

# **Urban agriculture for resilient cities (green, productive and social inclusive)**

## ***Key issues and possible courses of action for municipal authorities seeking to incorporate policies and programmes on urban agriculture***

### **Introduction**

The DVD and this booklet have been developed at the occasion of the networking event “Urban agriculture for resilient cities (green, productive and social inclusive)” held at the World Urban Forum in Nanjing (3-6 November, 2008) that was jointly organised by the RUAF Foundation, the International Development Research Centre, the Food and Agriculture Organization of the United Nations, CGIAR-Urban Harvest, and the Chinese Urban Agriculture Association.

With this small booklet the organizers seek to present an overview of important issues for consideration during policy formulation and planning of programmes on urban agriculture<sup>1</sup> and for each of these issues a number of “possible courses of action”: practical measures that several cities in the South are applying with success to facilitate the development of sustainable urban agriculture in order to enhance urban food security, stimulate local economic development and poverty alleviation, promote productive reuse of urban organic wastes, facilitate urban greening and other policy aims.

The key issues and suggested courses for action have been identified by government officials, practitioners and researchers during various international and regional conferences and workshops held in the last few years, during which practical experiences and research results in the field of urban agriculture were reviewed.

To keep this text concise but comprehensive we have refrained from including references to research data and other literature. The DVD contains many materials that will provide the interested reader more details on the research and practical experiences on which this document is based.

### **Urban agriculture**

Urban agriculture is the growing of plants, the raising of animals for food and other uses, and related processing and marketing activities, in and around cities and towns. Urban agriculture comprises a variety of production systems, ranging from subsistence production and processing at household level to fully commercialised agriculture. It is generally characterised by close proximity to markets, high competition for land, space confined, the use of urban resources such as organic solid wastes and wastewater, a low degree of farmer organisation, a focus on perishable products, and a high degree of specialisation, to name a few. By supplying perishable products such as vegetables, fresh milk and poultry products, urban agriculture complements rural agriculture and increases the efficiency of national food systems. The most important distinguishing characteristic of urban agriculture is that it is an integral part of the urban economic, social and ecological system: urban agriculture uses urban resources (land, labour, urban organic wastes, water), produces for urban citizens, is strongly influenced by urban conditions (policies, competition for land, urban markets and prices) and impacts the food security, poverty, ecological and health aspects of the urban system.

Urban agriculture has always been part of city life and tends to grow as cities expand. Although some forms of urban and peri-urban agriculture are based on temporary use of vacant lands,

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<sup>1</sup> Including both intra-urban agriculture (within the built up city) as well as peri-urban agriculture (in the areas surrounding the city)

urban agriculture as such is a permanent feature of most cities in developing as well as developed countries.

## **Policy relevancy of urban agriculture**

The number of people around the world who live in cities is increasing steadily and there is general consensus that urban populations will continue to grow rapidly. The major part of this urban population growth will take place in low income countries, notably in Africa and Asia. (UNCHS 'State of the World's Cities' Nairobi. 2001).

Many cities cannot cope with the massive population growth and face enormous challenges in creating sufficient employment, in providing basic services such as drinking water, sanitation, basic health services and education, in planning and maintaining of green spaces, in managing urban wastes and waste water and in decentralisation and creation of efficient local autonomy.

Accompanying the urbanisation process is a phenomenon referred to as the "urbanization of poverty": rural-to-urban migration combined with limited employment opportunities in cities is leading to a shift in the locus of poverty from rural to urban areas. The percentage of poor living in cities is expected to increase from 30% in 2000 to 50% by 2035 (UNCHS, 2001). In many countries, an unstable macro-economic and/or political situation is aggravating this situation.

Increasing urban poverty goes hand in hand with growing food insecurity and malnutrition in the cities. Both in the South and in the North, especially in the bigger cities, the urban poor find it increasingly difficult to access nutritious food at affordable prices. Food composes a substantial part of urban household expenditures (60-80 percent for poor households) and the lack of cash income translates more directly into food shortages and malnutrition in the city context.

Cities are quickly becoming the principal spaces for planning and implementation of strategies that aim to eradicate hunger and poverty. The size and urgency of these challenges require innovative ways to stimulate urban food security and local economic development. Urban agriculture is one such strategy involving novel strategies for urban food security and nutrition, in which increasing amounts of nourishing foods are sourced from the city area itself, with direct connection between healthy production and healthy consumption, and to waste management with a focus on recycling nutrients rather than linear processes of collection and removal. It also involves changed approaches to urban design, including agriculture as part of multi-functional land use approaches. Although local authorities have the responsibility for establishing green areas in and around cities for leisure, ornamental and other purposes, budget constraints often limits the extent of these areas and their maintenance level. Enabling the "private sector" – small urban producers – to create and manage productive urban green spaces not only contributes to the local economy, but also expands the availability of recreational and educational spaces and strengthens the city's capacity to contain heat island effects, dust concentrations and effects of CO<sub>2</sub> emissions.

More recently, new arguments in favour of urban agriculture have been proposed:

- a. *Growing scarcity of water*; Irrigated agriculture is the main water user in many countries, especially in arid and semi-arid zones. Along with more efficient water use in agriculture, the productive use of recycled urban wastewater has been identified as a sustainable way to produce food for the growing cities.
- b. *Rapidly rising food prices*. Several factors such as the use of grains for bio fuels, high oil prices and the growing demand for imported food by China and India, have contributed to steep increases in global food prices. In the past three years food prices have increased 83%, pushing 100 million people deeper into poverty. The impact of these price increases are felt especially in cities and the call for intensive food production close to the cities is increasingly heard (including by the UN Secretary General in a recent debate on the "The new face of Hunger"<sup>2</sup>).

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<sup>2</sup> <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/11/AR2008031102462.html?hpid=opinionsbox1>

- c. *Climate change*. Many cities risk becoming “disaster traps”, according to recent discussions on climate change including the possibility of suffering severe food supply problems due to floods, droughts and/or frosts affecting the food supply from rural areas. The World Meteorological Organization (WMO) suggested more urban and indoor farming as a response to the ongoing climate change and a way to build more resilient cities<sup>3</sup>. Urban and peri-urban agriculture also contributes to keeping flood plains and wetlands free from construction and storing and infiltration of excess storm water.
- d. *Reduction of the ecological foot print of cities*. Various cities are including urban agriculture as part of their strategies to reduce their ecological foot print, knowing that urban agriculture has lower energy use (less transport, less cooling, more fresh products sold directly to consumers) and enables cyclical processes and effective use of wastes (use of urban organic wastes as compost or as raw materials for production of animal feed; use of excess heat of industry in green houses, etcetera).

### Three perspectives on urban agriculture

It is useful to distinguish three main policy perspectives on urban agriculture each associated with different types of urban agriculture. These three perspectives are helpful in designing **alternative policy scenarios** for the development of urban and peri-urban agriculture.

The *social perspective* is mainly (but not exclusively) associated with **subsistence oriented types of urban agriculture** that form part of the livelihood strategies of urban low income households with a focus on producing food and medicinal plants for home consumption.

In addition, the family expenses on food and medicines are reduced and some cash is generated from sales of surpluses. These households seek out multiple additional income sources for their survival. Examples include home gardening, community gardening, institutional gardens at schools and hospitals, and open field farming at micro scale with low levels of investment. These systems show little direct profitability but have important social impacts such as enhanced food security, social inclusion, poverty alleviation, community development, HIV-AIDS mitigation etc.

The *economic perspective* is particularly related to **market oriented types of urban agriculture**. Activities usually involve small-scale family-based enterprises and sometimes larger scale entrepreneurial farms run by private investors or producer associations. The activities not only include food production (e.g. irrigated vegetable production, stall-fed dairy production) but also non-food products (e.g. medicinal and aromatic herbs, flowers, ornamental plants). These commercial farms are associated with small-scale and larger enterprises involved in delivery of inputs (such as seed, compost, fodder, agro-chemicals) and the processing and marketing of agricultural products.

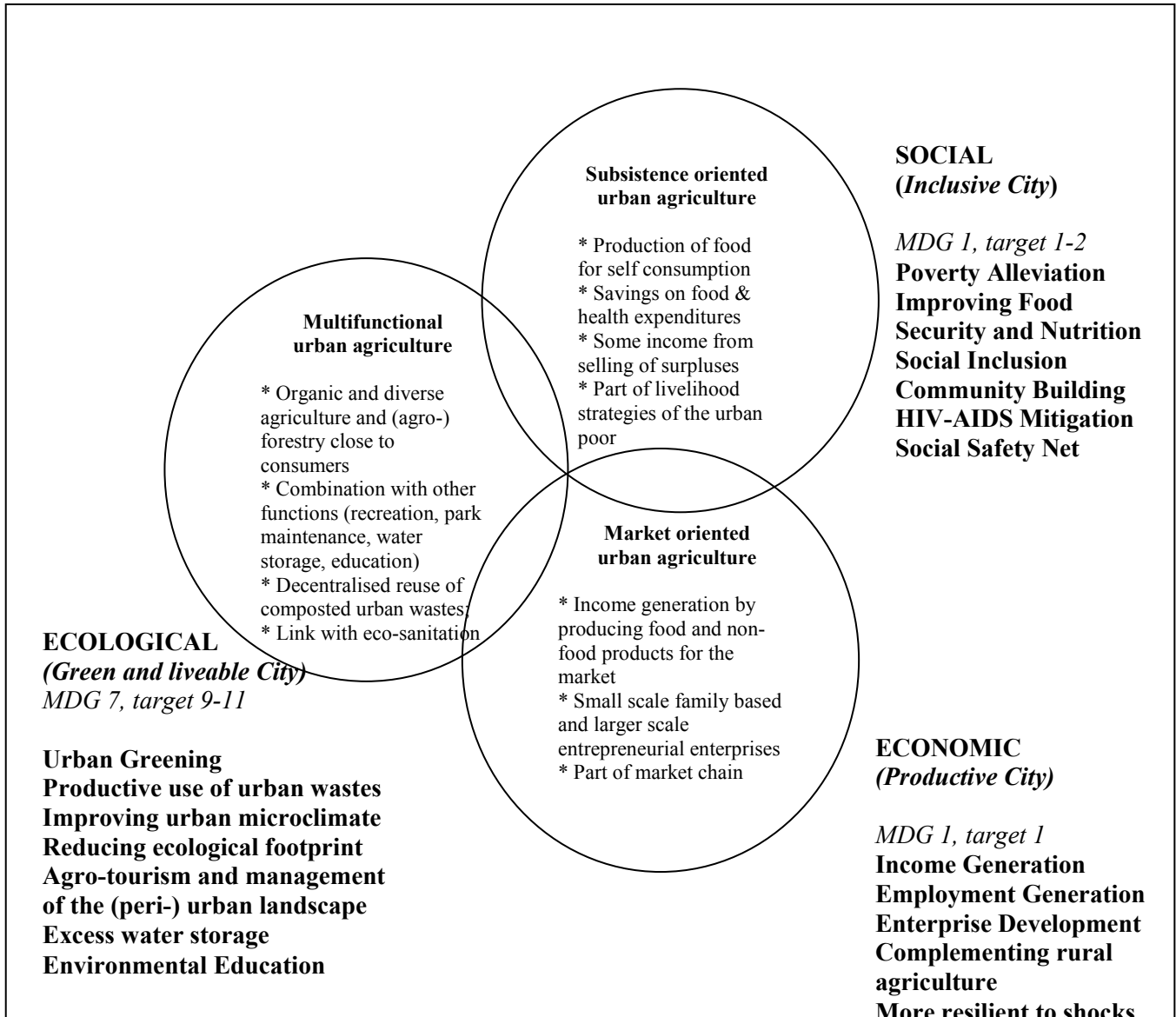
These types of urban agriculture have a more pronounced economic impact and higher profitability, but their externalities for the city and urban populations, especially those of the intensive larger scale enterprises, tend to be higher especially through risk of water and soil contamination due to intensive use of agro chemicals, health risks from use of contaminated water for irrigation and risks of animal-human disease transfers (zoonosis).

The *ecological perspective* refers mainly to **types of urban agriculture that have a multi-functional character**. Besides provision of food and generating income they can play a role in environmental management for example, through nutrient recycling via decentralised composting and reuse of organic wastes and wastewater. They can also provide other services demanded by urban citizens: urban greening, improvement of the urban climate, keeping buffer zones and

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<sup>3</sup> “UN Agency calls for urban agriculture” WMO press release December 7, 2007

**Policy perspectives and main types of urban farming**



*In Van Veenhuizen (2007), based on Cabannes and Dubbeling (2005)*

flood plains free from construction, provision of opportunities for leisure and recreational activities, storm water storage and flood prevention, etcetera.

In order to enable such a combination of functions, urban and peri-urban agriculture will have to adopt agro-ecological production methods, link up with eco-sanitation and decentralised sustainable waste management systems, as well as becoming part of the planning and management of parks, nature reserves and recreational services.

The three policy perspectives on urban agriculture suggest different **scenarios** for the development of urban agriculture and enable to consider alternative policy measures, in relation to the actual situation in the city and the existing policy priorities. It should be stressed that the three perspectives certainly are not mutually exclusive and in practice, most policies on urban agriculture will be based on a **specific mix** of the three perspectives, giving different emphasis to a certain perspective in certain locations and with certain categories of the population and another perspective in other parts of the city territory and with other actors.

### **Multi-stakeholders Policy Development and Action Planning**

Due to the cross cutting and multi-dimensional nature of urban agriculture, policy development and action planning on urban agriculture should involve various sectors and disciplines: agriculture, health, waste management, community development, parks and nature management, among others. Moreover, urban farmers, and the CBOs and NGOs supporting them, have to be involved in the planning process. An important aspect of strategic urban planning is related to the participation of the urban poor themselves in the analysis of the situation, in the definition of priorities and in action planning and implementation. Such consultative processes will make the outcomes of policy development and action planning not only robust and comprehensive, but also accepted and sustainable. Increasingly this is recognised and incorporated in urban planning approaches such as the multi-actor planning methodologies adopted by Local Agenda 21 and the Sustainable Cities Programme.

Multi-stakeholder planning processes on urban agriculture have been, amongst others, applied by Urban Management Programmes in Quito (Ecuador), Rosario (Argentina) and Dar es Salaam (Tanzania). Similar approaches have been used in promoting sustainable food systems through Food Policy Councils (Toronto, Chicago and Vancouver-Canada) The RUAF partners in the Cities Farming for the Future programme (see also [www.ruaf.org](http://www.ruaf.org)) have introduced the "Multi-stakeholder Policy making and Action Planning (MPAP) approach in twenty cities around the world. In those cities, a Multi-stakeholder Forum on Urban Agriculture and/or Food Security has been established, involving all direct and indirect stakeholders in urban food production and consumption, assisted by one or more multi-disciplinary working groups. This multi-stakeholder forum functions as a platform for dialogue and consensus building among the various stakeholders regarding the following: problem definition, agenda setting and identification of priorities; making choices among alternative strategies and policy instruments available; coordination of the drafting of action plans and participatory budgeting. The results are integrated in a City Strategic Action Plan on Urban Agriculture that will be formally presented for approval to the City Council (or one of its commissions). Subsequently, the Forum will coordinate the implementation of the actions plans, monitor the results obtained, draw lessons and adjust the strategies of the City Strategic Action Plan, if needed.

## Strategies for the Development of Safe and Sustainable Urban Agriculture

*"Local governments should show a clear commitment to the development of urban agriculture, mobilizing existing local resources, integrating urban agriculture in the municipal structure, expanding it nationwide, and allotting funds from the municipal budgets for carrying out urban agriculture activities." Quito Declaration, signed by 40 cities. Quito, Ecuador. April 2000.*

Urban policy makers can substantially contribute to the development of safe and sustainable urban agriculture by:

- Creating a conducive policy environment and formal acceptance of urban agriculture as an urban land use;
- Enhancing access to vacant open urban spaces and the security of agricultural land use;
- Enhancing the productivity and economic viability of urban agriculture by improving access of urban farmers to training, technical advice, and credit;
- Supporting the establishment and strengthening of urban farmer organisations;
- Taking measures that prevent/reduce health and environmental risks associated with urban agriculture (farmer training on health risks and related management practices, zonification, quality control of irrigation water and products).

We will discuss below for each of these areas a number of key issues that require for policy attention and actions that might be undertaken. Which actions will be selected will depend on the characteristics of the city, the policy priorities defined in the dialogue between the stakeholders and the assessment of benefits one expects from certain policy measures and actions and the costs to implement these.

### **1. Creation of an enabling policy environment**

Formal acceptance of urban agriculture as an urban land use and its integration into urban development and land use plans is a crucial step towards effective regulation and facilitation of the development of urban agriculture. Existing policies and by-laws regarding urban agriculture will have to be reviewed in order to identify and remove unsubstantiated legal restrictions and to integrate more adequate measures to effectively stimulate and regulate the development of sustainable urban agriculture.

A second important step is the creation of an institutional home for urban agriculture. Conventionally, sector policies have been defined under the assumption that agriculture refers to the rural sphere and will be attended to by institutions other than the urban ones, whilst most agricultural organisations don't operate in the urban sphere. As a consequence, urban agriculture often does not have an institutional home.

Municipal authorities can play a key role in filling this gap by selecting a leading institute in this field, creating an urban agriculture office or department in this lead agency with proper staffing, and establishing an interdepartmental committee on urban food production and consumption.

Nairobi and Accra have created a municipal agricultural department. In Villa Maria del Triunfo (Lima, Peru) an urban agriculture sub-department was created under the Department of Economic Development. The city of Rosario (Argentina) made in 2001 its Secretariat of Social Promotion responsible for the coordination of the new Urban Agriculture Programme.

In Cape Town, South Africa, an inter-departmental working group has been established in 2002 to coordinate the activities in the field of urban agriculture of various Municipal and Provincial departments and facilitate integrated policy development.

In Bulawayo, Zimbabwe, an Interdepartmental Committee on Urban Agriculture was created to coordinate the activities of the various Municipal departments active in this field including the Departments of Town planning, Health, Finance, and others

Also important is stimulating the dialogue and co-operation among the direct and indirect stakeholders in urban agriculture. This can be done by setting up a multi-actor platform and working group on urban agriculture that organises the joint analysis of the presence, role, problems and development perspectives of urban agriculture in the city and coordinates the process of interactive formulation of a policy and the planning and implementation of action programmes by the various actors.

## **2. Enhancing access to vacant land and security of land use**

Naturally, land is a critical asset for urban agriculture, and its availability, accessibility and suitability are of particular concern to urban farmers. City governments may facilitate access of urban producers to available urban open spaces in various ways. Below we present a number of measures taken by various cities in the South to enhance access of (especially poor) urban producers to land and improve their security of land use.

**Demarcating zones for urban agriculture as a form of permanent land use and integrating these into city land use planning.** Dar es Salaam (Tanzania), Dakar (Senegal), Maputo (Mozambique); Pretoria (South Africa), Kathmandu (Nepal), Accra (Ghana), Kathmandu (Nepal) and Beijing (China) are examples of the many cities that have demarcated zones for urban agriculture areas as a form of permanent land use in the perspective to support agriculture in combination, to protect open green areas, flood plains and areas under power lines to be built upon, to create buffer zones between conflicting land uses. Demarcation of such zones alone is not enough. Zoning in itself is not sufficient to maintain these green open spaces. To realise that, the *political will of the local authorities* and the *practical, technical and financial support provided* to the urban producers to stimulate the development of sustainable and multi-functional agriculture in these zones, is very important.

**Making an inventory of the available vacant open land within the city.** Contrary to the common belief, even in highly urbanised areas surprisingly high amounts of vacant land can be found that could be used for agriculture on a temporary or permanent basis. In the city of Chicago, researchers identified 70,000 vacant lots. Various cities, like Cienfuegos (Cuba), Piura (Peru) and Dar es Salaam (Tanzania) have made an inventory of the available vacant open land within the city (using methods like community mapping and/or GIS) and analysed its suitability for use in agriculture, which creates a good starting point for enhancing access, especially of the urban poor, to land for urban farming.

**Temporal lease of vacant municipal land.** Various cities, like Havana (Cuba), Cagayan de Oro (the Philippines), Cape Town (South Africa), Lima (Peru), Bulawayo (Zimbabwe) and Governador Valadares (Brazil) have formulated a City Ordinance that regulates the (temporal) use of vacant municipal land by organised groups of urban producers. The vacant land (that might be land that is earmarked for other uses but not yet in use as such or land that is not fit for construction e.g. flood zones, land under power lines, etcetera, or buffer zones and land reserves for future use) is given in short or medium term lease to organized groups of urban poor for gardening purposes (multi annual purposive specific leaseholds or occupancy licenses). Often the contract with the farmers includes conditions and regarding the required land, crop and waste management practices and eventually some restrictions.

**Stimulating owners of vacant land to give this land on medium-term lease to organised farmer groups.** The City of Rosario (Argentina) is providing a tax reduction to land owners that do lease out their land to urban producers (levying municipal taxes on land laying idle might be a complementary measure) and created a Land Bank which brings those in need of agricultural land in contact with landowners in need of temporary or permanent users. Also the city of Cagayan d'Oro, the Philippines, assists associations of the urban poor in the establishment of allotment gardens on privately owned land, which proves to be a successful strategy. Other examples of tenure agreements between urban producers and owners of private or semi-public

estates with idle areas can be found in Accra (hospital grounds), Harare (golf club), Santiago de Chile (school yards), Dar es Salaam (university campus) and Port-au-Prince (church grounds).

**Taking measures to improve the suitability of available tracts of land.** The City of Cape Town (South Africa) not only provides access to vacant land but also is assisting urban gardening groups in removing debris from that land, ploughing it, delivery of compost, etcetera. In New York community groups and volunteers, with the help of the Department of Sanitation, cleaned out derelict open spaces in their neighbourhoods and started there a community supported garden, leading amongst others to an increase of the prices of residential properties within 1000 feet of the garden.

**Providing assistance to reallocation of those urban producers that are poorly located** (and therefore may cause serious health and/or environmental risks due to these locations). For example, in Jakarta, Indonesia, 275 dairy cattle farmers with over 5,500 cows have been reallocated from the inner city (where they caused disease and waste problems) to a peri-urban area. Cape Town (South Africa) is planning a similar action creating new livestock kraals in the peri-urban area for the intra-urban herd owners.

**Including space for individual or community gardens in new public housing projects and slum upgrading schemes.** Cities like Vancouver (Canada), Colombo (Sri Lanka), Kampala (Uganda), Rosario (Argentina), Dar es Salaam (Tanzania), Chicago (USA) are experimenting with the inclusion of space for home and/or community gardening in new public housing projects and slum upgrading schemes.

**Promotion of multifunctional land use** Under certain conditions urban farming can be combined with other compatible land uses. Farmers may provide recreational services to urban citizens, receive youth groups to provide ecological education, act as co-managers of parks, and their land may also be used as water storage areas, fire break zones, flood zones, etc. By doing so the management costs of such areas may be reduced, and protection against unofficial uses and informal re-zoning may be enhanced.

In Bangkok (Thailand) aquaculture in urban or peri-urban lakes or ponds is combined with recreational activities like angling, boating, or a fish restaurant. In Calcutta the maintenance of the wetlands, agriculture and aquaculture are combined with wastewater treatment and reuse.

The Municipality of Beijing is promoting the development of peri-urban agro-tourism both in the form of larger agro-recreational parks as well as family-based agro-tourism: farmers diversifying their activities by offering services to urban tourists (food, accommodation, sales of fresh and processed products, functioning as tourist guide, horse riding, etc.). The local government made agro-tourism part of municipal and district level planning; established an agro-tourism association and information dissemination service; assists interested farmers with business planning, tax exemptions and funding of infrastructure development, and provides subsidized water and electricity.

Some municipalities (e.g. Pretoria, South Africa; Vancouver, Canada; Rosario, Argentina) entered into a partnership with producers to manage municipal open green spaces (and saving in this way the municipality considerable maintenance costs) by combining community gardening with other functions (e.g. park maintenance, recreational services).

### **3. Enhancing the productivity and economic viability of urban agriculture**

The potential for improvement of the efficiency in urban farming systems is high. The urban farming sector tends to be highly dynamic, amongst others due to the closeness to the consumers, but its development is restrained amongst others due to urban farmers' limited access to training and extension services. Agricultural research and extension organisations and other support organisations (i.e. credit institutions) have - until recently - given relatively little attention to agriculture in the urban environment. And where it has happened, most attention was given to the larger scale, capital intensive and fully commercial farmers, especially peri-urban irrigated vegetable production, poultry and dairy production.

Important measures that can be taken by Municipal Governments to enhance the productivity and economic viability of urban agriculture include the following:

***Promotion of the provision of training and extension services to urban producers***

Governmental organisations, educational institutes, NGO's and the private sector can be stimulated by the Municipal Government to provide training, technical advice and extension services to urban producers, with a strong emphasis on ecological farming practices, proper management of health risks, farm development (e.g. intensification and diversification), enterprise management and marketing. Cost-sharing systems (farmers, municipality, governmental organisations, and private enterprises) will be needed to ensure sustainability of such activities.

For example, the Cape Town policy on urban agriculture (South Africa) calls upon the services of the research, training and support organisations in and around the city to provide the urban farmers with training on business administration, technical skills, marketing, etc. The Botswana policy paper on urban agriculture assigns a critical role to farmer education through the production of books, brochures, posters, and community level demonstration projects and advocates for the integration of urban agriculture into the formal training and education system (e.g. agricultural colleges, technical schools). In Chicago, the Food Policy Council is the platform where the Municipality and NGO's, like Heifer and Growing Power, coordinate their activities regarding capacity building and training activities for community gardeners.

***Strengthening farmers organisations*** Most urban farmers are poorly organized, and if so mostly in an informal way, and thus lack channels and power to voice their needs. This limits the representation of their interests in urban policymaking and planning at the various levels and hampers their participation in development programmes. Well functioning farmer organisations can negotiate access to land, adequate tenure arrangements and access to credit. Such organisations may also take up roles in farmer training and extension, infrastructure development, processing and marketing; and control / certification of the quality of the products marketed. In More efforts are needed to identify existing farmer organisations and informal networks of (various types of) urban farmers, and to analyse their problems and needs and effective ways to further develop these organisations.

Municipalities may stimulate their departments as well as Universities, NGOs and CBO's present in the City to actively support farmer organisation and capacity development and to strengthen the linkages between farmer organisations and private enterprises, consumer organisations and support organisations.

The PROVE programme of Brasilia FD stimulated the urban producers to establish producer associations and their capacities were enhanced to gradually replace the government officers in their supporting role. In Rosario, Argentina, the Municipal Urban Agriculture Programme supported the establishment of the Urban Producers Network and helped them to establish working relations with various governmental and non-governmental organisations. In Beijing, agricultural cooperatives, often closely linked to village-level management, are created that facilitate capacity building and joint marketing.

***Development of appropriate technologies*** Urban agriculture is performed under specific conditions that require technologies different to those used in the rural context. Such specific conditions include among others: limited availability of space and the high price of urban land, proximity to large numbers of people (and thus a need for safe production methods), use of urban resources (organic waste and wastewater), and possibilities for direct producer-consumer contacts. Most available agricultural technologies need adaptation for use in these conditions whilst new technologies have to be developed to respond to specific urban needs (e.g. non-soil production technologies for use on roofs and in cellars; development of safe and economic practices for reuse of wastewater).

Municipalities can provide budget and expertise for local technology development, and/or to stimulate research organisations and universities to put urban agriculture issues on their research agenda and to undertake participatory action – research with urban producers. Also more

coordination between research institutes, agricultural extension organisations, NGOs and groups of urban farmers could be promoted. Special attention is to be given to introduction of ecological farming practices (like integrated pest and disease management, ecological soil fertility management, soil and water conservation, etc.), space intensive and water saving technologies, health risk reducing practices and the creation of farmer study clubs and field schools that actively engage in the technology development and assessment process.

The national urban agriculture programme in Cuba undertakes ample practical research to develop technology appropriate for the urban conditions e.g. agro-ecological production methods that do not harm the environment.

The Botswana policy paper on urban agriculture urges research and extension institutions to develop and disseminate technologies with and to small-scale urban farmers. The following technologies are mentioned: (a) adaptable cultivars (e.g. cabbage, tomato, onion, etc.), (b) water saving techniques (e.g. drip irrigation system or micro-irrigation system), (c) appropriate production practices (e.g. hydroponics, concrete benches, protected agriculture).

**Enhancing access to water, inputs and basic infrastructure** Also access to year round supply of low cost water is of crucial importance in urban agriculture as well access to (composted or fresh) organic materials and other sources of nutrients (like wastewater).

Municipalities can play an important role in enhancing access of urban farmers to water and production inputs. The city of Bulawayo (Zimbabwe) provides treated wastewater to poor urban farmers in community gardens, while the city of Tacna (Peru) agreed to provide urban farmers its treated wastewater in return for their assistance to maintain public green areas. The City of Gaza (Palestinian Authority) promotes the reuse of grey household water in home and community gardens. Mexico City (Mexico) promotes systems for rainwater collection and storage, construction of wells and the establishment of localised water efficient irrigation systems (e.g. drip irrigation) in urban agriculture to stimulate production and to reduce the demand for potable water. The municipality of Cape Town assist community garden groups with basic infrastructure (a fence, a tool shed, a tank and hoses for irrigation) and allows them to use up to a certain amount of piped water daily free of charge. The city of Havana facilitates adequate supply of quality seeds, natural fertilizers and bio-pesticides in small quantities to urban farmers through a network of local stores and is supporting the establishment of decentralised low-cost facilities for compost production and the installation of composting toilets.

**Enhancing access of urban farmers to credit and finance** Improvement of the access of urban farmers to credit and finance (with an emphasis on women-producers and the resource poor farmers) is very much needed. Municipalities can stimulate (e.g. by creating a guarantee fund) existing credit institutions to establish special credit schemes for urban producers or to allow the participation of urban producers in existing credit schemes for the informal sector.

In Brasilia FD (Brazil), the PROVE programme provided the urban producer associations with a non monetary guarantee in the form of "Mobile Agro-industries" (metal frames that can be transported on a truck). Since these frames are mobile and durable, they can be used as collateral for a commercial loan.

The inclusion of urban agriculture in the municipal budget is also an essential component in the promotion of urban agriculture activities. In many cities, the City Council allocates resources to support its policy and programme on urban agriculture (infrastructure development, training, marketing support, start up kits, etcetera).

**Facilitate (direct-)marketing** Due to the low status of urban agriculture and the usual exclusive focus on food imported from rural areas and the exterior, the creation of infrastructure for direct local marketing of fresh urban produced food and local small processing of locally produced food has received little attention in most cities.

Municipalities may facilitate marketing by poor urban farmers by providing them access to existing city markets or to assist them in the creation of farmers' markets (infrastructure development, licenses, control of product quality), authorize food box schemes and/or support the establishment of "green labels" for ecological grown and safe urban food. An example is Brasilia D.F. that is furthering the integration of small food production with local food processing and

marketing. The Budapest municipality assisted Biokultura, the local organisation of urban and peri urban farmers, to establish a weekly organic farmers' market for organically grown food products. The municipality of Governador Valadares has prioritised the marketing of urban agricultural products in different ways: (a) by providing incentives for the formation of cooperatives for the production and commercialization of products, (b) by the creation of sales and distribution centres as well as farmers markets in the city and c) by buying agricultural products from the urban farmer groups to supply to schools, community kitchens, hospitals and other service organizations.

**Supporting micro-enterprise development** Various Municipalities are promoting the development of small scale enterprises: suppliers of (often ecological) farm inputs (compost, earthworms, open pollinated seeds and plant materials, bio-pesticides) and processing enterprises (food preservation, packaging, street vending, transport) by:

- Provision of start up licenses and subsidies or tax reductions to micro- and small entrepreneurs
- Provision of technical and management assistance to micro- and small enterprises
- Providing subsidies and technical assistance for local infrastructure and equipment for small scale food preservation and storage facilities

In Ghana, the Tema Municipality cooperated with the Ministry of Food and Agriculture in the establishment of a milk collection system in order to encourage dairying in the peri-urban areas of Tema. In Brasilia, the Municipality facilitates the development of small agro- processing and/or packaging units managed by urban farmer groups and assisted them in setting up quality labels and other marketing strategies.

#### **4. Measures to reduce the health and environmental risks associated with urban agriculture**

Rather than restricting urban agriculture out of fear - often unspecified – of health and environmental risks associated with urban agriculture, cities –instead- better design a series of accompanying measures to reduce these risks. The following measures are regularly recommended to prevent eventual risks associated with urban agriculture.

**Improved coordination between health, agriculture and environmental departments** The first measure to be taken is to create mechanisms of cooperation between agriculture, health and environment/waste management departments to assess actual health and environmental risks associated with urban agriculture and to design effective preventive/mitigating strategies for which the participation of all these sectors is required.

In Kampala, Uganda, health, agricultural and town planning specialists closely cooperated in the development of the new ordinances on urban agriculture livestock and fisheries. In Phnom Penh (Cambodia) steps are being taken to improve the coordination between municipal departments, universities and private organisations for controlling and monitoring the microbiological and chemical quality of the wastewater-fed fish and plants in order to reduce a number of health problems (especially skin infections) related to wastewater fed aquaculture. In Kumasi, Ghana, small kits have been made available to various local organisations to periodically test the quality of the irrigation water. The Accra working group on urban agriculture, with the Accra Metropolitan Assembly as a member, has drafted revised by laws on the use of waste water and support an awareness campaign on health risk minimisation strategies in production and marketing (Farm to Fork) of urban vegetables. The Ministry of Housing, Construction and Sanitation of Peru (MVCS) is formulation of policy guidelines for the promotion of productive use of treated wastewater in intra- and peri-urban agriculture) and recreational use of wastewater (irrigation of parks and other public green areas).

**Health considerations when zoning urban agriculture** Many cities identify zones where certain types of urban agriculture are allowed (often defining required management practices) and other types are excluded (due to expected negative effects in the given local circumstances) in order to reduce health and environmental risks. When preparing such a zoning and related

regulations, factors like population density, the ecological sensitivity of the area concerned, closeness to polluting industry, closeness to sources of drinking water, etc. should be taken into account as well as the potential risks related to certain types of urban agriculture. Furthermore, the available means to enforce the zonification and related regulations should be taken into account.

A city may want to avoid free roaming cattle and major concentrations of stall-fed dairy cattle or piggeries in central districts (traffic, bad smells, flies, waste management problems). Also intensive horticulture and poultry keeping in areas that are sources of drinking water (risk of water contamination) or mono-cropping in river stream beds (erosion problems/siltation of dams) might need to be avoided. Also proper location of crop fields in relation to sources of contamination is important in order to reduce the effects of air pollution. Within 50-75 meters of a main road, leafy vegetables could better be avoided; production of food crops close to industries that emit certain toxic elements should be discouraged.

**Farmers education on the management of health and environmental risks** Health risks associated with urban farming can be reduced substantially if farmers are made well aware of these risks and know how to prevent them. Examples of preventive measures that can be implemented by farmers themselves are the following:

- Application of ecological farming methods to reduce risks related to intensive use of agrochemicals.
- Adoption of adequate animal wastes management, regular cleaning and disinfection of the stables, proper handling of animal feed, etc. in order to prevent health risks related with raising animals in proximity of homes
- Use of adequate irrigation practices and proper crop choice can reduce health risks related to the use of wastewater. Untreated wastewater preferably should not be used for food crops (especially not fresh leafy vegetables), but may be used for growing trees or shrubs, crops for industrial use and other non-edible plants (ornamentals, flowers). In Xochimilco, Mexico, urban producers have shifted from vegetable growing to a lucrative floriculture when untreated canal waters became unfit for food growing. In Hyderabad, India, farmers shifted from production of paddy to fodder grass production, when river water that is used for irrigation, gradually became more polluted.

Food fish farmers in Bangkok, facing increasing pollution and food safety problems, were stimulated to switch to ornamental fish production. Vegetable producers in Ho Chi Minh City have begun cultivating ornamental plants for the urban middle class to reduce the risks of growing vegetables with wastewater. Municipalities in Ghana, Jordan and Senegal are field testing the various methods and procedures proposed by WHO to reduce risk of use of wastewater in urban agriculture in situations where comprehensive wastewater treatment is too expensive and not feasible in the near term (as common in many cities in the South)

**Training of food vendors and consumers** During production, processing and marketing crops can get contaminated. Access to clean water and sanitation facilities in markets should be provided and food-hygiene training is to be provided to small food processors and vendors. Consumers need to be educated regarding washing or scraping of crops, heating of milk and meat products and securing hygienic conditions during food handling. They also need education regarding the importance of fresh nutritious foods and medicinal herbs and their preparation (also in relation to HIV-AIDS).

A FAO project on making street foods safer, among others in Dakar Senegal, is training food vendors, food inspectors and consumers in food hygiene issues. In Accra, Ghana, a multi-partner project resulted in the training of more than 3,000 street food vendors on improved hygiene practices as well as increased consumer awareness

**Prevention of industrial pollution of soils and water by industry** Contamination of soils, rivers and streams by industry is a growing obstacle to safe urban food production. Separation of city waste (residential and office areas) and industrial waste streams and treatment of industrial wastes at the source should be promoted. In areas where contamination might occur (e.g. down streams of industrial areas: both wind and water) periodic testing of soils and water quality in

agricultural plots might be needed. Increasing pollution and contamination of the city's domestic wastewater with industrial wastewater effluents is a major constraint to the continued viability of irrigated urban agriculture as well as to aquaculture. In many South-East Asian cities, the continuity of the existing potential for growing aquatic vegetables and fish using urban wastewater will depend on the city planners' ability to coordinate and develop strategies for effective separation of toxic industrial waste from domestic sewage. There are already encouraging examples in Hanoi and Ho Chi Minh City (Vietnam) of relocation and zoning of urban industries to industrial parks which allow for more effective treatment and monitoring of effluents. In the medium term, enforcing existing pollution control legislation to control contaminants at their source and monitoring and regulation of industrial wastewater discharge in public water sources can be effective in reducing health risks.

## **Final remarks**

A growing number of cities are designing policies and programmes on urban agriculture, applying multi-stakeholder planning approaches to identify effective ways to integrate urban agriculture into urban sector policies and urban land use planning and to facilitate the development of safe and sustainable and multi-functional urban agriculture.

Urban agriculture has the potential to become a dynamic economic sector that quickly adapts to changing urban conditions and demands, intensifying its productivity and diversifying its functions for the city. governmental policy should create the proper framework conditions for optimal development of the social, economic and ecological benefits of urban agriculture, whilst reducing negative effects on public health and environment that some types of urban agriculture can have if improperly managed or not well located.

The sustainability of urban agriculture is closely related to its contributions to the development of a sustainable and resilient city that is socially inclusive, food-secure, productive and environmentally-healthy.