmes. Such connections between food issues and built form have the potential to transform not only food production and distribution, but basic assumptions about the programming required in the design of buildings and urban spaces.

This part of the exhibit presented projects, ranging from community greenhouses to community food centres, that house initiatives such as teaching people to grow food, helping to develop and manage allotment and community gardens, assisting in the development of food-centred micro-enterprises and supplying food banks and soup kitchens with fresh produce they otherwise lack. Neighbourhood-scale initiatives such as Growing Home in Chicago and Growing Power in Milwaukee have shown how urban gardening can have the power to transform communities through educational initiatives, back-to-work programmes, improved access to affordable and healthy food, and the creation of a focal point for the community. The exhibition showed how designers can play their part in this transformation.

Designing buildings for food at home and at work

From restaurants to hotels, from condominium complexes to row houses, the projects in this part of the exhibition illustrated how to get food production closely linked to where it

Mole Hill neighbourhood community garden, Vancouver, British Columbia.

Photo: Joe Nasr 2008



A proposed library with a rooftop urban agriculture garden for the UNESCO World Heritage City of Ouro Preto, Brazil.

Photo: Jorge Silva, designer, 2008

is processed and consumed. Since design is the integration of many variables, buildings can provide a variety of benefits, including thermal performance improvements from productive green roofs and green walls that act as insulation and buffer layers. Chefs can offer fresh herbs in winter from their own greenhouses, and families can have vegetables from their front yard or rooftop that taste better than anything they can buy in the store.

Compelling ideas presented in this part of the exhibition included the integration of food production in alternative spaces, such as co-housing, orchards and allotment gardens on rooftops, and community gardens in laneways. All home and work spaces were shown to be potentially productive, from front lawns to flat roofs. But this was not all "pie in the sky". Alongside the student and other visionary projects were examples of buildings already in use and under construction. Toronto is already home to many green roofs and buildings and it has now adopted a green roof policy, by passing a by-law that requires such roofs on new buildings of most types.

Product design for urban agriculture

Urban agriculture requires a toolbox of objects, technologies, systems and components that can enable food production to take place in urban locations or can incorporate it into building design. Shown in this section of the exhibit were designs from around the world, either proposed or currently in use, that foster urban agriculture. The term "products" describes ideas that are not site specific but can be applied in various locations and situations. These include technologies such as living walls, green roofs, planter systems, chicken coops, beehives, vertically integrated greenhouses, and mobile support structures. Several products that were shown tackle the problem of urban soil remediation through container gardening. Other designs solve the problem of small growing spaces or deal with existing roofs that cannot support heavy planters. While some of these items are based on sophisticated principles and state-of-the-art techniques, many use off-the-shelf components that provide creative urban agriculture solutions for a variety of challenges.

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FEEDing the City: Approaches to the Upscaling of Urban Agriculture in Almere, Toronto, Lima and Milan

Henk Renting

Excursion to Onze allotment gardens under glass. Photo by: Henk Renting

In 2022 the city of Almere will host the World Horticultural Expo Floriade, with the central motto “Growing Green Cities”. In the years until the Floriade, the municipality has ambitious plans to develop Almere as a prototype for a Green City, of which urban agriculture and regionalised food provisioning are an important part. A key question for the municipality is how to build bridges between existing successful, but small-scale, UPA initiatives and challenges at larger scale levels. During the GROW the City Urban Agriculture Café on 16 April 2014, Almere had the opportunity to share experiences in the upscaling of urban agriculture initiatives with such other cities as Lima (Peru), Toronto (Canada) and Milan (Italy).

Almere Floriade 2022 - “Growing Green Cities”

Almere is a special city for several reasons. First, it is situated on newly reclaimed land in the polders in the centre of the Netherlands. It was founded quite recently, in the 1970s, and is thus a young city without a long history, which has made it possible for Almere to be flexible and creative in its planning approaches. Second, Almere is facing important development challenges, not the least of which is the expectation that it will alleviate growth pressure from the neighbouring

city of Amsterdam. The population of Almere, currently more than 190,000 inhabitants, is projected to double by 2030.

Almere’s proposals for the Floriade reflect these challenges. As urbanisation continues, quality of life increasingly depends on the quality of cities. Almere was developed as a “Garden City”, incorporating considerable green spaces in the urban structure, and for future growth it will be important to consolidate and strengthen this model into a “Green City”. The motto for the Floriade therefore is “Growing Green Cities”, and for the period until 2022 the municipality has challenged itself to become an exemplary “Green City” in four thematic areas.

Under **FEEDing** the city, agriculture is to be brought (again) into the heart of the city, both to contribute to food production and as a means to enhance social cohesion, education, and awareness of where food comes from. **GREENing** the city expresses that green areas are considered key for quality of life, and are crucial assets to attract investments and cultural activities. **ENERGIZing** the city implies a focus on closing cycles, increasing energy efficiency, and self-sufficiency in energy generation. Finally, **HEALTHYing** the city refers to the contributions of healthy, fresh and local food and of green spaces to the well-being and health of Almere’s inhabitants.

FEEDing the City: challenges at different scale levels

The key challenges Almere is facing for the theme FEEDing the City, as discussed during the Urban Agriculture Café, is how relations between the city and the countryside can be

strengthened at different scale levels and, more generally, how successful UPA and regional food provisioning initiatives can be upscaled. This requires building connections between innovations at three different scale levels (see Figure 1).



Figure 1. Building urban-rural connections at different scale levels

At the **micro-level**, urban agriculture and local food initiatives increased markedly in recent years, to some 50 initiatives in 2010. These are mainly community gardens aimed at strengthening social cohesion, or school gardens where UPA is integrated in educational programmes. Another example is the *City Farm Almere*, a professional organic farm started in 1996 that created strong links with citizens as visitors and customers and currently uses 160 hectares in and around the city, largely on land owned by the municipality.

At the other extreme, Almere is located in a highly production-oriented agricultural region with farms that are strongly integrated in world markets. At this **macro-level**, linkages between the city and the countryside are still poorly developed, even though some production types (e.g., tulip bulbs) have added value in preserving the typical, open landscape around the city.

Finally, at the **meso-level**, in the coming years many opportunities to strengthen city-countryside relations and develop

innovative forms of urban agriculture will emerge. To provide Almere with regional larger-scaled food initiatives connections of the city with urban or periurban and rural producers are needed. Some farms may also create new economic perspectives by rebuilding direct links with the city, as did the horticultural enterprise *ONZE* who stopped producing for the world market and now rents out allotments in the greenhouse to citizens. The *Oosterwold* region pays specific attention to the meso-level. It is an area of 4,300 hectares east of the city where new green housing is developed through an innovative open planning process. Citizens can present their own plans on the condition that building proposals be combined with agricultural uses on 50% of the land. It is hoped that this experiment with “do-it-yourself” urbanism will result in innovative forms of UPA and strengthen linkages between the city and the countryside.

Different strategies for upscaling and strengthening urban food systems

At the Urban Agriculture Café, the challenges faced by Almere in strengthening relations between city and countryside at different scale levels were shared with experiences from three other cities in different parts of the world: Toronto, Lima and Milan. The exchange made clear that different strategies are available for upscaling and strengthening UPA and regional food systems; these may be applied by city governments, depending on specific local settings.

Toronto: Food Policy Council bringing together local stakeholders

The city of Toronto, represented by Lauren Baker, is particularly interesting to Almere for its experience with the Toronto Food Policy Council (TFPC), founded in 1991 as an innovative platform to engage citizens in local policy making on food and agriculture. Since then, the TFPC has become an international reference followed by many other cities in Canada, the USA and, increasingly, also Europe. The TFPC brings together citizens and local policy makers engaged in food issues, and by doing so has become a focal point for new policy dynamics surrounding food and agriculture in Toronto. Initially, the focus of the TFPC was mainly on food and public health, but now it covers all aspects of the food system, including agriculture, economic development, wellbeing, social justice, and environmental sustainability.



Local and international guests at the Urban Agriculture Café.
Photo by Daniel de Jong



Henk Meijer explains Almere's challenges. Photo by Daniel de Jong

The TFPC has generated important spin-offs to local policies related to Feeding the City, e.g., the *GrowTO – Urban Agriculture Action Plan for Toronto* established in 2012, which defines policies and support measures for food-growing efforts by Toronto's citizens. Another example is the *Golden Horseshoe Agriculture and Agri-Food Strategy – Food and Farming Action Plan 2021* for Toronto's green belt, which aims to strengthen relations with the city, among others by creating value chains that build on local distinctive qualities.

Lima: municipal policy promoting urban agriculture

Urban agriculture in Lima (Peru) has come up in a very different context with a direct need to improve food security for disadvantaged groups. The metropolitan municipality of Lima has extensive experience with promoting urban agriculture and was identified by FAO as one of the 10 leading cities in "Growing Greener Cities" in Latin America and the Caribbean. In 2012, the municipal policy programme "Mi Huerta" (My Garden) was established to promote urban agriculture as a strategy for environmental improvement, food security, social inclusion and local economic development. As part of this, various investments and support measures were put into place.

In 2013, 1,000 urban gardens were established, benefitting 20,000 inhabitants. These consist of family gardens, community gardens and school gardens, and mainly provide food for home consumption. *Mi Huerta* also promotes vegetable sales by producers on local eco-fairs and gives support through training, promoting producer associations, developing marketing concepts and establishing infrastructures. Also, links with environmental management are strengthened, through the reuse of grey water for irrigation and the establishment of educational gardens in public parks that form part of Lima's green infrastructure.

Milan: agricultural districts linking the city with periurban areas

Milan (Italy) is interesting to Almere because it hosts the *World Expo 2015* with the motto "Feeding the Planet. Energy for life", which has clear parallels to the Floriade agenda of Almere. Additionally, in Milan several initiatives have come up that successfully connect the city with surrounding



Lauren Baker (Toronto) and Andrea Calori (Milan).
Photo by Daniel de Jong

Andrea Calori, scientific food coordinator of Milan's Food Policy, reflects on the Almere Urban Agriculture Café

"What I found impressive about the UA Café was that politicians, students and professionals discussed so easily at the same level, in an open way and without hierarchy. It was also striking to see that Almere municipality makes such a clear choice for combining food, environment and lifestyle and connects this with the city's development and urban planning. This is rare, within Europe as well, and certainly for a city with such a rapid growth rate. It is interesting that Almere, as a city without a clear and pronounced history, is creating a new identity and personality in which agriculture and environment play a prominent role. For the situation in Milan I have learned several concrete lessons, for example the management of municipal land by a city farm for which environmental management criteria make up part of the contract. And also the way in which Almere city mobilises young people and entrepreneurs as "Urban Greeners" is an approach that we can use in Milan."

periurban areas. The establishment of the *South Milan Agricultural Park* in 1990, the first agricultural park in Italy, and with 47,000 hectares the largest in Europe, gave a strong initial stimulus for developing territorial policies and initiatives on tourism and land management in Milan's periurban areas.

In recent years, this was complemented by initiatives building local food networks around the city, for example *Mercato della Terra* ("Earth markets") organised by Slow Food and ca. 120 consumer cooperatives for local and organic products, organised by social movements and entrepreneurs. Recently, institutional innovations are also emerging, supporting the integration of agricultural, rural and urban food policies by establishing "agricultural districts" in the periurban zone, while Milan's city council decided to start elaborating a Local Food Policy. Milan's experience demonstrates the important role that the empowerment of local actors can play as a potential force for creating interrelations between the city and countryside.

Henk Renting

References

www.stadsboerderijalmere.nl/
www.almeerseweelde.nl
<http://floriade.almere.nl/en/>
<http://almere20.almere.nl/gebiedsontwikkeling/oosterwold/>



Growing a Healthy Community: the Green Roof at Access Point on Danforth, Toronto

Lara Mrosovsky

Educational workshop about herbal medicine with Danette Steele the herbalist. Photo: Lara Mrosovsky

Access Alliance in Toronto is the first Community Health Centre (CHC) in Ontario, Canada to have an intensive Green Roof. Since 2011, this Green Roof functions as a teaching garden through a programme called Green Access. Green Access weaves together social, community and environmental health. This experience is showing the way forward for the health sector: integrating urban food into a range of programmes that improve community health and well-being.

The location of this 597 m² Green Roof is on the second floor of AccessPoint on Danforth, straddling Toronto and Scarborough. The social and geographical location has shaped the activities happening on the rooftop. AccessPoint on Danforth is contained within a high-rise and high-density area around Victoria Park and Danforth known as Taylor Massey. Food insecurity is a persistent problem, while unemployment and precarious employment further increase the barriers to accessing adequate healthy food. Fresh, organic produce is not readily available and access to space for gardening is severely limited.

In this context, staff and participants use Green Access to teach and learn skills for growing food in small spaces. People who get involved in the programme not only take a share of the harvest from the garden but also take away tools and information for growing their own. An especially relevant skill is building experience with balcony gardening. Workshops and trainings are hosted on a range of other urban agriculture related skills from seed saving and composting to healthy eating and food preservation.

Mixed support

The idea for a green space and/or garden came from looking at the needs of the local community. While there was limited space on the property at ground level, the building already had a section of flat roof. A special set of circumstances made it possible to invest close to Canadian Dollar 150,000 in green infrastructure for a building that the organisation is actually renting.

The provincial government (specifically, the Ontario Ministry of Health) was instrumental in establishing AccessPoint on Danforth when it awarded funding to Access Alliance for setting up satellite sites. This coincided with the community funding organisation United Way's Building Strong Neighbourhoods Strategy, a social improvement plan which identified the City's priority neighbourhoods - high-density,

high-needs areas in the inner suburbs - where social services were historically lacking. United Way was ready to support the creation of multi-service hubs of community services in priority neighbourhoods. They supported the Hub of Community Services with operating dollars and brought in big donors to support the capital investments. Extra funding from Bank of Montreal covered Green Roof installation costs.

Especially for non-profit agencies who wish to invest in Green Roofs or other gardening initiatives with overhead costs, this effort to bring together combinations of public and private support (and good timing) is important. Gaining support and approvals from multiple sources may be a key to development of green infrastructure within health and community services.

The building is a Hub of community services – 5 organisations, including a Community Health Centre, with a full range of primary health services integrated with settlement services, allied health providers like social workers and dietitians, and a variety of community programmes serving youth, families and seniors. Although the target population for Access Alliance are the most vulnerable new immigrants and refugees, these kind of hubs are designed to serve everybody in the local area.

Staffing

Staffing was then needed to bring the rooftop to life – by planting a successful garden as much as establishing a range of programmes and partnerships that bring a high level of participation to the garden. Two staff (a Health Promoter and a part-time Community Health Worker) are on salary to coordinate all aspects of programming and food production. For instance, a visiting school group is engaged in transplanting, watering and mulching seedlings in early spring, thus accomplishing an educational activity for the kids and a labour-intensive seasonal task in the garden at the same time. All of the programmes and services at AccessPoint on Danforth have participated in growing the garden on the roof and many of them benefit in some way from the harvest. Energy-saving features include rainwater harvesting and a passive solar water heater.

The Roof Top Garden

More than a garden, the rooftop is also a social space, with deck areas, seating and barbecues that various groups use for gatherings, meetings and events. After Year 1 some additions and improvements were made to the rooftop that better allows its use by programmes and community members. We built a pergola for shade so people could sit comfortably during the daytime hours when the building is open. Pathway improvements made the planting beds easier to access and a special raised edge was installed in the children's area so that tiny gardeners could get involved in planting without stepping on the beds/plants. These design elements became evident after using the garden for a year and finding out what kind of features could make the space more usable. For anyone planning a similar initiative I would recommend having a programme staff / frontline staff / gardener involved in the design phase to anticipate these

kinds of needs. Otherwise be prepared to make some changes or additions after the first year – because inevitably, the architect's design can only take the end-user so far.

Fresh, organic food

Fresh salads are supplied to the community kitchen, which is utilized by Access Alliance, partner agencies, and community groups throughout the week. Roof garden ingredients are used in community kitchen recipes, served as part of snacks, and distributed to programme participants. As the Green Access programme evolves, more of the people cooking in the community kitchen are aware of fresh harvest being available from the rooftop, and in some cases the meal planning chart included an extra column to identify a garden ingredient for each week's recipe. The fresh flavour and beautiful appearance of the produce serves as an outreach tool to advertise the benefits of locally grown organic food and to bring more people into gardening. For example, the selection of herbs grown for tea has been expanded (peppermint, lemon grass, tulsi basil and chamomile to name a few) that, once dried, supply a quaint tea cart that travels between meetings held in the building.

Plant selection has not varied a great deal from the initial crops grown, though the roof gardening is constantly adapted to the learning along the way. Large plants like pumpkin and watermelon have been largely avoided from the beginning, as have root crops (except the occasional bed of carrots). But roof tops provide different kinds of micro-climates than other gardens. The first year it was found that cool-weather greens get stressed and bolt almost immediately when the weather heats up. The full sun and heat are not conducive to production of lush leafy crops except when they're planted in the few shady areas, like those in containers underneath the solar water heater. The heat-loving plants that thrive in the full sun and shallow soil of the roof garden are mainly chili peppers, tomatoes, eggplant, okra and beans. Most of the tomatoes planted are bush varieties, better suited than large vining plants to the windy conditions and soil depth of only 20 cm. Bush tomatoes also require less staking – an important detail because the shallow soil and the wind make staking a challenge unless plants are grown around the perimeter where they can be supported by fencing. The rooftop garden also features miniature varieties. About 30 raised boxes are dotted around the roof and have a 60 cm soil depth to allow larger plants to grow (e.g., grape vines, globe cedar) and contain aggressive plants with a tendency to spread (e.g., tansy, hops, mints). A diversity of culinary and medicinal herbs are cultivated. Among 40+ perennial and annual herbs, the best suited to the hot dry conditions are the thymes, lavenders and chives. In the pollinator garden (not irrigated), drought-tolerant native species flourish. There's even a prickly pear cactus (*Opuntia humifusa*) that bore fruit.

The beds with annual, fruiting plants are watered by a drip irrigation system on a timer. The timer is critical during the heat of mid-summer when watering should ideally happen in the early hours, before the building is open. The soil is enriched with a combination of rich top-dressing (compos-



Garden group harvesting tomatoes. Photo: Lara Mrosovsky

ted duck manure) and liquid fertilisers (like vermicompost tea), keeping in mind that organic matter absorbs more water and increases the weight per cubic foot of soil. Other organic amendments include kelp meal, greensand, bone-meal, insect frass, mycorrhizae and vermicompost.

Linking the garden to the Hub

Some plant choices are geared towards specific programmes and collaborations. For example, a menu of 15 culinary herbs plays an essential part in the Savoury Garden tour, a collaboration with the Access Alliance dietitians. It uses the garden for education on reducing sodium, one of the risk factors for hypertension that can be controlled. Savoury Garden explains high blood pressure and introduces easy-to-grow herbs as a flavourful substitute for salt. This educational programme was created (by dietetic intern Eugene Jeong) because hypertension was one of the top reasons for visits to health providers.

This Savoury Garden is only one example of a collaboration within the Community Health Centre that has simultaneously served to generate interest in gardening and growing while addressing a pressing health concern of service users. Specific herbs are cultivated that match informational profiles and research that supported the development of the

programme. The success of this partnership depends on the plants and the garden as well as the expertise of the health providers (in this case, dietitians) in the clinic.

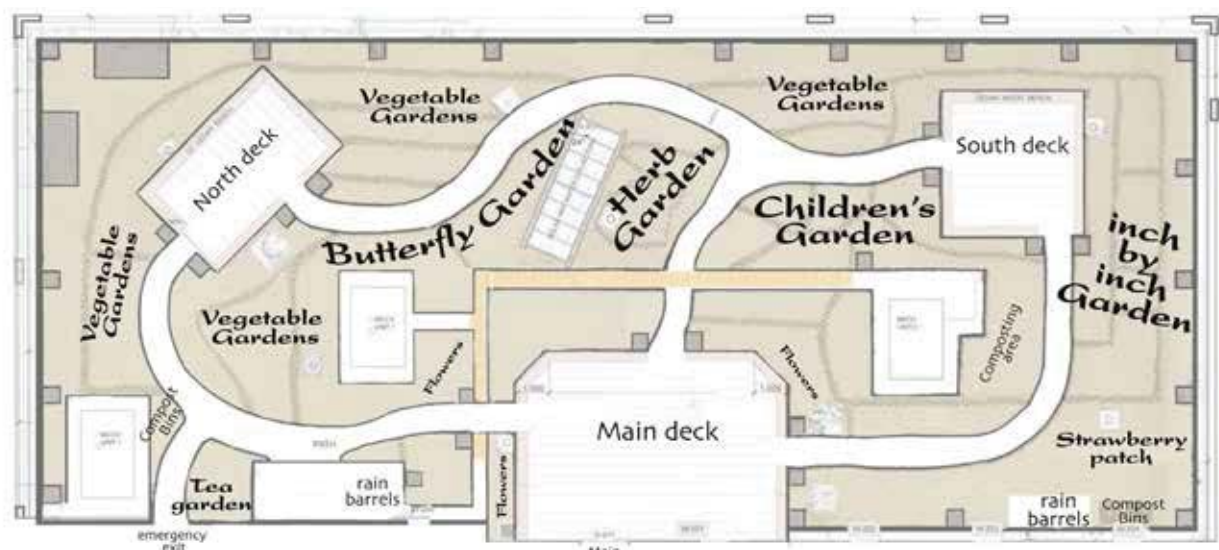
Urban agriculture knowledge is propagated on the roof as well as in innovating partnerships: included in working together with TESS (Toronto Employment and Social Services), adding a gardening theme to their “Let’s Talk” programme. This has led to compilation of a toolkit for use by Public Health and TESS City-Wide. When developing partnerships with non-gardening groups we are always looking for possibilities to spread the knowledge and practice beyond the Green Roof.

Building Alliances

The Green Access programme demonstrates a coming together of Urban Agriculture and Community Health. Both stand to benefit from these kinds of combinations and there is much to be learned by others in both fields. One challenge of building initiatives like Green Access in an economic climate of austerity is that many community organisations aren’t in a position to innovate and develop new, multidisciplinary approaches such as garden and food programmes. The public sector faces increasing cutbacks and non-profits may be forced to offer only the bare bones of programmes and services. On the other hand, when health agencies include environmental initiatives it may allow them to access sources of funding that they wouldn’t otherwise tap into.

The way forward is for more agencies in the health sector to value and promote gardening and food production as a means of achieving health outcomes, while the gardening community (Urban Ag Groups) should look to other sectors, such as Health organisations, as sources of support, new possibilities and venues for growing food.

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The rooftop is also a social space, with deck and seating areas that various groups use for gatherings, meetings and events. Photo: Lara Mrosovsky

Food Policies in North American Cities

The next two articles describe enabling policy tools designed to improve local food systems in North American cities. These strategies can often be traced to calls from civil society movements for more accessible, safe, culturally acceptable and nutritious food grown under environmentally sustainable conditions. The goal is a food system in which food production, processing, distribution and consumption are integrated to enhance local environmental, economic, social, community, and nutritional health (Community Food Security Coalition (CFSC), www.foodsecurity.org, April 2006). Promotion of urban agriculture fits in this discussion on local food systems, where concerns related to the environment, social cohesion and access to healthy food join hands. Strategies developed in various cities include promoting multi-actor involvement and collaboration in policy making and programme implementation, integration of food system issues into a broader sustainable development agenda, and the creation of food policy councils that can act either as a citizen advisory body to the city council as in Toronto or Chicago (as described here) or play a formal role within the city government, as the experience of Vancouver illustrates.

Creating and Implementing Food Policies in Vancouver, Canada

Although Vancouver is a city of soaring glass towers and modern urban amenities, it is also located within one of the most productive agricultural regions in Canada. Combine the favourable climatic conditions with municipal policies that encourage sustainable development and the result is a city in which urban agriculture is thriving.



Small Community Garden

Wendy Mendes

Vancouver currently has 18 operating community gardens, with two more under development. Community gardens can be found on park, school, city and transit-owned land. The demand for garden space far exceeds its availability. Most gardens have year-long waiting lists. Other popular forms of urban agriculture in Vancouver include rooftop gardens, backlane gardening, edible landscaping and farmers' markets. Alongside the popularity of urban agriculture in Vancouver, the city and its region are also contending with urban sprawl, population pressures, farm consolidation, threats to agricultural

land, and rising rates of poverty and hunger.

On July 8, 2003, the Vancouver City Council approved a motion supporting the development of a "just and sustainable food system" for the city of Vancouver. A just and sustainable food system is defined as one in which food production, processing, distribution, consumption and recycling are integrated to enhance the environmental, economic, social and nutritional health of a particular place. This commitment to food policy was made in response to more than a decade of community organising efforts. Community groups sought local government response to pressing issues including urban sprawl, threats to agricultural land, health and nutrition problems, and food access issues, particularly for marginalised populations. The Council motion reflects a growing trend in Canadian and US

cities in which food system issues are being recognised as an area in which local governments have an important role to play.

Since the July 2003 Council motion, the city's commitment to food policy has included an eight-month public consultation process; a food system assessment, approval of a Food Action Plan (see <http://www.city.vancouver.bc.ca/ctyclerk/cclerk/20031209/rr1.htm>); hiring of food policy staff; facilitation of a number of food-related initiatives including community gardens, urban beekeeping, fruit trees, and edible landscaping; project collaborations with a range of partners; and the election of an 18-member multi-sectoral Vancouver Food Policy Council.

Stemming from the Food Action Plan, strategies to create and implement enabling policy tools to improve

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Vancouver's food system include:

- 1) promotion of multi-actor involvement in policy making and implementation, and
- 2) integration of food policy into a broader sustainable development agenda.

PROMOTION OF MULTI-ACTOR COLLABORATION IN POLICY MAKING AND IMPLEMENTATION

There are two inter-connected dimensions of the city of Vancouver's recognition of the importance of partnerships and collaboration where food policy is concerned. The first focuses on "internal" partnerships (within local government itself), while the second emphasises partnerships and collaboration between local government and community agencies and organisations.



Wendy Mendes

Rooftop gardens under construction

From the outset, the Food Action Plan acknowledged that some of the resources and policy tools necessary to address food system issues fall outside of the jurisdiction of the municipality. As such, the development of partnerships with other agencies has been instrumental to the process. Key partners include Vancouver Agreement (an agreement between three levels of government to address poverty in Vancouver's most impoverished neighbourhood, the Downtown Eastside), Vancouver School Board, Vancouver Park Board, Vancouver Coastal Health, community organisations, and local universities, among others. Examples of past collaborations include strategies to improve emergency food access in the Downtown Eastside, a food system assessment of Vancouver led by a community-based consortium of researchers, and the approval of good management practices for beekeeping in urban residential areas.

Also key to the success of urban agriculture and food policy are partnerships and collaborations among municipal departments within local government itself. Vancouver's commitment to food policy is seen as part of its commitment to sustainability. This has the benefit of associating food policy with a set of already existing policies and mandates. Like sustainability, urban agriculture and food policy are cross-cutting issues often involving a wide range of departments for effective implementation and monitoring. As such, the ability to implement food policies and programmes has been facilitated by organisational expertise developed over the years through inter-departmental collaborations in pursuit of sustainable development goals in Vancouver.

The second dimension of the city of Vancouver's recognition of the importance of partnerships and collaboration has more far-reaching implications. This dimension involves the mechanisms designed to facilitate governmental/ non-governmental partnership approaches to food policy design and implementation. This objective is best embodied in the Vancouver Food Policy Council, seen as a new model for collaborative municipal governance.

Vancouver Food Policy Council

Vancouver's Food Policy Council (VFPC) is considered a new model of integrated local governance involving city staff and citizen representatives. The VFPC was conceived as a multi-actor body whose mandate would be "to act as an advocacy, advisory and policy development body on food system issues within the city's jurisdiction" (Vancouver Food Policy Council Terms of Reference, 2004). From May to July 2004, the Vancouver Food Policy Task Force produced and ratified a set of recommendations for the creation of the VFPC. Recommendations included VFPC member roles and responsibilities, principles and protocols; vision and mandate; structure and election process. The result was the election of a twenty-member multi-sectoral food policy council on July 14, 2004 as the last act of the Food Policy Task Force before it dissolved.

The Vancouver Food Policy Council is comprised of individuals from all aspects of the local food system. The membership includes people with a variety of backgrounds, such as nutritionists, food wholesalers and distributors, food retailers and grocers, managers of non-profit organisations and academics engaged in the food system. This multi-

disciplinary group creates an innovative forum for discussion and action towards building a food system that is ecologically sustainable, economically viable and socially just. It also builds upon existing collaboration between citizens and government officials on numerous initiatives. The primary goal of a Food Policy Council is to examine the operation of a local food system and provide ideas and policy recommendations for how it can be improved.

Vancouver's Food Policy Council has been meeting since September 2004. In addition to education and awareness-raising strategies, the Vancouver Food Policy Council works on specific projects and goals in support of issues and action items identified in the Food Action Plan. The VFPC initially identified four priority areas including: (a) increasing access to groceries for residents of Vancouver; (b) institutional food purchasing policy for public facilities; (c) recovery, reuse, and recycling of food; and (d) creating a food charter for the city of Vancouver. Building on these areas, new priorities and strategies continue to evolve.

INTEGRATION OF FOOD POLICY INTO A BROADER SUSTAINABLE DEVELOPMENT AGENDA

A sustainable food systems approach to food policy supports the social, environmental and economic goals embodied in the city's existing commitment to sustainability. Goals include the promotion of health, nutrition, ecological responsibility, social inclusion and community capacity building. One of the key policy objectives for urban agriculture and other food policy initiatives in Vancouver is integration into broader sustainable development agendas. These agendas include child and youth programmes, environmental programmes, social sustainability programmes and urban development programmes.

"Vancouver enjoys a long history of leadership on progressive issues such as environmental sustainability. Urban agriculture now forms an important part of the city's commitment to sustainable development." Peter Ladner, City Councillor.

A specific illustration of the goal of integrating urban agriculture into existing sustainability policies, though

even predating the adoption of the City Food Action Plan and formation of the Food Policy Council, can be found in an area known as Southeast False Creek (SEFC). In 1991, the City Council directed that the area be developed as a residential community that incorporates principles of energy-efficient design in its area plan. The idea was to explore the possibility of using SEFC as a model "sustainable community".

As part of the planning and consultation process in Southeast False Creek, a citizen advisory group was set up to provide input on the Official Development Plan as it evolved. This group, known as the Southeast False Creek Stewardship Group, took a keen interest in promoting urban agriculture on the site. In at least two reports to the City Council, the Stewardship Group identified urban agriculture as a key development priority. The rationale was that urban agriculture would provide multiple benefits to future residents including environmental sustainability by reducing the distance food travels, reducing the heat island effect, reducing cooling and heating needs, reducing storm water management costs, and creating possible reductions in emissions and transportation costs. The group also argued that urban agriculture would enhance social sustainability by providing less expensive and more nutritious food for the residents of Southeast False Creek, as well as by providing social spaces for people to meet and interact with their neighbours. Together these benefits would increase social cohesiveness and networks, which are essential for a community that relies on the participation of its members in planning and ongoing governance.

Some of the resources and policy tools fall outside of the jurisdiction of the municipality

A second mechanism that enabled the integration of urban agriculture into SEFC was the participation of the food policy staff team in the finalisation of the Official Development Plan (ODP). By spring 2004, the SEFC Official Development Plan was ready for presentation to the City Council for approval. Because of pre-existing

commitments to urban agriculture already embedded in the SEFC policy statement and active lobbying by the SEFC Stewardship Group, the food policy staff team was able to work with the SEFC Planners and other city staff to more clearly articulate opportunities for urban agriculture, and express them more comprehensively and explicitly in the ODP itself.



Wendy Mendes

A selection of herbs that can be produced on your roof

Key features of the Official Development Plan now include green roofs where space will be provided for the future residents to engage in urban agriculture. A demonstration community garden and site for a farmers' market also appear in the SEFC Official Development Plan. Furthermore, targets have been set for the amount of produce consumed by residents of Southeast False Creek to be grown on-site in community gardens and private balcony and rooftop gardens.

Since the approval of the SEFC ODP, two additional residential developments have integrated urban agriculture into their vision of more sustainable communities: an area known as East Fraserlands has proposed the inclusion of community and rooftop gardens, edible landscaping and a farmers market; and a new 180-unit downtown condominium development has recently completed approximately 60 rooftop garden plots for the use of residents.

RESULTS AND WAY FORWARD

The two policy strategies have resulted in a number of behavioural changes among Vancouver citizens. The benefits derived from these changes address Millennium Development Goals #1 (eradicate extreme poverty and hunger) and #7 (ensure environmental sustainability). At the same time, benefits also encompass a number of important dimensions of social sustainability including community

development, social inclusion and civic engagement. Three changes in particular are:

- improved education and awareness
- enhanced collaboration between city departments and other agencies
- a shift towards a food systems approach to food issues.

A number of key lessons from this project experience should be taken into account by other local governments. These include the need to:

- build on community knowledge and expertise
- build and enhance partnerships
- adopt a systems approach to food issues
- sustain involvement of food policy staff for consistent leadership, organisational stability, keeping food system goals on the radar of local governments and avoiding lapses in activity.

Key next steps in Vancouver's case are to measure the direct impacts of urban agriculture and food policies and determine the role that urban agriculture may play in existing strategies leading to pilot programmes to address hunger, health, addiction and homelessness. In this context, the City Council also recently (June 2006) adopted a motion to implement 2010 garden plots by the year 2010 (personal communication Peter Ladner, July 2006). Furthermore, Vancouver welcomes exchanges with other Northern and Southern cities, to discuss new perspectives on sustainable food systems and integrated models of municipal governance involving citizen advisory groups, producers, NGOs, youth groups and other partners.



Bert Lof

A educational garden in Grant Park in Chicago

Beyond Food Security: Urban agriculture as a form of resilience in Vancouver, Canada

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Kent Mullinix
Arthur Fallick
Deborah Henderson

The more people become sequestered in cities and insulated from ecological engagement, the greater the danger is that they will lose sight of the mounting economic, social and ecological burden that we are imposing on the earth's resources and systems.

In the context of examining the role of urban agriculture in building resilient cities, our research at the *Institute for Sustainable Horticulture* in British Columbia, Canada, attempts to answer the question: *How can urban and periurban agriculture be tied directly to the economic, social and ecological vitality of our cities?* We believe the answer lies in part in building sustainable bio-regional, agri-food systems, as a necessary pre-condition for creating food sovereignty.

The metropolitan Vancouver region of south-west British Columbia (B.C.), Canada, is an amalgamation of 21 cities and municipal districts, encompassing 282 million ha, including 41,000 ha of farmland, with a population of 2.1 million. Metro Vancouver has a long and rich agricultural heritage and remains an important part of the province's agriculture sector. The region currently generates 25 per cent of B.C.'s gross farm receipts from 14 per cent of its agricultural land base. Smaller, family owned and operated farms still dominate (88 per cent are smaller than 26 ha), but the number of farms has declined by 25 per cent in the last 10 years. The average farmer is 55 years old, and farmland has become prohibitively expensive for those who are interested in starting out.

Efforts to promote the expansion of urban agriculture in this region range in scale from grassroots activism (such as community gardens and farmers' markets), through design parameters (such as green roofs and edible landscaping), to public policy initiatives (such as the City of Vancouver's *Food Policy Council* (Mendes, 2006), *Sustainability Charters* proclaimed by several municipalities, Metro Vancouver's *Regional Growth Strategy*, and the *Agricultural Land Reserve* maintained by the Government of British Columbia). At the same time, however, there is a growing awareness in our region that the combined effects of peak oil/peak water, climate change, rapid urbanisation and continued population growth have the potential to undermine the resilience of our cities, threaten our food security and ultimately not result in a sustainable agri-food system for the Metro



A vision of the Farmscape Vancouver
Photo: Michael Marrapese

Vancouver region. Evidence of the convergence of these forces was felt in 2008 when the overall inflation rate was 1.2 per cent while food costs in general rose 7.3 per cent, cereal products 12.4 per cent and fruits and vegetables a staggering 26.9 per cent.

The Agricultural Land Reserve (ALR) is a precedent-setting provincial regulation intended to conserve agriculture land and enhance agriculture in British Columbia. For the last 30 years it has been a de facto urban growth boundary, which has resulted in a metropolitan area that is significantly more compact than most in North America. While this has been a positive outcome, ALR land values have risen to CAD\$ 250,000 or more per ha - a cost that cannot be supported by typical farm receipts. Urban agriculture and related efforts to support the ALR are necessary to increase sustainability and contribute to resilience in British Columbia, but they are not sufficient to achieve full sustainability and reconnect urbanity to its roots in the land.



Peri-urban agriculture land in Metro-Vancouver
Photo: Graham Osborne

In Canada, municipalities have a pivotal role to play in laying the foundations for a sustainable 21st century urban-centred society. Resilience and adaptability are examples of the type of potentials that we believe to be essential for creating sustainable futures for our cities and their associated agricultural lands. Urban agriculture, defined to include farming in and around cities for and by residents of those cities, can provide the comprehensive social, environmental and economic integration needed to create a sustainable agri-food system at the municipal scale.

The B.C. Ministry of Agriculture and Lands' recent publication: *British Columbia Agriculture Plan: Growing a Healthy Future for B.C. Families* calls for enhanced community-based/ local food systems that ensure food security through diverse local production, environmental stewardship / climate change mitigation and linkages across the urban/agriculture divide. At Kwantlen Polytechnic University, the Institute for Sustainable Horticulture (ISH) is responding to this call by making the advancement of urban agriculture and food sovereignty a programmatic priority. The institute is engaging community partners in applied research and using the land base to create living laboratories. Two examples can serve to illustrate our emergent focus.

We are promoting a dialogue across Metro Vancouver through which citizens, NGOs, governments and institutions of higher education can build partnerships and explore ways to create urban-focused, bio-regional agri-food systems that can, in tangible and substantive ways, connect urbanites to agriculture and contribute to regional food self-sufficiency. In a recent publication, *Agricultural Urbanism and Municipal Supported Agriculture* (2008), we advance our view of urban and peri-urban agriculture as a mechanism whereby municipalities can make municipally owned lands available, at affordable cost, for agriculture enterprise. In this approach, municipalities would procure lands to facilitate the development of an agri-food sector that serves its citizenry and thereby fosters

increased food security. A companion paper, *Agriculture on the Edge* (2009), addresses the central challenge of the increasing value of land in the region, and the pressure this creates for the remaining viable agricultural lands that face the continuous threat of encroachment by urban sprawl. The proposed solution is to reserve part of the rural-urban fringe land for agriculture, and to seek to maximise the value of this land. A new zoning designation would transfer a portion of this land to public ownership (to be held in perpetual trust for agriculture only). In addition the value of non-agricultural land use could be used to support this new urban agriculture infrastructure. To model this concept, a partnership of a local developer, broad community stakeholders, and ISH have designed a plan for a model community - a high density, 5000 person development - in which agriculture (on 100 designated ha) will be central to community economics, sustainable design and land use governance.

Our second example involves a partnership between ISH, the City of Richmond and two Richmond area NGOs. Together they plan to develop the **Richmond Farm School** in recognition of the fact that farmers in our region are aging and that developing urban agriculture in Metro Vancouver will require many knowledgeable, skilled and dedicated people. The objective is to prepare a new generation of urban farmers to engage in urban agriculture enterprises including production, processing, adding value, distribution, marketing and sales. The school will also develop the participants' leadership capacity to advance urban agriculture as an element of sustainable cities. This partnership and the land access programme are unique in North America.

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References

- British Columbia Ministry of Agriculture and Food. 2008. *British Columbia Agriculture Plan: Growing a Healthy Future for B.C. Families*. http://www.al.gov.bc.ca/Agriculture_Plan/ [accessed 12/3/2009].
- Condon, P. and K. Mullinix. 2009. *Agriculture on the edge: The urgent need to abate urban encroachment on agricultural lands by promoting viable agriculture as an integral element of urbanization. Agriculture on the Urban Edge Summit*. Simon Fraser University, University of British Columbia and Kwantlen Polytechnic University. Vancouver, B.C. February 27, 2009. <http://www.kwantlen.ca/ish/urban.html> [accessed 12/3/2009].
- Mendes, Wendy. 2006. *Creating and Implementing Food Policy in Vancouver, Canada*. Urban Agriculture Magazine. # 16, p. 51- 53.
- Mullinix, K., D. Henderson, M. Holland, J. de la Salle, E. Porter, and P. Fleming. 2008. *Agricultural Urbanism and Municipal Supported Agriculture: A New Food System Path for Sustainable Cities*. Surrey Regional Economic Summit, Surrey Board of Trade, Surrey, British Columbia. September 18, 2008. <http://www.kwantlen.ca/ish/urban.html> [accessed 12/3/2009].