

CONTRIBUTION OF URBAN AND PERI-URBAN AGRICULTURE TO FOOD SECURITY IN SUB-SAHARAN AFRICA

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Abstract

Urban and peri-urban agriculture has a significant share in the food supply of many cities in Sub-Saharan Africa (SSA) and takes special care of urban diets, which include exotic or perishable vegetables, fresh milk and poultry products. In this way, UPA is significantly contributing to a higher variety of foods on the city markets, contributes to employment, livelihoods and poverty alleviation. The provision of most crops throughout the year depends largely on the availability of water for irrigation. Case studies from SSA are presented for illustration. Although many benefits derive from UPA, the production is often associated with health risks, for instance through the use of polluted urban water, which need to be minimized. The challenge for urban agriculture in Africa derives from being in most cases in a vacuum of semi-official recognition with limited active support from city authorities, or even in conflict with city planners or health authorities with respect to land tenure and water use. It is therefore stated that urban authorities, policy makers and planners need more data on the contribution of urban and peri-urban agriculture to urban food supply to give this agricultural sector appropriate recognition.

1. The urban millennium

Urbanisation is one of the major problems facing mankind. According to UN projection, about half of the population of Africa and Asia will live by 2020 in urban and peri-urban areas, inspiring Kofi Annan to announce the **Urban Millennium**. Especially Sub-Saharan Africa is experiencing one of the fastest rates of urbanization. In regions with large coastal cities, such as humid West Africa, already today more people live in cities than in rural areas, while this is only 22% in the Sahel zone.

While in 1930, 40 million people lived in West Africa with 4% in cities, in 1990 there were about 190 million and 40% in cities; and for 2020 63% of the estimated population of 430 million will be found in urban centers. This trend is alarming in a region with limited resources for providing the necessary urban services. Ensuring food security and appropriate nutrition of the urban population - and in particular of the poorest households - has become a major challenge worldwide.

2. Urban Food security

Ensuring food security and appropriate nutrition of the urban population – and in particular of the poorest households – has become a special challenge in the tropics where rural food production is limited by marginal soil fertility and too low incomes to buy necessary inputs.

As a response of the urban poor to inadequate or costly food supply, food (crops and livestock) production in urban backyards became worldwide a common feature. But the related increase in urban food demand opened also the door for farming systems in and around our cities specialised on perishable products, such as vegetables, taking advantage of every open space, market proximity and the general lack of a functional cold chains. All these farming systems are part of a phenomenon called **Urban and Peri-urban Agriculture (UPA)**.

The United Nations Development Program (UNDP) estimated in 1996 that 800 million people are engaged in urban agriculture worldwide. Of these, 200 million are considered to be market producers employing 150 million people on full-time basis. Urban agriculture contributed 15% of world food production in 1993 and this is expected to grow to 30% by 2005 (Smit et al., 1996).

The concept of food security, however, is used to emphasis access to food rather than mere availability of food. It also incorporates the need for a healthy food. Urban households must have both. According to Maxwell (1999) the nature of urban food insecurity has changed from the problem of “feeding the cities” (or maintaining aggregate supply), to that of access at household and individual level. The responses of urban households to the economic crisis are normally the focus of efforts to combat poverty and food security. Poor urban consumers can spend from 60% to 80% of their limited income on food. Here, urban agriculture becomes an interesting option as it contributes to the aggregate supply, in particular of fresh and perishable plant and animal food, as well as to food production at home for home consumption and better nutrition. However, UPA should certainly not be seen and promoted as “the” answer to urban food insecurity and malnutrition, but as one important complement to rural agriculture, which increases the efficiency of the national food system in that it provides products that rural agriculture cannot supply easily (e.g. perishable products), that can substitute for food imports and can release rural lands for local production.

3. Urban Agriculture

Urban farming activities can be found everywhere, behind houses or along roadsides, on roofs or in the middle of roundabouts, along and between railway lines, in parks, along rivers, under power-lines, etc. Often we only have to train our eyes to see that in all kinds of private or open public spaces crops are cultivated and animals like goats and chicken roam around. A few examples from the Resource Centre for Urban Agriculture and Forestry (RUAF) database:

- In **Kumasi** and **Dar es Salaam**, home gardening is a very common production system in urban areas. This can be found in high-, medium- and low-density areas. Production is for subsistence needs, often done by women and reduces household expenses while contributing to the diet. Two out of three households in Kumasi cultivate at least a few crops. Open-space production, on the other hand, is clearly market-oriented and supplies the cities with fresh, leafy vegetables. Farming takes preferably place in the inland valleys and lowlands with water access (Fig. 1). The production is usually done by men and often the only source of family income. Major constraints are security of land rights and quality and regular supply of water. Apart from open space vegetable production (mostly in the dry season or year round) also open space maize farming is common, especially in the rainy season, or flower and ornamental production. In addition, there exist some highly specialized commercial systems for foreign export taking advantage of the proximity of city airports and harbours like pineapple farmers near **Accra** in Ghana and Basil leaf farmers on the beaches of **Lomé**.

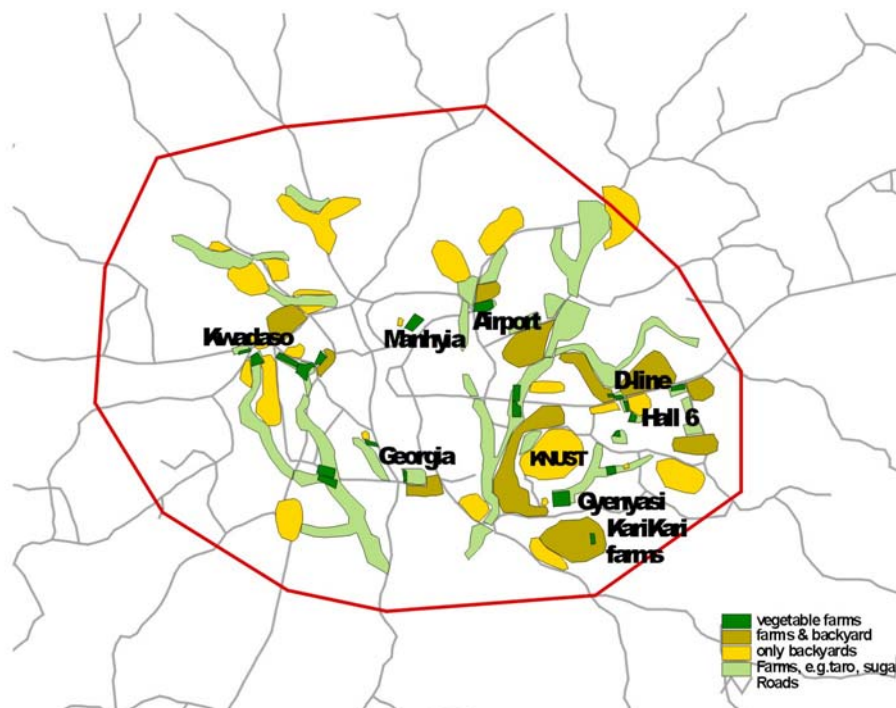


Figure 1: Larger urban agriculture sites in the Kumasi Metropolitan Area follow in many cases inland valleys (IWMI, unpubl.). A similar picture can be found e.g. in Ibadan, Nairobi or Yaounde.

- UPA is promoted in **Nairobi** primarily to help the poor to feed themselves and improve their nutritional status. One of the very few examples to see whether this is really so, is a study carried out in 1994 in the Nairobi slum of Korogocho. Of a group of farmers compared to a group of non-farmers (with comparable household income levels) the farmers regarded their food situation as better than non-

farmers. This was confirmed by a higher energy intake (100 kcal/consumer unit/day) originating entirely from their own production, and a lower percentage of children stunted or severely malnourished. Similar results are reported from **Kampala**.

- In **Harare**, Zimbabwe, under the current economic crises, more than 20,000 urban farmers will have enough food this year, as they produced on open spaces in the city. Agricultural production in and around cities appears in fact to expand during economic crises as a means for impoverished households to feed themselves. The City of Harare has acknowledged the importance of this activity and tolerates maize cultivation on fallow area in the city, even allocated plots to urban residents, and started stakeholder meetings to develop adequate policies.

The economic impact of urban agriculture appears at different levels (Nugent, 2000). It is first of all related to the direct economic benefits for the urban households involved in the agricultural production: self-employment, income from sales of surpluses, savings on food expenditures, exchange of agricultural products for other economic goods. Solely profit-oriented is the open-space production of vegetables with irrigation which gives farmers e.g. in **Kumasi** 2-3 times the income they could earn in traditional rainfed agriculture even on larger fields (Danso et al, 2002). An overview about profits from mixed vegetable production in open-space urban agriculture shows that monthly income ranges between USD 30 and 70 per farmer, but can go up to USD 200 or more with larger space, extra labour and e.g. a motor pump (Table 1).

Table 1. Monthly net income from mixed vegetable farming with irrigation in urban areas in West Africa

| City | Net income in USD per month and farmer |
|-------------|----------------------------------------|
| Lome | 13 – 25 (300) |
| Cotonou | 50 – 70 (110) |
| Ouagadougou | 25 – 70 (100) |
| Accra | 40 - 50 |
| Kumasi | 30 - 65 |
| Bamako | 20 – (200) |
| Dakar | 40 – 66 (250) |

Source: IWMI Ghana, unpubl., 2002

On the macro level, the contribution of urban agriculture to the Gross Domestic Product will be small, but the importance for certain commodities, such as cabbage or milk, might be substantial especially if we consider up- and downstream activities. In **Dar es Salaam**, for example, urban agriculture forms at least 60% of the informal sector (Mr. Majani, UCLAS, pers. comm. 2001) and urban agriculture is the second largest urban employer (20 percent of those employed). In 1993, urban fresh milk production was worth an estimated USD 7 million (Mougeot, 1994). The annual gross output of over ten thousand urban agricultural enterprises in the city of Dar es Salaam totaled more than 25 million USD.

Urban Agriculture is contributing to several **policy goals** (De Haas and Gura, 1996, Mougeot, 2000): Commercial urban agriculture makes a significant contribution to employment, income generation, and poverty alleviation, and contributes to the aggregate supply of the city as well as balanced diets. Backyard production reduces food expenditures and improves household diets. Moreover, during periods of economical or political crisis, urban agriculture proved to be an important survival strategy in many countries. Taking the current urbanisation rates into account, it is no surprise that Urban Agriculture received during the last years increasing attention by major donors and is now included in programmes of FAO, UNDP, UNCHS, WHO, USDA and the CGIAR system as well as many other international organisations.

4. The complementary role of urban, peri-urban and rural agriculture

A review on local food demand met by urban and peri-urban agriculture was given by Nugent (2000). It showed that the data are difficult to compare as they vary significantly between commodities and with the assumed area of the peri-urban interface (Table 2).

Table 2. Food provided by urban and peri-urban agriculture (UPA)

| City | Local needs met by UPA (%) |
|---------------|---------------------------------------------------------------------------|
| Havana | 64 (rice), 58 (vegetables), 39 (non-citrus fruits), 13 (tubers), 6 (eggs) |
| Dakar | 70-80 (vegetables), 65-70 (poultry) |
| Dar Es Salaam | 60 (milk), 90 (vegetables) |
| Jakarta | 10 (vegetables), 16 (fruits), 2 (rice) |
| La Paz | 30 (vegetables), |
| Sofia | 48 (milk), 53 (potatoes), 50 (vegetables) |
| Shanghai | 60 (vegetables), 90-100 (milk), 90 (eggs), 50 (pork, poultry) |
| Nairobi | 50 (low income households) |
| Kumasi | See table 3 |
| Hong Kong | 45 fresh vegetable, 68 live poultry, 15 pigs, 45 vegetables |
| Singapore | 25 vegetables |
| Hanoi | 80 fresh vegetables, 50 pork, poultry and fresh water fish, 40 eggs |
| Kathmandu | 37 Horticulture crops, 11 animals, 30 vegetables |
| United States | 70 fruits, vegetables, ornamental plants |
| Vancouver | 70 Spinach |

Sources: Nugent (2000), UAM (2002)

The specific contribution of urban agriculture to aggregate supply and its complementarity to peri-urban and rural production has been quantified by IWMI around different cities in Ghana and Burkina Faso. An

example is given for Kumasi: The peak and lean seasons show obvious differences with respect to the quantities of food supply from various sources. During the peak season, plenty of food enters Kumasi (Fig. 2) especially from peri-urban areas (66%) but also urban (14%). In the lean season, Kumasi depends more on food coming from further away, i.e. rural areas or beyond (73% of all food crops). The total quantity of food entering Kumasi varies between the seasons and has an annual average of appr. 750,000 - 800,000 t/y.

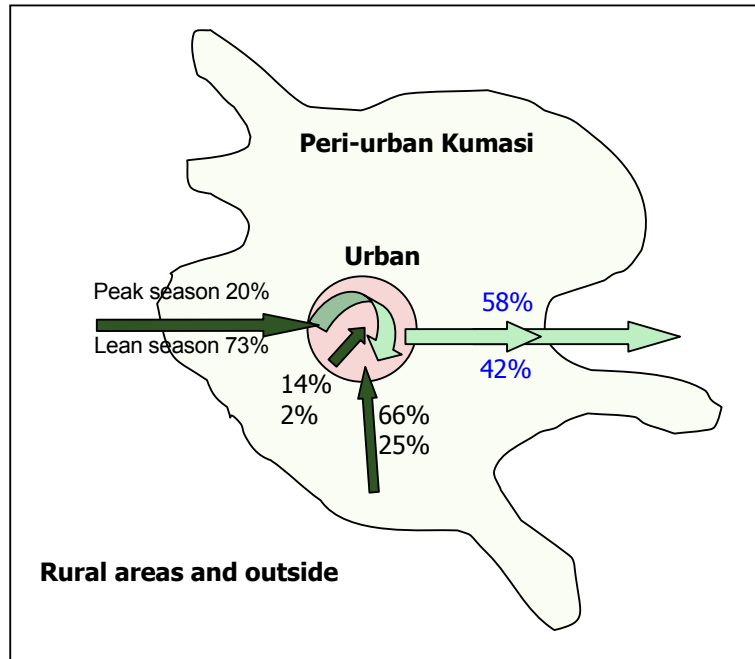


Figure 2: Food flows in and out of Kumasi during different seasons showing the contributions of rural areas (plus import), peri-urban Kumasi and urban agriculture (Gellermann et al., 2002).

Consumption surveys carried out by IWMI show that only 58% of the food items entering Kumasi are also consumed within the city, while 42% leave the urban markets for peri-urban and rural areas. This can also concern produce of urban and peri-urban agriculture. In Dakar, Senegal, for example, about 60% of the national vegetable, milk and poultry consumption is produced in and around the city (Mbaye and Moustier, 1999).

As our Kumasi calculations are based on food weight, heavy food crops like yam, cassava, maize, plantain and rice have a major impact on the summary assessment given in Fig. 1. A more detailed analysis of the origin of the food in the city markets shows the competitive advantage of urban and peri-urban agriculture (Table 3). These figures do not include food produced in backyards and consumed in urban households.

Focusing on the contribution of open-space urban agriculture to urban food supply, table 1 shows that the demand for certain vegetables (like lettuce or spring onions) as well as fresh milk is nearly completely covered by inner-urban production. Especially tomatoes, garden eggs, and cassava as well as eggs and

poultry meat derive from the peri-urban area while staples, such as yam, cocoyam, plantain, maize and rice come from rural areas or via import to the city markets. Poultry production is a vital part of Kumasi's urban and peri-urban agriculture and practised by people from all social sectors. Between 1986 and 1995 Ghana's poultry population doubled from 6.4 to 13.1 million. Farmers in and around Kumasi benefit from large amount of poultry manure generated, as this offers them access to cheap but high-quality fertilizer.

Significant additional contributions of **backyard** farming to urban food supply have been reported from many African cities (RUAF database). While for instance in **Nairobi and Lusaka**, the farming households produce between 20 and 30 percent of their food requirements, in **Harare and Kampala**, up to 60 percent of food consumed by low-income groups was self-produced. Paule Moustier (2000) compiled the percentages of households involved in agriculture in various African cities (Table 4).

Table 3. Contribution of rural, peri-urban and market-oriented urban agriculture to urban food supply in Kumasi. Data for selected food items (Cofie et al., 2001).

| Food item (examples) | Kumasi Metro-politan Area (%) | Peri-urban Kumasi (%)* | Rural and import (%) ** |
|----------------------|-------------------------------|------------------------|-------------------------|
| Cassava | 10 | 40 | 50 |
| Maize | < 5 | 5 | 90 |
| Plantain | < 5 | < 10 | 85 |
| Yam | 0 | 0 | 100 |
| Cocoyam | < 2 | < 10 | 90 |
| Rice | 0 | < 5 | 95 |
| Lettuce | 90 | 10 | 0 |
| Tomatoes | 0 | 60 | 40 |
| Garden eggs | 0 | 60 | 40 |
| Onions | 0 | 0 | 100 |
| Spring onions | 90 | <10 | 0 |
| Poultry/eggs | 15 | 80 | < 5 |
| Livestock | 5 | 10 | 85 |
| Fresh cow milk*** | >95 | < 5 | 0 |

* As analysed by NRI approx. a 40 km radius from the city center (Adam, 2001).

** Imported are mainly rice, onions and part of the livestock.

*** University farm production.

Table 4. Percentage of households involved in agriculture.

| City | Percentage of households in agriculture |
|-----------------------|-----------------------------------------|
| Brazzaville (1994) | 25 |
| Bissau (1993) | 30 |
| Yaounde (1998) | 30 |
| Douala (1998) | 16 |
| Garoua, Maroua (1994) | 10 |
| Nairobi (1994) | 30 |
| Lusaka (1993) | 45 |
| Dar Es Salaam (1988) | 20 |
| Kampala (1993) | 30 |
| Accra (2000/1) | 46 |
| Tamale (2000/1) | 26 |
| Kumasi (2000/1) | 57 |

Sources: See Moustier (2000), Data from 2000/1 by IWMI Ghana (unpubl.)

5. Risks and challenges

Although most tropical soils are of low fertility and many African farmers struggle below the poverty line, irrigated (peri)urban vegetable production allows significant profits. It also shows that permanent cropping is possible on marginal soils with, for example, up to eleven lettuce harvest per year. Thus irrigated urban agriculture attracts significant research interest, as it appears as one of the most productive farming systems in Africa despite its informal and seldom supported character.

The success is steered by the large urban market and its demand for high value crops. But highly output-oriented cash crop systems require correspondingly high inputs in form of water, nutrients and pesticides. To get the inputs needed UPA is often making use of typical urban 'resources' like wastewater. In fact, there might be little alternative: In and down-stream of our cities pollution is common and most streams show microbiological contamination far exceeding WHO standards. Most farmers are not aware of this risk or have simply no alternative to the use of polluted water as city authorities lack the funds for better treatment facilities. In other cases, "wastewater" might be the only reliable water source. In general, the water resources used depend on local opportunities and include groundwater, (polluted) surface water, wastewater and piped water accessed via shallow wells and watering cans or motor and treadle pumps. Water application is intensive and rates can range even with watering cans between 600-1600 mm per year (IWMI Ghana, unpubl.).

While (peri)urban agriculture could play a positive role in the urban ecological system, it is most exposed to the urban footprint and environmental pollution, compared with other farming systems (Birley and Lock, 1999). But it can also have significant negative impacts on health and environment:

- A significant negative impact of UPA concerns food contamination. In most countries of SSA, vegetables are highly contaminated with pathogens through the use of polluted stream/drain water for irrigation, and also with pesticides. This issue received high quotations in RUAF's regional need analyses (RUAF, unpubl.).
- Other impacts can be linked to the support of breeding sites for the malaria vector through irrigated farming (Afrane et al., 2003) or e.g. zoonoses through keeping animals under poor hygienic conditions close to humans (Mantovani, 2000).
- As vegetable production is often taking place along streams, off-site effects through over-fertilization are possible. In Kumasi, annual poultry manure application rates of 100-200 t/ha are common. Although year-round irrigation adds additional nutrients, it contributes much more to manure (N, K) leaching (Drechsel, 2002). However, water eutrophication appears of little significance in comparison with the general ecological footprint of the cities that is often 50 to 125 times the area of the metropolis itself (Rees, 1992).
- The intensification of agriculture can lead to competition for water between farmers and residents influencing the viability of agriculture in and near cities (Livingston, 1987).
- Evidence from Asia shows that current practice in commercial peri-urban vegetable production can lead to a build-up of minerals and pesticides, particularly in the edaphic environment, which over the long-term can create detrimental health and environmental consequences if no adequate measures are taken (Jansen et al., 1995; Midmore, 1996).

In the past, the fear of negative health impacts has in many cities led to the imposition of generic and restrictive policies on urban agriculture. However, nowadays, more and more cities, such as Dar Es Salaam (Kitilla and Mlambo, 2001), realise that such policies are bound to be ineffective. The tendency of many local governments now is to formulate more diversified and regulatory policies that seek to actively manage the health and other risks through an integrated package of measures, with the involvement of the direct stakeholders in the analysis of problems and development of workable solutions. These efforts should be supported by applied research into feasible options.

6. Conclusions

Urban and peri-urban agriculture has a significant share in the food supply of many cities in SSA and takes special care of urban diets, which include exotic vegetables, fresh milk and especially poultry products. In

this way, UPA is significantly contributing to a higher variety of foods on the city markets, contributes to employment, livelihoods and poverty alleviation.

Although many benefits derive from UPA, the production is often associated with health risks, which need to be minimized. Most vegetables produced are contaminated with pesticides as well as pathogens through the use of polluted stream/drain water for irrigation. To protect farmers' and consumers' health, the World Health Organization (WHO) published 1989 guidelines for the safe use of wastewater in agriculture. The application of the guidelines, however, has been found to be difficult in many field situations, including Africa, as recently discussed during an expert meeting in Hyderabad organized by IWMI and IDRC (11-14 Nov. 2002). To take into account urban and peri-urban agriculture, adjustments were suggested. The overall goal should be to find a better balance between safeguarding consumers' and farmers' health and farmers' livelihoods (Drechsel et al., 2002).

The dilemma for urban agriculture in Africa derives from being often in a vacuum of semi-official recognition but with limited active support from city authorities, and even oppression with respect to insecure tenure, city planning and water use. It was therefore stated that urban authorities, policy makers and planners need more data on the contribution of urban and peri-urban agriculture to urban food supply to assist urban farmers in producing safe and nutrient-rich products for both home consumption and city markets. This will require a good understanding between the various stakeholders involved, in order to enhance the positive impacts on households food security and nutrition and minimize or mitigate health and environmental risks.

An important step would be the organization of urban farmers to facilitate sustainable access to productive resources (land, water, seeds, credit), information and training. Appropriate information, education and training for farmers as well as traders and consumers will be important to ensure their understanding and contribution to good nutrition and health.

At the international level, several programmes and initiatives are ready to support this process. They include among others the Support Group for Urban Agriculture (SGUA), the Cities Feeding People Programme of the IDRC, the ETC- Resource Centre for Urban Agriculture and Forestry (RUAF), the Urban Management Programme (UNCHS-UNDP), the Strategic Initiative on Urban and Peri-urban Agriculture (SIUPA) of the CGIAR system and FAO's Food for the Cities program (cf. Mougeot, 1999, 2000).

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