Chapter 7
Local Economic Development and Marketing of Urban Produced Food

This chapter deals with the socio-economic impact of urban agriculture on income generation, poverty alleviation, urban food supply, livelihoods, as well as indirect costs and benefits for society including environmental externalities. Two levels of analysis are considered to assess this impact: the household and the city. The assessment of social and economic impact at the city level suffers more from lack of data than is the case at the household level. A main question is whether urban agriculture should be seen as an informal, residual, subsistence activity or as one that can shift from simple to enlarged reproduction of urban food, by making the best of its proximity to urban consumers and sustaining incomes in the long run.
Local Economic Development and Marketing of Urban Produced Food

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State of debates

If urban agriculture is attracting the growing attention of researchers, policy makers and diverse development stakeholders, it is mostly because it provides some answers to the unique social, economic and environmental challenges posed by fast urban growth (see also the preceding chapters). The dramatic speed of urban growth in developing countries has not been paralleled with the development of enterprises and infrastructure needed to absorb the new employment needs, by contrast to the developed countries where urban development has been much slower (Henderson, 2002). Finally, the context of fast liberalisation and restrictions in the public sector has reduced the possibilities of employment in public administration, traditionally a major provider of employment in cities.

Yet, peri-urban agriculture is still a subject of debate as regards its viability and the necessity for it to receive political support. In a challenging paper, Ellis and Sumberg (1998) provide a number of reasons why scarce public resources should not target urban agriculture. The report stresses that in the light of high land costs in urban areas and the fact that there is still not enough land to cater for housing and infrastructure needs, it would seem legitimate to let agriculture move towards rural areas whilst improving the transport infrastructure at the same time, as has been the case in Europe. Moreover, urban agriculture is subjected to many types of pollution and is itself a pollutant. In fact, urban agriculture takes advantage of market distortions and can be only transient. But most to the point, the authors looked at the lack of rigorous quantitative data to assess the social, economic and environmental impact of urban agriculture, and compare it with alternative sources of incomes in the city, alternative uses of land, and alternative sources of food.

In her analysis of the case studies prepared for the ETC Reader on urban agriculture in 2000, Rachel Nugent also points out the informal, small-scale character of UA, and its little impact in terms of income injection into the economy: “agriculture is a residual activity within imperfect markets. As such, it is conducted opportunistically and with relatively little investment. Farmers are more induced in self-subsistence rather than looking at income opportunities” (Nugent, 2000). The survival strategies of urban farmers has also been brought to the fore by Lipton (1977) as part of his famous “urban bias” theory in which he describes urban producers as “fringe villagers, waiting until penury forces them back to the land and meanwhile living on casual work or on their rural relatives”. In fact, UA is often presented with the characteristics found typical of the informal sector, which have been summarised by Cole and Fayissa (1991) as small size, family management, labour intensiveness and extra-legal nature. These characteristics generate what economists call the simple reproduction of the enterprise, i.e. the impossibility to generate more than the income necessary for the enterprise to pay for the inputs and means of production involved, and hence the impossibility
for the enterprise to accumulate savings and invest in its development. This process has been particularly well described by a series of studies on UA in Zambia (Rakodi, 1988; Jaeger and Huckabay, 1984): poor gardeners are caught up in a vicious circle when they plant a garden because their jobs do not provide them with enough cash income to feed their family, and they cannot grow more food and thus save money because they do not have cash to buy agricultural inputs, eg., manure, wastes or fertilisers...a typical poverty trap.

Yet, as discussed in chapters 1 and 4, empirical data on urban agriculture generated in the last ten years helps analysts to go beyond the image of the subsistence farmer as the dominant type in urban agriculture. Thenumber of case studies on urban and peri-urban agriculture has increased rapidly and are a comprehensive and valuable source in evaluating the economic and market role and comparative advantage of farming in and around cities. The methods, both in terms of conceptual frameworks and data collection, have improved to take better account of the specific features of urban agriculture, especially its numerous non-market costs and benefits, as well as its non-market organisational features based on the logic of location and risk alleviation, for which economics of proximity, combining insights from spatial and institutional economics, provide relevant analytical tools. While a frequent focus of prior studies has been the opposition between the informal urban agricultural sector and the urban environment, particularly in terms of policy, the benefits of alliances between agriculture and the urban environment are given more attention now, and a more balanced appreciation of the conflicts and synergies is looked for (Van den Berg et al., forthcoming). It is only through such alliances that urban agriculture can break out of the transient remains of rural agriculture and really gain an "urban nature" as expressed by Donadieu and Fleury (1997).

Urban Agriculture and Livelihood Strategies

Diversity of livelihood strategies
According to UNDP (1996), 80 percent of families in Libreville (Congo), 68 percent of urban dwellers in six Tanzanian cities, 45 percent in Lusaka (Zambia), 37 percent in Maputo (Mozambique), 36 percent in Ouagadougou (Burkina Faso), 35 percent in Yaounde (Cameroon) are involved in urban agriculture. The involvement of so many people in urban agriculture indicates its centrality amongst informal-sector activities (Obosu-Mensah, 1999). Yet the reasons for getting involved in urban agriculture, and consequently, its social and economic impact, vary across different categories of households. A major feature of UA is indeed the diversity of the socio-economic profiles of actors involved, and their varying income and livelihood strategies. Thus, the valuation of socio-economic impact will be different according to the types that are referred to, and not taking this into consideration may lead to differing estimates. Several attempts to classify urban agricultural systems have been made (Bakker et al., 2000; Smith, 1999; Moustier et al., 1999) which can be summarised into the types below and of which the characteristics are found in Table 7.1 (additional types could be added including hobby farmers or speculators).

1. Subsistence home intra-urban farmers (intra-urban and peri-urban areas)
2. Family-type commercial farmers (intra-urban and peri-urban areas)
3. Urban and peri-urban agricultural entrepreneurs (intra-urban and peri-urban areas)
4. Multi-cropping peri-urban farmers (peri-urban areas)
The proportions may be different elsewhere. In East Africa the subsistence type may be more significant due to the availability of more vacant space within cities. In Latin America and Asia, the types definitely differ across cities.

Subsistence home (intra-) urban farmers
This category involves urban residents who farm around their homes or elsewhere near the city, mostly for subsistence purposes. They raise staple food crops, vegetables, small livestock, and sometimes trees. Drechsel et al., 2004) documents that every second household is engaged in some form of subsistence production in Accra, Ghana. The production is typically seasonal, and the output is used mainly for home consumption, in addition to market purchases. There may also be the occasional sale of the surplus in the market. These survival strategies have been documented by a number of case studies including the ones reviewed by Nugent (2000). Typical examples are maize growing in the districts of Yaoundé, Accra metropolis and Harare; rice growing in Tamale, Ghana and Bandim, Bissau (Armar-Klemesu, 2000; Danso et al., 2002a; Lindell,1995); and multi-cropped fields cultivated seasonally by elderly women in Brazzaville on the outskirts of the city. Food from subsistence type production is usually of better quality, lower in cost and is more consistently accessible than purchased food (Gerstl, 2001).

Strategies of family-type commercial farmers
Family-type commercial farmers appear to be the dominant type in terms of importance in urban food supply, if not in terms of numbers. The typical crops grown are vegetables. What these farmers have in common is a family background in agriculture, which may also be in

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**Table 7.1 Summary of typology of Socio-Economic profiles**

<table>
<thead>
<tr>
<th></th>
<th>Home subsistence farmers</th>
<th>Family-type commercial farmers</th>
<th>Entrepreneurs</th>
<th>Multicropping peri-urban farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>U (P)</td>
<td>UP</td>
<td>P</td>
<td>Home + urban market</td>
</tr>
<tr>
<td>Outlets</td>
<td>Home</td>
<td>Urban market</td>
<td>Urban market + export</td>
<td>Home consumption and income for subsistence</td>
</tr>
<tr>
<td>Objective</td>
<td>Home consumption</td>
<td>Income for subsistence</td>
<td>Additional income Leisure</td>
<td>Income for subsistence</td>
</tr>
<tr>
<td>Size</td>
<td>Usually &lt;100m²</td>
<td>Usually &lt;1000m²</td>
<td>Usually &gt;2000m²</td>
<td>Usually &gt;5000m²</td>
</tr>
<tr>
<td>Products</td>
<td>Leafy vegetables, cassava, plantain, maize, rice, goats and sheeps, poultry, fruits</td>
<td>Leafy vegetables, temperate vegetables Poultry (sheep) (milk)</td>
<td>Staple food crops, local vegetables</td>
<td></td>
</tr>
<tr>
<td>Intensification (inputs/ha)</td>
<td>2</td>
<td>2 to 3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Gender</td>
<td>F</td>
<td>F + M</td>
<td>M</td>
<td>F + M</td>
</tr>
<tr>
<td>Limiting factor</td>
<td>Size</td>
<td>Size, land insecurity, access to inputs, water and services, marketing risks</td>
<td>Technical expertise, marketing risks</td>
<td>Access to inputs Fertility</td>
</tr>
</tbody>
</table>

The proportions may be different elsewhere. In East Africa the subsistence type may be more significant due to the availability of more vacant space within cities. In Latin America and Asia, the types definitely differ across cities.
relation to ethnicity. For instance in Buenos Aires where the vegetable growers are mostly Bolivian, the Japanese mostly grow herbs and the Italians grow trees (Craig et al., 2002). Another common feature of these farmers is that they have searched for alternative employment having experienced failures in their studies or former employment; this also reflects the difficult employment situation in African cities, especially for poorly qualified people. Three-fourths of the interviewed vegetable growers in Brazzaville mentioned failures in other jobs as mechanics, taxi drivers, cooks etc. before getting into agriculture. Urban agriculture thus enables the employment of urban people who are quite vulnerable from an economic point of view – yet not as vulnerable as the subsistence farmers. But the activity seldom generates enough income for savings and investment, all the more since access to land is insecure.

In contrast with subsistence urban farmers, who mainly produce for self-consumption, commercial urban and peri-urban farmers are involved in agriculture to earn a monetary income to pay for the numerous expenses in an urban environment (housing, children’s schooling, medical expenses). Although they may consume some of their produce, it is only a small portion. Agriculture represents their main household source of income, which may be in addition to other sources of income. In Yaoundé, more than 70 percent of intra-urban farmers do not have other occupations (Temple-Boyer, 2002); this figure is 85 percent in Abidjan (Yappi Affiou, 1999). In Yaoundé, again, 70 percent of commercial producers cited agriculture as their principal source of income, 21 percent cited a job in the formal sector and the remaining 9 percent cited petty commerce. By contrast to these figures, 67 percent of household food producers cited a formal sector job as their principal source of income, 20 percent cited petty commerce, and the remaining 13 percent cited their pension. While none cited agriculture as their principal income source, approximately half did say it was their second most important source of revenue (Gockowsky et al., 2004).

In peri-urban Hanoi, alongside commerce and craft work, agriculture still provides more than half of the incomes in a municipality such as Trung Trac (Lecostey and Malvezin, 2001). Forty-four of 100 farmers surveyed in Cagayan de Oro, Philippines, indicated vegetable production as their main source of livelihood (Potutan, 1998).

As the farmers’ objectives are to get regular food and income and secure their livelihoods, the cropping system has to be risk averse, yet have high value crops to cope with small size of land. This is typically the case of leafy vegetables (see also section 7.4 and chapter 11), which are hardly sensitive to water excesses or shortages and to diseases. Their short cycles (two to three weeks) enable regular cash generation. The proportion of leafy vegetables in the cultivated area is 70 percent in Brazzaville (Moustier, 1996). In Yaoundé (Gockowsky et al., 2004), the focus on traditional leafy vegetables and green maize production is observed among both commercial producers and household food producers.

Production systems of this category display common characteristics: irrigation, use of organic matter, cultivation on beds, and small farm size (less than 1ha). This reflects the necessary intensification per unit of land in a context of high pressure on land. As the farmers have differentiated access to land and capital (the higher the capital, the higher the presence of men in the business), the production systems display variations in the following aspects: the
nature of crops grown (low-risk and short cycle crops, eg. leafy vegetables, versus more risky and longer cycle crops, eg. temperate vegetables or ornamental crops); the nature of agricultural inputs; equipment; marketing strategies. The intensification strategies of vegetable farmers have been especially well documented in Kumasi, Ghana by Danso et al., 2002b (see the Kumasi case). Depending on the availability of land, type of production system and location of the farm, the labour requirement differs. In the urban areas, where plot sizes are small, domestic labour is enough to cultivate the land area. In most peri-urban areas, hired, permanent and domestic labour is employed, depending on the above mentioned factors. As the main objective is to get a continuous income, the farmers may change plots and type of crops according to the time of the year. This may give an appearance of seasonality and discontinuity in the farmers’ business, but in fact the activity usually continues, although at various locations. While in the dry season, vegetables are grown along the rivers and polluted streams, and with water from dugout wells, shallow groundwater and pipe borne water, farmers may move to non-flooded areas during the rainy season. This was observed in Brazzaville and Bangui where farmers have access to sloping land enabling them to higher ground to cope with flooding. In Bissau, on the other hand, women farmers had access only to plots located along the river (the non flooded plots were cultivated by civil servants) and they had to stop growing vegetables in the rainy season, which also explained their limited income (Moustier, et al., 2001).

Urban Agricultural Entrepreneurs

The main differences between this category and the family commercial farmers are the scale of the farms and the use of salaried labour. Urban entrepreneurs, usually civil servants, businessmen or expatriates, invest in intensive temperate vegetable production, poultry keeping, fish farms, or fruit growing, often in combination or with income from other sources. They invest in infrastructure such as motor pumps, treadle pumps, shelters, buildings, and attempt at mechanising certain agricultural operations, eg. irrigation or land tillage. They rely on a salaried labour force for doing most of the tasks. They may lack an agricultural background and the cases of losses and failures are numerous. They often control the marketing of their produce, eg. through direct delivery to stores or with links to export companies. Some examples of this category are the producers of green beans around Dakar, the civil servants involved in fruit production around Yaoundé, the chicken farmers around Ouagadougou and the poultry producers in and around Kumasi. In peri-urban Hanoi, the possibility of access to capital leads to land accumulation and other, non-agricultural, activities. This additional income is invested in agricultural diversification (moving away from rice cultivation to fish-farming, arboriculture etc.) or commerce (Lecostey and Malvezin, 2001).

Multi-cropping Peri-urban Farmers

This category refers to farmers who share many of the characteristics of rural farmers (and may be called “rurban” farmers), except for the influence of the city in terms of production outlets with a growing share of marketed output; sources of incomes, including agricultural and non-agricultural; level of intensification; and specialisation (eg. having some vegetable
fields). They are hardly threatened by urbanisation in terms of land pressure. This category of has been extensively studied in Cameroon IITA. The study reveals that agriculture is often only one of diverse options to generate food and income. Also see the case on Kumasi by Danso et al.

Dynamics of change

An important question of course is whether an urban farmer develops from one category to another? Is it possible for a farmer to evolve from being a subsistence type to a more commercial type, generate sufficient income and savings to increase the scale of business, and even move on to being an entrepreneurial type? The observation that most entrepreneurs originate from sectors other than agriculture suggests that commercial family farmers find it difficult to increase their scale of enterprise, and that they reach little more than to maintain (reproduce) their livelihood. This is due to a trap in terms of farm size and available capital, common to many enterprises of the informal sector, viewed as refuge options rather than paths for development. Yet there are some examples suggesting possible avenues for dynamic accumulation and growth from UA. Vegetable farmers in Lome and Cotonou have moved from subsistence to commercial vegetable production, as their savings enabled them to use treadle pumps and then motor pumps, and most of them are now producing for export and local consumption (Keraita et al., 2003). In Kenya, contractual farming agreements with livestock agro-industries has enabled farmers to generate substantial incomes (Mireri, 2002). The initial conditions for farmers to enter into such a contract are space (being able to accommodate 300 chicks), the ability to pay for the costs for water, electricity, labour and basic equipment, and the payment of a deposit of US$ 0.8 per chick. A supporting system in terms of municipal legislation, technical skill development and credit provision is crucial for these patterns of accumulation.

Interestingly, although they are often documented as a necessary condition for farmers to gain easier access to resources, markets and investment, farmers’ organisations are rarely documented as successful in paving the way for economic development (see also the section on food markets).

Evaluating Economic Impact

Methodology

Reliable statistics on farmers’ incomes are rare due to difficulties such as the diversity of farmers’ profiles, seasonality of crops, continuous harvesting of crops (vegetables), scattering of plots and multi-cropping. Establishing a typology of urban farmers and traders and monitoring their incomes is suggested as a means of overcoming this problem. The typology of farmers should account for the variability of incomes in relation to land size, type of products, age, sources of incomes, etc. (see previous section). The typology of traders should account for the variability of incomes in relation to the position in the marketing chain (wholesaler or retailer), the nature of commodities, and the type of customers (popular versus wealthy), all of which vary according to the location of the market. Farmers’ and traders’ incomes should be monitored at different times of the year, ideally every month, to...
take account of the harvests of short-cycle leafy vegetables, or at least during two seasons, the season of maximum harvest (usually, the dry season); and the season of minimum harvest (usually, the rainy season).

In order to assess whether engaging in urban agriculture is a valuable opportunity for urban residents, it is necessary to find references for comparison. In terms of its role in supporting livelihoods, the income from urban agriculture should be compared with the budget necessary to provide for basic food, clothing, and housing expenses in the city. Comparison should also be made with alternative labour opportunities in the city, for varying levels of qualification: for instance, the farming income of a commercial farmer with no qualification can be compared with the income of a cleaner or a guard. The comparison with rural incomes enables to assess the benefits of moving from countryside to city.

Ideally, data on incomes should be computed for one unit of the different factors of production: land, labour, inputs, invested capital, to compare the activity with alternative uses of these factors, in particular for the most crucial such as land. This type of assessment will help to confirm the rationale of urban farmers to invest in crops with the highest returns per unit of land, eg., horticulture and aquaculture. Finally, indicators of risks should be obtained by asking farmers and traders about the variability of incomes (minimum, maximum, standard deviation), within a year and during the five years before.

In order to shift from the household level to the city level, it is necessary to have data on the number of stakeholders involved in farming and trading activities, of the different types, and to extrapolate data gained at the household level using the share of the different types in the total population. The total added value is a useful indicator of the contribution of the sector to the national economy, when compared with the added value of other urban sectors (eg., construction), or to the total urban gross domestic product.

Income from urban farming
A comprehensive overview of monthly farm income from urban agriculture in different cities is presented in Table 7.2. Case studies conducted by CIRAD between 1989 and 1992 provide interesting estimates of commercial farmers’ incomes in comparison to the income necessary for subsistence. In Brazzaville and Bangui, at the time of the surveys, market gardening yielded enough income to provide for the basic food requirements of the family, plus housing, clothing and schooling expenses (Moustier and al, 2004). Hence, even if the total number of farms is small in comparison to the total urban population, their functioning demonstrates that urban agriculture is one of the - too few - sources of stable income that should be protected and considered within a portfolio of other urban cash-earning activities with limited initial capital requirements.

In Kumasi, the incomes of urban farmers occupying open space in low- or bottomlands were estimated at US$ 400 to 800, which is 2-3 times the income they could make in rural farming (see case of Danso, et al 2002). Urban home gardeners in Ouagadougou are able to earn about US$ 4 (direct) and US$24 (indirect) per month. This estimation is comparable to the monthly GNP per capita of Burkina Faso (US$20), one of the lowest in the world (Gerstl.,2001). In Dar es Salaam, Tanzania, incomes generated from urban agriculture were larger than regular salaries of 67 percent of the respondents.

Following the logic of market forces, farmers develop their limited resource - land - by seeking to add highest value. As the urban pressure on land increases, a change from food crops to market gardening, flower growing or fish farming can be observed. In Bangkok, shrimp farming, which brings in on average 1,400 bahts (US$ 34) per hectare per year, is developing and replacing market gardening that brings in only 200 bahts (US$ 5) per hectare per year, which once replaced rice farming that brought in 40 bahts (US$ 1) per hectare per year (Vagneron et al., 2003). Greater distances from city centres means lower land prices and
higher transportation costs; there is an optimal distance at which it is the most economically viable to practise agriculture, in terms of highest added value per hectare, as we can see in Figure 7.1. Around Hanoi, agriculture is most intensive 20 kilometres from town, in Dong Anh and Tu Liem Districts, which gives these areas the highest per hectare added value of 85 MVND/ha (5360 US$/ha).

**Table 7.2** Monthly net income from irrigated mixed vegetable farming in West and East Africa (US$ per actual farm size)

<table>
<thead>
<tr>
<th>City</th>
<th>Typical net monthly income per farm in US$</th>
<th>GNI per capita (US$/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accra</td>
<td>40 - 57</td>
<td>27</td>
</tr>
<tr>
<td>Bamako</td>
<td>10 - 300</td>
<td>24</td>
</tr>
<tr>
<td>Bangui</td>
<td>n.d. - 320</td>
<td>22</td>
</tr>
<tr>
<td>Banjul</td>
<td>30 - n.d.</td>
<td>26</td>
</tr>
<tr>
<td>Bissau</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Brazzaville</td>
<td>80 - 270</td>
<td>53</td>
</tr>
<tr>
<td>Cotonou</td>
<td>50 - 110</td>
<td>36</td>
</tr>
<tr>
<td>Dakar</td>
<td>40 - 250</td>
<td>46</td>
</tr>
<tr>
<td>Dar Es Salaam</td>
<td>60</td>
<td>24</td>
</tr>
<tr>
<td>Freetown</td>
<td>10 - 50</td>
<td>13</td>
</tr>
<tr>
<td>Kumasi</td>
<td>35 - 160</td>
<td>27</td>
</tr>
<tr>
<td>Lagos</td>
<td>53 - 120</td>
<td>27</td>
</tr>
<tr>
<td>Lome</td>
<td>30 - 300</td>
<td>26</td>
</tr>
<tr>
<td>Nairobi</td>
<td>10 - 163</td>
<td>33</td>
</tr>
<tr>
<td>Niarney</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td>Ouagadougou</td>
<td>15 - 90</td>
<td>25</td>
</tr>
<tr>
<td>Takoradi</td>
<td>10 - 30</td>
<td>27</td>
</tr>
<tr>
<td>Yaounde</td>
<td>34 - 67</td>
<td>53</td>
</tr>
</tbody>
</table>

Note: GNI – General Net Income (UN statistics); n.d. = not determined/reported.
Source: Dreschel et al. (2006)

1 *Some reports lack information on the time/period (number of harvests, seasons) the revenues are based on. Only a few valued family labor input and depreciated for investment costs. Data were combined in case of multiple reports per city.*

**Figure 7.1** Impact of distance from Hanoi on agricultural added value per hectare
Valuation of environmental, social and health impacts

The field of economics has evolved a great deal in the past ten years to better integrate the value and cost of non-marketed goods. As was pointed out by Pareto in 1906, the value of goods is determined by rarity and need. But the availability versus rarity of goods is not necessarily reflected as a financial cost, because the cost may be delayed in time, or not necessarily easy to measure, or because a market does not exist at all. This is typically the case of health or environmental damages, the costs to the population of which are not directly and immediately paid for. Likewise, the needs for some goods or services are not necessarily translated into a market demand, as is the case of environmental preservation for future generations. Economists refer to these indirect costs and benefits as externalities that cannot be translated into the immediate equation of supply and demand. It is legitimate to try to evaluate the indirect costs and benefits of urban agriculture. Land is sometimes used free-of-charge by urban farmers, either because their presence is tolerated on idle land such as near airports (e.g. in Cotonou or Bangui), by the side of main roads (in Nairobi) and under pylons (in Accra, or Cotonou) or because the government has lent some land to them in appreciation of the social role of urban agriculture (in Cuba- Moscow, 1999). But this free use does not mean that the land is of no value to the farmers; in fact, it may actually be a first step towards income generation and becoming capable of paying for more adequate and sustainable land resources. Another typical non-financial benefit of urban agriculture is the role it plays in greening the city, flood proofing and acting as a buffer against urban encroachment. This benefit can also not be captured in direct financial terms.

In order to convince policy-makers of the indirect costs and benefits of urban agriculture, and of the necessary policies to enhance the benefits and reduce the costs, indirect methods of valuation have been tested in certain urban case studies (Henn et al., 2002; Danso et al., 2005). Contingent valuation methods are based on creating shadow markets - simulating shadow situations where people would have to pay for or accept some goods and services and asking people what they would do in such situations.

When damage created (by farming in the city this case) can be repaired (which is not always the case), the costs associated in repairing such damage can provide an estimate of the environmental cost of the damage.

Contingent valuation (CV) has been developed to estimate the users' willingness to pay for a certain good. A good example of CV is the case study in Cuba (Henn and Henning UAM no.7, 2002) where farmers were asked about their willingness to pay for continuing gardening on their land based on two hypotheses: (i) on their present land; (ii) on land improved in terms of water access and protection from theft. The willingness to pay was appraised by bids, starting from a given amount and then increasing or decreasing it until it reached the acceptable amount. The result is was a value equivalent to 11 percent (without improvement) and 14 percent (with improvement) of their total monthly income, or US$ 344,000 when extrapolated to cover all urban farmers.

In Bangkok, the willingness of farmers to pay for clean water (which is affected by industrial as well as agricultural pollution) was estimated in a similar procedure of decreasing and increasing bids, starting from 1,000 baht per year (US$ 24). The average amount that the farmers are willing to pay for unpolluted water is 1,196 baht/ha/year (US$ 29), and 1,025
baht/ha/year (US$34) when including the farmers who are not willing to pay for unpolluted water. The average amount is higher for vegetable (3,200 baht/ha/year=US$77) and shrimp (890 baht/ha/year=US$21) farmers than for fish farmers (220 baht/ha/year=US$5).

Taking account of the indirect costs of environmental damage enables us to have estimates of the economic sustainability of UA for farmers. In Bangkok, when taking into account the costs associated with cleaning the water and making up for soil depletion, shrimp farming—the most polluting activity—still remains the most rewarding activity, but the income per family worker reduces by 10,100 baht/year (US$242), and growing vegetable becomes slightly more profitable than raising fish (Vagneron et al., 2003).

However, the consistency of contingency evaluation methods may be questioned. Indeed, when asked whether they are ready to pay more to access clean water, most farmers are—at best—sceptical. Paying more for a hypothetical service often seems out of the question since many farmers already struggle to cover their expenses. Declarations from simulations may not reflect the true behaviour in a real situation. Despite its difficulties, this method still takes us a way forward in making more adequate consideration of the undisclosed costs and benefits of UA to society.

The Integration of UA in Food Markets

The specific role of UA in urban food supply

There are now more balanced approaches in considering the areas (rural or urban) for urban food production. A growing body of evidence supports the complementarity between the two forms of urban food supply. This change in perspective also implies a change in methods in the sense of combining the insights of geography, which helps identify product flows towards urban markets, with spatial economics, which enables a better understanding of the economic reasons behind the location of supply sources, in particular the relationship between the proximity of production and consumption areas and the perishable nature of the products. Substantial study on spatial economics has been done by Von Thünen (1851), and his insights have been commonly used by researchers on peri-urban agriculture. New insights of spatial economics, using inputs from institutional economics and sociology, go even further in the analysis of the influence of market proximity on production characteristics. They transcend the physical attributes of transport, storage or land costs or “physical proximity”, and focus on relational proximity, e.g., interactions between farmers and market agents, farmers and consumers, and also within the farming community itself.

The revelation of the specific role of UA in urban food supply has also benefited from more rigorous data collection, which recognises that only comparing yearly production and consumption in the city has a number of limitations. These limitations include difficulties in grasping the perishable, seasonal nature of products or not considering the destination of products. Appraising the precise role of UA in urban food supply implies surveys in wholesale and retail markets, and questions on origin and quantities of products traded at different times of the year to take account of seasonal variations. This type of data collection is not easy as, for instance, most fresh products are sold either early in the morning or late in the evening or in the night. When limited by time, such studies should focus on some key products, at least fresh vegetables, as they provide the bulk of what is supplied by urban areas. Increasingly, studies in urban food systems are undertaken in the USA. CIRAD studied food markets in Central Africa and more recently in Vietnam, Laos and Cambodia. SIUPA has also supported the quantification of cassava flows to Yaoundé by an IITA led team, and IDRC has supported similar studies in Ghana via IWMI (Drechsel et al., 2004).

The specific role of UA in the supply of perishable food commodities

Basic food products (cereals or tubers) and dry vegetables (onions) come mostly from rural areas in the country or are imported from abroad. However, current data confirms the
The importance of UA in the provision of fresh perishable vegetables, mainly leafy vegetables, poultry and dairy products mostly from peri-urban areas (see Table 7.3 for comprehensive data on Kumasi, Ghana and Table 7.4 for various cities in Africa, Asia and Latin America).

**Table 7.3** Origin of different Food Items Sold/Consumed in Kumasi, Ghana

<table>
<thead>
<tr>
<th>Food item (Examples)</th>
<th>Metropolitan area Source (%)</th>
<th>Peri-urban Kumasi Source (%)</th>
<th>Rural and import* source (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>10</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Maize</td>
<td>&lt; 5</td>
<td>5</td>
<td>90</td>
</tr>
<tr>
<td>Plantain</td>
<td>&lt; 5</td>
<td>&lt; 10</td>
<td>85</td>
</tr>
<tr>
<td>Yam</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Cocoyam</td>
<td>&lt; 2</td>
<td>&lt; 10</td>
<td>90</td>
</tr>
<tr>
<td>Rice</td>
<td>0</td>
<td>&lt; 5</td>
<td>95</td>
</tr>
<tr>
<td>Lettuce</td>
<td>90</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>0</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Egg plant</td>
<td>0</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Onions</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Spring onions</td>
<td>90</td>
<td>&lt; 10</td>
<td>0</td>
</tr>
<tr>
<td>Poultry/eggs</td>
<td>15</td>
<td>80</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Meat</td>
<td>5</td>
<td>10</td>
<td>85</td>
</tr>
<tr>
<td>Fresh milk**</td>
<td>&gt; 95</td>
<td>&lt; 5</td>
<td>0</td>
</tr>
</tbody>
</table>

* Imported are mainly rice, onions and part of the livestock (meat)
** University farm (same in Accra) Source: Cofie et al., 2003.

Fresh vegetables in this category are mainly leafy vegetables such as amaranth, sorrel, morel, cabbage, lettuce and chives. These vegetables top the list of vegetables consumed, in Africa and in Asia. These vegetables are well known for their short shelf life: after one day they are no longer fresh - and in many countries, freshness is an important criterion for consumers who do not own refrigerators. These leafy vegetables are mostly brought into town from distances of less than 30 kilometres from the city centres, be it in Africa or in Asia. The peri-urban percentage of supply is more than 70 percent.

In Africa, improved broiler chicken, milk and eggs come from city farms or from the suburbs. These farms are run by city dwellers, whereas local beef comes from traditional pastoral or agro-pastoral farms. Urban animal food products are also imported from lower-end European production facilities and pose strong competition to certain local products, such as chicken, despite differences in quality (Guérin, 1998). In Addis Ababa, 20 million litres of non pasteurised milk come from back-yard city farms and are sold directly to the consumer by the producer. Butter, on the other hand, comes from rural areas and from as far away as 650 kilometres from the city (Bonnet and Duteurtre, 1998; Tegegne et al, 1999). In Kumasi, 95 percent of fresh milk consumed in the city is from urban agriculture.

**Complementarities in Time**

A comparative advantage of (peri) urban agriculture may be in the continuity of product supply, either because of specific natural conditions, or because urban farmers are able to sustain continuous production due to more specialised and irrigated systems - characteristics they may share with some specialised rural areas (the case of Lome and Accra). This is also observed in the dry areas of Mauritania, where peri-urban agriculture is able to supply the
market with vegetables on a more continuous basis than the rural areas (Laurent, 1999). In Bangui (David, 1992) and Bissau (David and Moustier, 1993), the share of UA in the vegetable supply increases by 10 percent in the dry season. This comparative advantage is observed especially in the dry season for temperate vegetables, because in the rainy season, the access to non-flooded areas is easier in rural areas. In Hanoi, while 75 percent of tomatoes sold during the cold season are grown less than 30 km from the city, 80 percent of tomatoes sold in the rainy season originate from China and 15 percent from Dalat, located more than 1000 km away from Hanoi (Hoang Bang An et al., 2003).

Table 7.4 Percentage given to urban production in urban supply

<table>
<thead>
<tr>
<th>City</th>
<th>Leafy vegetables</th>
<th>Tomato</th>
<th>All vegetables</th>
<th>Maize</th>
<th>Plantain banana</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazzaville (1)</td>
<td>80</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangui (2)</td>
<td>80</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yaoundé (4)</td>
<td>80</td>
<td>25</td>
<td></td>
<td>90</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Bissau (5)</td>
<td>90</td>
<td></td>
<td></td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nouakshott (6)</td>
<td>90</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dar es Salaam (7)</td>
<td></td>
<td>90</td>
<td></td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Dakar (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Kumasi (9)</td>
<td>90</td>
<td></td>
<td></td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanoi (11)</td>
<td>70</td>
<td></td>
<td>0 to 75</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>according to season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phnom Penh (12)</td>
<td>100</td>
<td></td>
<td>0 to 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>according to season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vientiane (13)</td>
<td>100</td>
<td></td>
<td>20 to 100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>according to season</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The Advantage of Proximity in Market Organisation

Short marketing chains
Urban products are distributed through very short marketing chains (see figure 7.2). The shortest is direct producer involvement in retail sales: this is the case of 30 percent of all sales in Bangui (David, 1992) and 70 percent of those in Bissau, when private trade had just been legalised (David and Moustier, 1993). More often than not, the producer sells to retailers. This transaction takes place at the field or at night wholesale markets (in Brazzaville, Bangui, Bissau as well as in Hanoi, Phnom Penh or Vientiane – see Moustier and David, 1997; Sokhen et al, 2004; Kéthongsa et al, 2004). The quantities collected are small: between 5 to 10 kilos of collected and sold produce per day per retailer/ collector in Brazzaville. In Hanoi, more than 40 percent of all wholesale market sellers are also producers; this percentage goes up to 100 percent for water convolvulus. Producers bring 100 to 200 kilos per day to wholesale markets on overloaded bicycles or scooters.
The strong involvement of farmers, or their relatives, in the processing and marketing of their products, can be termed as vertical integration (see the case of Brazil of PROVE), which has a positive impact on the reduction of transaction costs in the marketing of perishable products, of varying quality standards. This involvement in the chain of production is also explained by the small-scale of production and low prices, making it attractive for producers to spend some hours in transportation to get as much as possible of the final price. Yet these characteristics contribute to further fragmentation of the final supply, while economies of scale could be reached by collective marketing. Experiences of collective marketing are hardly developed in peri-urban areas though, or have had little success, given the variability of production in quantity and quality that makes farmers reluctant to “put their eggs in the same basket” as other farmers who may be unsuccessful and pull down the marketing results. Yet there are some successful examples when farmers have shared similar characteristics, and have identified reliable marketing outlets. Examples are the vegetable cooperatives in Hanoi and Ho Chi Minh City, as well as the vegetable farmers’ groups in Yaoundé who have organised themselves to sell by a rotation formula. The cooperative horticultural marketing by HOPCOMS in Bangalore is another example (Premchander, 2003 (UAM no.9). Yet such experiences, and especially their economic efficiency in comparison to individual marketing, are not sufficiently documented.

Relational proximity is a common feature of the link between farmers and traders in developing countries, especially for perishable products. This has been documented by a number of research studies on marketing chains from rural as well as peri-urban areas. What may be more specific to peri-urban areas is the existence of relational proximity between farmers and consumers, and the possibility of direct links between them, as at farmers’ markets where farmers meet consumers directly. These have been especially well documented by Kirwan (2004) in England. In the USA and Europe, urban and peri-urban farmers seek to market their - especially locally grown organic - produce at farmers’ markets. The number of farmers’ markets in the USA had increased from 1755 to more than 2746 in 1998 – but direct sales from farmers to consumers only represented 0.3 percent of the market value in 1997 (Heller and Keoleian, 2000). In developing countries, direct sales are also observed as a way of promoting organic or IPM vegetables, eg. Farmers’ direct delivery to a group of consumers organised in Hanoi and in Phnom Penh with the support of a marketing company and an NGO respectively. This has also been observed among mushroom farmers in Accra who do door-to-door delivery of fresh mushrooms to targeted consumers (Danso et al.,2005).

Low price differential
Short marketing chains contribute to a low price differential for products between farm and final consumption: these account for 30 percent on leafy-vegetables, 35 to 50 percent for cabbage and 75 percent for tomato in Hanoi (Gia B.T., 1999; Son et al., 2002). In rural chains, wholesalers’ incomes may be up to ten times higher than that of farmers, but the risks of bankruptcies are higher. Price differentials are higher for rural products due to higher transportation costs and higher wholesalers’ margins. While the price differential for peri-urban vegetables in Congo shifted from 1 to 2 from farm to retail, the price differential was 1 to 3 for rural vegetables, 20 to 80 percent of the marketing margin being absorbed in...
transport costs (Moustier, 1995). And in Havana, Cuba, the prices of tomato, onion, pork and fruit fell from 1 to 3 between 1999 and 1994, the period when the urban agricultural programme was launched (Novo, 2002).

Information on quality and control
The proximity of production areas to consumers, makes it easier for consumers to control quality, and at the same time, keeps producers from cheating on product quality. Most of the supermarkets, shops and restaurants in Hanoi are supplied by three cooperatives located in the peri-urban areas where production along IPM or organic standards is certified by government bodies. Likewise, in Ho Chi Minh City, the cash and carry supermarket is supplied with leafy vegetables by a peri-urban cooperative which gets the support of the department of agriculture and labels their vegetables as safe. Proximity enables frequent contacts between farmers, traders, and consumers and checks on the production process. Proximity between farmers and consumers is not a perfect substitute for independent public control, which is still deficient in Vietnam, but it does reinforce the incentive for farmers not to deceive their customers.

Freshness
In situations of limited access to fridges, freshness of produce is especially valued by urban consumers. In Thiès (Senegal), more than 90 percent of 150 interviewed housewives thought that vegetables should be grown nearby, for freshness and quick access (Broutin et al, 2005). In Vientiane, freshness is the criterion of vegetable choice stated by the highest number of consumers (71 percent out of 100 interviewed, in Potutan et al., 1999). In Hanoi, freshness is the advantage of peri-urban vegetable production cited by 74 percent respondents out of 500 in 2003 (Figué, 2004).

Enhancing Social and Economic Impact

Acknowledging the multi-functionality of UA
Urban agriculture creates landscapes, which is a public good from which users cannot be excluded. This makes urban land management of little interest to the private sector (Donadieu and Fleury, 1997). Urban agriculture produces other things of value to the public: food security, social inclusion and jobs. Within cities, there are other sectors that create landscapes such as parks, to which UA can be linked to and compared with. The advantage of urban agriculture is that its functioning is supported by market forces, even if these markets are imperfect. It is thus a less expensive landscape producer than a public park. It also provides jobs and social inclusion (esp. Latin America). This multifunctionality of urban agriculture makes it a ‘cheap’ producer of public goods. Table 7.5 compares the ‘scores’ of three urban sectors: industry, public spaces and agriculture in terms of the production of different goods and services. It shows that agriculture gets the highest combined mark. An increased distance between urban centres and agriculture is, however, inevitable if market forces are given a free hand. Hence, from a political economic viewpoint, it is legitimate that the public sector supports UA agriculture. Four areas of support are particularly relevant: integration into urban planning (see Chapter 3); financial support (see Chapter 4), research and extension for more profitable and sustainable intensive commercial vegetable and animal systems (Midmore and Jansen, 2003; Smith et al., 2004; and Chapter...
10); and innovative marketing, which will be elaborated in the next section. Municipalities have a crucial role to play in organising such support, in collaboration with national and international programmes.

**Table 7.5 Comparative multi-functionality of three urban sectors**

<table>
<thead>
<tr>
<th>Products</th>
<th>Sectors</th>
<th>Industry</th>
<th>Parks</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape</td>
<td></td>
<td>-</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Economic good</td>
<td></td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Job - Social inclusion</td>
<td></td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Food security</td>
<td></td>
<td>-</td>
<td>-</td>
<td>++</td>
</tr>
</tbody>
</table>

Source: Moustier (2003); Donadieu and Fleury (1997).

**Innovative marketing**

Farmers’ organisation and information

As established in the previous section, the proximity between production and consumption brings undeniable comparative advantages for marketing yet it also brings some constraints. The small size of gardens and the problems of access to land result in the scattering of plots and the small volumes of transactions. This fragmentation of production (in place and time) makes the circulation of information on market supply difficult among farmers. A solution to this problem is the provision of timely market information to stakeholders: examples are available for Hanoi (see http://www.avrc.org/susper) and Brazzaville (Moumbélé and Moustier, 1995). A solution to transaction volume is to support farmers’ cooperation in terms of marketing to limit market gluts or deficits (see the example of the marketing manager in Ghana). Although farmers’ organisations can never completely reduce supply instability, which is mostly generated by the impact of the climate on production, it can nevertheless partly reduce it. It can also generate economies of scale. Farmers’ organisation should not be imposed from outside but rather be sought on the basis of existing groups sharing common interests and having developed relationships of trust.

Labelling safe UA products

The internal and external sources of product contamination are manifold in peri-urban areas, but the control of quality is made easier by farm proximity to consumers. Farmers investing in quality control efforts should therefore ensure that their products are recognised by customers as such, so that they can keep customer trust and profit from their investments in maintaining quality.

Some successful examples of peri-urban cooperatives that have developed adequate labelling of their vegetables, based on organic or IPM guidelines, are observed in Vietnam (Hanoi and Ho Chi Minh City). The Van Tri cooperative is an interesting example of successful collective action and vertical integration in the chain. The direct sales of Van Tri vegetables by the producers allow regular contact with the consumers, who ask questions and are given answers concerning the production methods used by the cooperative (Moustier et al., 2005). A similar involvement of a peri-urban farmers’ group in the production and marketing of safe vegetables, with the labelling including the origin of product and methods of production, and delivery of a supermarket, is observed in peri-urban Ho Chi Minh City (Phan Thi
GiacTam, forthcoming). In Senegal, it is mentioned that in contrast to many industrial producers, urban micro-enterprises may survive by closer contact to consumers through their personalised labels (Fall et al., 2001).

In the Dutch city of Delft, a farmer was able to negotiate a 12-year lease on 35 hectares of land with the municipality thanks to his commitment to producing organic vegetables and milk, and also setting aside five hectares of the land for nature preservation (Deelstra et al., 2001).

Although it does not specifically target urban areas, Prove in Brasil (small agricultural production programme) is a successful example of multi-dimensional programme aimed at developing small-scale enterprises, especially in regards to processing of agricultural products (see case) (Homem de Carvalho, 2001).

**Challenges Ahead**

**Collecting homogeneous and comprehensive impact indicators**

The discussion above has shown how difficult it is to get comprehensive indicators of social and economic impact for all the different sectors involved in urban agriculture. The majority of cases mentioned deal with vegetable growing. Subsistence or commercial farming types are usually taken into account. A comprehensive list of indicators, at household and city level, is presented in table 7.6, and could be the basis for collection of data in different cities of Africa, Asia and Latin America. This is especially important in order to convince local, national and international decision-makers on the economic role and viability of UA.

**Combining economic and market studies on a commodity chain**

Economic studies tend to focus either on farms or on markets, but studies carrying out economic analyses all along the chain from farm to consumption are still limited and should be developed. These studies should provide for a comparative evaluation of rural and urban agriculture in order to show comparative advantages. They should further evaluate the economic impact of successful marketing strategies by farmers including quality promotion. And for these studies to be really meaningful, they should focus on one product that can be supplied by different geographical sources (for a comparison between rural versus urban agriculture, tomato would be a good example), or by different marketing strategies, and they should be carried out at different periods of time to take account of seasonal variations.

**Strengthening the analysis of development dynamics and poverty impact**

Although the image of urban agriculture has gained more appreciation and moved slightly beyond “subsistence/simple reproduction”, there is still insufficient case material on enlarged reproduction, capital accumulation and spill-over effects from innovative commercial farmers. In-depth case studies on the “success stories” of such innovative farmers, who have been able to save up and develop their business, over different time periods, would serve in assessing the viability of these cases and further improving the image of UA.

**Appraising the future of neighbourhood agriculture in global commodity chains**

The development of international trade, as well as the globalisation of capital in food
distribution is now well documented (see in particular McMichael, 1984; Reardon and Berdegué, 2002). This creates risks of growing distances between food producers and consumers, and reduced possibilities for citizens to exert control on the way food is produced, i.e. decreased food sovereignty: "From a food-democracy viewpoint, one's right to be fed needs to embrace one's right to feed oneself" (Koc et al., 1999).

Durability of food is developed at the expense of its sustainability (Friedmann, 1994). "More rapidly and deeply than before, transnational agri-food systems disconnect production from consumption and reconstruct them through buying and selling (ibid, p. 272). The pressures to reconstruct regional links between producers and consumers is apparent in many places, whether from economic desperation or from urban politics that place a high priority on ecologically-sound land use and uncontaminated foods than on the social and technical imperatives of mono-cultural farming" (ibid, p. 272 and p. 274). The life cycle assessment of the US food system has shown the lack of sustainability of the system, in particular the high cost of energy involved in transport, packaging and refrigeration: the food system absorbed around 5 percent of the total energy consumption in 1991 (Heller and Keoleian, 2000).

The impact of the development of supermarkets and restaurants on the characteristics of supply chains, including proximity versus distance aspects, needs more attention. As seen in the previous section, the proximity between production and distribution can confer advantages to peri-urban farmers in terms of promoting their product quality, which in itself is an advantage for the supply to supermarkets – if peri-urban farmers can ensure regularity of product supply.

Linking research with local development

Research on urban agriculture requires a long-term involvement in the field because of its informal and unstable character. As urban farmers and traders are generally poor, it is not so easy to collect data from them without rewarding them in return, and it is not always easy to convince them of the long-term benefits of research on the economics of urban farming. At present, the literature on urban agriculture can be schematically categorised in two groups: the works of scholars – especially geographers and more recently economists who try to develop a scientific approach on urban agriculture with explicit research questions and hypotheses, often involving Masters or PhD. students who may have difficulties in gaining continuous reliable data in the field - and the work of practitioners, who are very much involved in the field where they try to solve constraints of urban producers through stakeholders' platforms, technical or marketing support - but who may lack the time and skills necessary to carry out rigorous research to evaluate the socio-economic impact of UA and of the innovations in UA. Ideally, teams working on the development of UA should involve people from both research and development (and other stakeholders), be action-oriented and be more concerned with long-term replicability and impact of their work than with one-off assessments which could cause frustration for the UA farmers and for the research community alike. The Cities for the Future Programme of RUAF is seeking to establish working groups in the cities they are working in.
Table 7.6  Summary of indicators of UA social and economic impact

<table>
<thead>
<tr>
<th>Level of Analysis</th>
<th>Household</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Generation</td>
<td>Income per head of the different types of farmers and traders involved (compared with: subsistence income; alternative occupation; rural incomes)</td>
<td>Number of farmers involved in UA of the different socio-economic types</td>
</tr>
<tr>
<td></td>
<td>Income per ha, income per labour unit, and income per capital invested of the different types of farmers involved (compared with alternative use)</td>
<td>Number of traders (and other input-provision and post-harvest enterprises) involved in the marketing of UA of the different socio-economic types</td>
</tr>
<tr>
<td></td>
<td>Total incomes of and added values to the different stakeholders (farmers, traders, and related enterprises)</td>
<td>Total incomes of and added values to the different stakeholders (farmers, traders, and related enterprises)</td>
</tr>
<tr>
<td>Food supply (Subsistence)</td>
<td>Share of self-consumption in total urban consumption, for the different food products, and different socio-economic profiles (including the poor)</td>
<td>Share of self-consumption in total urban consumption, for the different food products, and different socio-economic profiles (including the poor)</td>
</tr>
<tr>
<td>Food supply (Commercial)</td>
<td></td>
<td>Share of intra-urban and peri-urban areas in the quantities of retail marketing for different food products: based on surveys on quantities/origin in selected wholesale and retail markets</td>
</tr>
<tr>
<td>Landscape and environmental preservation</td>
<td>Qualitative appreciation of UA for greening and environmental functions by non farmers Willingness to pay for UA preservation by urban residents</td>
<td>Combination of household based data</td>
</tr>
<tr>
<td></td>
<td>Urban stakeholder groups’ appreciation of UA environmental advantages/ drawbacks Use of compost for UA and savings in transport of waste</td>
<td>Urban stakeholder groups’ appreciation of UA environmental advantages/ drawbacks Use of compost for UA and savings in transport of waste</td>
</tr>
<tr>
<td>Social inclusion</td>
<td>Appreciation of “self-esteem” provided by urban agriculture</td>
<td>Number of unprivileged urban residents (migrants, former unemployed) involved in UA</td>
</tr>
</tbody>
</table>

References


Midmore D.J. and Jansen H.G.P. 2003. Supplying vegetables to Asian cities: is there a case for peri-urban production?”, In Food Policy


In a rapidly changing city like Beijing, urban agriculture covers a diversity of (economic) roles. Not only does agricultural production benefit the producers and consumers directly, it also contributes to city growth and sustainable development.

Who Benefits

Beijing, the capital of China, is facing rapid urbanisation, and undergoing a dramatic transformation. Nearly all activities related to production are moving away from the city centre towards the periphery (the periurban areas). The backbone of the economy is changing, with a dramatic increase of the services sector and a decrease in the importance of the primary industry. This change can also be seen in agriculture. However, the role of agriculture would diminish and its functions in the city economy would depreciate, unless the city of Beijing takes measures to link agricultural activities to the city’s development. Many farmers have become farmer entrepreneurs engaging themselves in urban agricultural production and management. Vendors sell urban agricultural products in the streets.

There are at least 2 million urban farmers in Beijing, including migrant farmers. According to official statistics, there were 3.2 million people living in the rural areas of Beijing in 2003, accounting for about 23 percent of its total population. Among this rural population, about 1.7 million are still classified as farmers, involved in farming, forestry, animal husbandry, fisheries, small industries and other commercial activities. Many of the rural youngsters are already full-time industry workers.

Meanwhile, more and more migrants arrive in Beijing, and join the ranks of the so-called “floating population”. They come from all over China but have not yet got their household registration status in the city, even though they may have already lived in the city for many years. This situation is changing, but there are still many differences between the floating and local (registered) urban population. The peri-urban areas provide an opportunity for some of this floating population to engage in urban agriculture. This floating population amounted to approximately 4.1 million in 2003 in Beijing, of which about 55.9 percent and 35 percent lived in the inner and outer peri-urban areas respectively. According to author’s research, the floating population in peri-urban Beijing increased by 350,000 from 2002 to 2003, with most of these people engaged in UA activities such as agro-tourism and processing of agricultural products.

In general, the economic impact of urban agriculture is multi-faceted, as is shown in the following analysis of three aspects: general city development, UA enterprises growth and farmer household benefit.
General City Development

In 1994, the municipal government officially launched its urban agriculture policy, which focused on six types of agricultural activities, i.e. promoting greenhouse farming, utilizing new types of seeds, creating new brands of agri-products, agri-product processing, export agriculture and recreational (sightseeing) agriculture. Since then, Beijing has made notable achievements in its peri-urban development. The agricultural output value has been increasing steadily, but its share in the city’s GDP has been declining (see figure 7.3).

![Agricultural Output Value and Its Contribution to GDP](image)

The percentages of the rural population and agricultural land in Beijing have also got smaller during 1995-2003 (see table 7.8). Yet the output value of agriculture has gained a steady growth. In 2003, the agricultural output value per rural labour unit was RMB 37,554 (equivalent to US$ 4,700), while if other related activities such as rural industries and services are included, the rural gross output value per rural labour unit can be as high as RMB 96,018 (equivalent to US$ 12,000).

The economic structure in peri-urban Beijing has also been changing. Grain and vegetable production used to be the dominant sources of rural income in the 1980s. With the official introduction of urban agriculture in the 1990s, the agricultural economic structure changed dramatically. In 1995, the proportion of agricultural output value for farming, forestry, animal husbandry and the fisheries was 53 percent, 2 percent, 42 percent, and 4 percent respectively, and changed to 37.7 percent, 5.6 percent, 53.3 percent and 4.4 percent respectively in 2003. The market mechanism clearly played a role in this change. Other agricultural related industries also grew, diversifying the agricultural sector even more.

UA is strongly linked to other activities such as transport, construction, commerce and food catering. In fact, the number of agriculture-related labourers in peri-urban Beijing increased from 1,636,000 in 1995 to 1,696,000 in 2003, despite the fact that urban Beijing expanded
dramatically in this period and the agricultural land reduced. Most of this increase in work is in UA-related sectors such as agro-services, transportation and agro-business.

**Table 7.7** City growth and agricultural transformation in Beijing

<table>
<thead>
<tr>
<th>Year</th>
<th>Urbanization level (%)</th>
<th>City total population (million)</th>
<th>Rural population (million)</th>
<th>Arable land (1,000/ha)</th>
<th>Agricultural output value (Rmb billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>62.0</td>
<td>11.03</td>
<td>4.2</td>
<td>412.7</td>
<td>7.0</td>
</tr>
<tr>
<td>1995</td>
<td>66.1</td>
<td>11.70</td>
<td>4.1</td>
<td>394.3</td>
<td>16.5</td>
</tr>
<tr>
<td>2000</td>
<td>77.6</td>
<td>13.80</td>
<td>3.1</td>
<td>329.2</td>
<td>19.5</td>
</tr>
<tr>
<td>2003</td>
<td>79.1</td>
<td>14.56</td>
<td>3.0</td>
<td>259.9</td>
<td>23.8</td>
</tr>
<tr>
<td>2020 (planned)</td>
<td>90.0</td>
<td>18.00</td>
<td>1.8</td>
<td>Na</td>
<td>Na</td>
</tr>
</tbody>
</table>


Recent development trends show that urban agriculture in peri-urban Beijing is diversifying both in quantity and quality. In the inner peri-urban areas, more high-level and capital-intensive UA activities, such as agro-tourism, are growing fast, while in outer peri-urban areas, fruit growing and green vegetable production is taking place instead of traditional grain production.

**Urban Agricultural Enterprises**

In Beijing, the most common urban agriculture-related enterprises are processing and production, agricultural tourism and high-tech agriculture. Apart from mini- and micro-enterprises, there are also some big enterprises engaged in these activities. In agricultural production and processing alone, over 940 enterprises are active (statistics of 2005).

From 2000 onwards, agro-tourism has gained momentum, including "sightseeing agriculture" which refers to one-day trips of tourists (visiting and picking activities) and "recreational agriculture", referring to multiple-day stays with accommodation and other tourism-related activities. Many farmers build up sightseeing agricultural gardens by utilising their existing farmland. These easy-access activities have resulted in more than 1,900 sightseeing agricultural gardens in the 300 villages of the 50 towns and townships in peri-urban Beijing. Among these gardens of varied size, there are 285 big enterprises, of which 30 are designed as municipal key gardens. At another level of agro-tourism, recreational resorts make use of resources by integrating agricultural activities with modern recreational experiences, hotels and entertainment. There are now about 155 different resorts in Beijing integrating services such as health care, ecological experiences, folk custom appreciation, etc.

Hi-tech agro-industry is another active area for UA related development in peri-urban Beijing. By the end of 2001, 375 various hi-tech agricultural parks had been constructed. The most famous is Xiaotangshan High Tech Demonstration Agricultural Park, which is a national level park. Besides this, there are six other hi-tech agricultural parks constructed by the Ministry of Chinese Technology & Science and 25 agro-industrial parks sponsored by the Beijing municipal government.

As illustrated in Table 7.8, UA enterprises in peri-urban areas are quite lucrative with a high income ratio. In fact, all UA related enterprises make more money than enterprises in other sectors, such as services and manufacturing. This was particularly true since 2002, when UA
development in Beijing got a substantial boost through the promotion of the municipal government.

**Table 7.8 Income ratio of enterprises in peri-urban Beijing by sector**

<table>
<thead>
<tr>
<th>Types</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1.11</td>
<td>1.10</td>
<td>1.55</td>
<td>1.52</td>
</tr>
<tr>
<td>Woods and Forestry</td>
<td>1.10</td>
<td>1.10</td>
<td>1.62</td>
<td>1.53</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>1.05</td>
<td>1.03</td>
<td>1.32</td>
<td>1.31</td>
</tr>
<tr>
<td>Fisheries</td>
<td>1.04</td>
<td>1.12</td>
<td>1.40</td>
<td>1.39</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.15</td>
<td>1.14</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td>Construction</td>
<td>1.12</td>
<td>1.12</td>
<td>1.20</td>
<td>0.12</td>
</tr>
<tr>
<td>Transportation</td>
<td>0.74</td>
<td>0.69</td>
<td>1.30</td>
<td>1.28</td>
</tr>
<tr>
<td>Wholesale &amp; Retail</td>
<td>1.12</td>
<td>1.06</td>
<td>1.15</td>
<td>1.14</td>
</tr>
<tr>
<td>Services</td>
<td>1.18</td>
<td>1.31</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: The Ratio equals income divided by cost
Source: Beijing Statistical Yearbook 2001-2004

In terms of gross output value, the economic performance of UA is also quite outstanding, as shown in Table 7.9. For example, the annual growth rate of the gross output value for urban agriculture in processing and production is high at 26 percent during 1998-2002 (Beijing Agricultural Yearbook 2003). It can be foreseen that agricultural processing will become even a more important UA sector in peri-urban Beijing since the market potential in Beijing is huge. For the same reason, sightseeing and recreational agriculture will also have a promising future in peri-urban Beijing.

**Table 7.9 Economic performance of urban agricultural industry**

<table>
<thead>
<tr>
<th>Types</th>
<th>Economic performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agro-processing and production</td>
<td>Growth rate in 1998-2002: 26 percent; 68.1 percent of the total agricultural output value in 2002; output value in 2005: Rmb25 billion</td>
</tr>
<tr>
<td>Sightseeing Agriculture</td>
<td>Agro-tourists: 40 million person-times Revenue: Rmb2.7 billion in 2004 Output value: Rmb3.84 billion in 2001</td>
</tr>
<tr>
<td>High-tech Agriculture</td>
<td>Profit: Rmb1.66 billion in 2001 Accounted for 18 percent of the total Beijing’s agricultural output in 2001</td>
</tr>
</tbody>
</table>

Source: Situation of agricultural processing in Beijing, 2003 (Jiuran, Zhao), Practices and explorations on high tech agricultural gardens in Beijing (Beijing Municipal Rural Commission, Beijing Fiscal Bureau & Beijing Rural Economic Research Center)

**Farmer or Household Level**

Urban agriculture definitely has a high economic impact on individual households, too, including that of local and migrant farmers. Farm workers in UA enterprises and urban farmers cultivating on rented plots (migrants) saw their incomes rise quickly in recent years.

According to research (Table 7.10), there were about 272,000 farm households who were involved in agro-processing activities in peri-urban Beijing in 2002 and received an income of RMB89,600 Yuan (equivalent to US$1,200) per capita, which was much higher than the average
income of farmers in Beijing. In sightseeing and recreational agriculture, there were 24,000 farmer households involved, of which 20 percent were getting better-off.

Table 7.10 Farmer households involved in UA in peri-urban Beijing

<table>
<thead>
<tr>
<th>Types</th>
<th>No. of farmer households involved in</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agro-processing and production</td>
<td>272,000 (2002)</td>
<td>Income: RMB 9,600 per capita</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Net income: RMB 84,500 per capita, higher than average farmer net income in Beijing</td>
</tr>
<tr>
<td>Sightseeing Agriculture</td>
<td>24,000 (2004)</td>
<td>20 percent of the households are getting better off</td>
</tr>
<tr>
<td>High tech Agriculture</td>
<td>94,000 (2002)</td>
<td>N.A.</td>
</tr>
<tr>
<td>Rural association</td>
<td>342,000</td>
<td>About 80 percent of milk, 46 percent of vegetable, 35 percent of melons, and 30 percent of aquatic products in peri-urban Beijing are distributed through these associations</td>
</tr>
</tbody>
</table>

Li Jinshan. 2002.

There were 2,030 agricultural associations in peri-urban Beijing in 2002, with 342,000 households as members (from 500 villages). About 80 percent of milk, 46 percent of vegetable, 35 percent of melons, and 30 percent of aquatic products in peri-urban Beijing were distributed through these associations.

For the floating population of farmers, the economic impact of UA is even greater. According to a case study done by the China Regional Focal Point of the RUAF programme in 2005 (Liu, Cai & Yang), the net income of migrant farmers in peri-urban Beijing could be as high as RMB 8,000-9,000 Yuan (equivalent to more than US$ 1,000), which is more than five times the net income in their home villages. It was estimated that there were more than 100,000 migrant farmers in peri-urban Beijing in 2003, while this number is continuing to grow as the development of various types of UA activities in the city is accelerating.

Notes


2 Multifunctionality is usually defined as the multiple roles or objectives that society assigns to agriculture, including economic, social and environmental roles. This “normative” definition has to be combined with a more constructivist approach which considers the synergy between the functions (Vollat, 2002; Véron, 2004).

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Beijing Fifty Years Statistics (1949-1999)
Beijing Fiscal Bureau & Beijing Rural Economic Research Center, 2003, Practice and Explorations on Hi-Tech Agricultural Parks in Beijing, China Agriculture Press

200 Cities Farming for the Future
PROVE – Small Agricultural Production Verticalisation Programme

João Luiz Homem de Carvalho

PROVE – Small Agricultural Production Verticalisation Programme - is a programme designed to promote small-scale agricultural production, processing and trade. It involves many urban and periurban agricultural systems, including vegetable gardening, fruit growing and livestock keeping. Intervention is at the individual and/or collective level, especially aimed at lower income groups.

PROVE started in 1995. In the five years prior to 1995, over 400,000 small farms were closed down in Brazil, forcing about 2 million people to leave the rural areas. This rural exodus played a major role in increasing the unemployment rate as the cities could not provide jobs to so many people. Simultaneously, this increasing urbanisation has led to an increase in the demand for processed products. PROVE was designed to tackle both problems.

In the period of 1995-1998, under PROVE, about 500 small agro-industrial facilities were built in Brazil. During the said period, the monthly per capita family income of those involved in the programme rose from 25 to 100 dollars. On average, each project generates jobs for six people, who are usually members of the same family. The funds disbursed by the public sector (US$ 200) for each job that PROVE generates are related to expenses on wages, cars, fuel, etc. All the remaining costs are borne by the producers themselves.

The PROVE was designed to enable small farmers to overcome certain fundamental stages or hurdles in the production, processing, and trade of their products which in our opinion can segregate them. For illustrative purposes, these stages are compared to rungs in a ladder (11 rungs) that small farmers have a very hard time climbing (Carvalho 2001). Enabling them to climb these rungs is a fundamental requirement to ensure the success of the PROVE and, consequently, to ensure their social integration with sustainable development and solidarity.

1. Motivating institutions

The first step consists of an inventarisation and assessment of the stakeholders; how and for what purpose could the existing public institutions be engaged in a programme like PROVE? We ensured that the officials involved were provided with all the required information about the programme. Courses, presentations, and seminars on the need to work with socially-marginalised rural producers were used for this purpose. The political will of the government as a whole to carry out the programme was also clearly demonstrated to them. The priority was on disseminating information about the programme.

2. Providing incentives

In order to motivate a socially-marginalised audience, the advantages of the programme were described. This meant explaining the added value to small rural production schemes and collective initiatives, without closing the doors to others who wished to take part in the programme individually. The producers were encouraged to create the Association of PROVE.
Producers. Furthermore, the NGO APROVE (Association in Support of Small Agricultural Production Verticalisation) was established for the purpose of supporting and encouraging small farmers’ initiatives.

3. Ensuring credit lines
Credit lines were provided, both by public and private finance agents, at market interest. A Guarantee Fund created by the public sector is used to guarantee loans of up to US$ 7,000 for individual projects, and US$25,000 for collective projects. For loans above these limits, the borrowers have to provide collateral. The grace period for repayment to each project varies according to the financial capacity of each borrower, but it typically ranges from 1 to 2 years for an individual and 4 to 6 years for collective projects. The mobile agro-industrial scheme itself is the guarantee for the bank. The idea for this scheme arose from the need to consider people who, despite having their credit applications turned down, were competent enough to generate an income and jobs. After all, like anyone else, they need to work, raise children, and lead a meaningful life.

4. Specific sanitary legislation and laws
It was necessary to review and reformulate the Law of the Federal District for the Inspection of Animal and Vegetal Products, as it was a hurdle for many people to engage in such activities. The state government drafted a set of rules for the construction of small agro-industrial facilities (30-40 m²) and enacted them into law. This law has served as an example for other Brazilian states and cities.

5. Building small agro-industrial facilities
Once the law was passed, projects for small agro-industrial facilities such as slaughterhouses for small and medium-sized animals and facilities for producing sweets, pre-processed vegetables, preserves, dairy products, etc. were developed.

6. Training
Training was provided to small producers for starting the production of raw materials. Visits were paid to supermarkets to provide them with theoretical and practical guidance on how to market processed or semi-processed products. Courses on the establishment of associations and cooperatives, and rural management, food hygiene and handling, specially designed for PROVE target audiences, were provided.

7. Inputs
Various inputs are necessary for manufacturing different products. In addition, packaging of the processed products determines the success of marketing. Small-scale producers do not always have enough funds to buy all these inputs. For this reason, the Small Agro-Industry Counter was created to enable small producers to buy small-sized machines and equipment.

8. Publicity and marketing
PROVE wanted the government to stimulate and fund publicity and marketing professionals on a full-time basis for designing and implementing a plan for the marketing of its products. One of the most important tasks was to create a trademark identifying the programme (PROVE means “taste it” in Portuguese) which covers all products. It also serves as a quality seal.
9. Trading the products
The small agro-industrial facilities make many products of excellent quality. Marketing of the products is the endpoint of the production process, which is also the most difficult stage. PROVE has shown that it is much easier to sell a good product with an attractive packaging and a professional label, even if it is manufactured at a small scale and by low-income people. PROVE products began to be sold in supermarkets as a result of an agreement between the states, supermarkets and producers (Pesquisa PROVE - Market Research 1998).

10. Inspection and control
For consumers to be assured of the hygienic and sanitary conditions of PROVE products, they must know that they are inspected at the production site and are subject to strict quality control measures. For this purpose, chemical and microbiological analyses are carried out on the products, which are periodically inspected.

11. Follow-up
The information collected during the evaluation of PROVE (Duarte et al. 1998), showed that the programme contains the necessary elements to sustain its success - those of including small farmers in the production system and restoring their citizenship rights. The fact that small producers in the PROVE programme have developed the skills to manage their own businesses, understand the cost-benefit calculations of their activities, keep accounts and plan for the future clearly indicates the changes that have taken place in the lives of these people. The excellent ratings on transferability of the programme can mainly be attributed to the massive dissemination campaigns through the national media and to the thousands of site visits paid by people coming from different parts of Brazil and abroad to the capital, Brasilia. These people have confirmed that the programme is feasible, particularly because it can be implemented easily and at a low cost for public agencies, while also boosting the local economy.

**Why PROVE did not continue in the Federal District**
Despite the development and success of PROVE in the Federal District Brasilia for four years (1995-98), the creation of enabling bylaws, and the success of the programme in other regions in Brazil, the programme came to a halt in the Federal District of Brasilia.

The main reason is that the programme did not manage to create sustainable institutional structures, owned by the social actors involved (government, micro-entrepreneurs, University). It was therefore vulnerable to political changes.

With the change of government in 1999 in Brasilia District, the existing links between producers/micro-entrepreneurs and the government were broken. It appeared that the Association of PROVE producers (ASPROVE) still was too dependent on support by Government and could not survive by its self. In 2003, most agro-industries had stopped functioning or continued functioning marginally.

Of course in setting up programmes for the poor and excluded population one cannot expect them to be autonomous in just 4 years. There is a need for prolonged government support for the most vulnerable sector of society. What happened was, that the PROVE programme from the start was only supported by the then dominant ruling party, “the Workers Party”, and never counted with support from opposition. A major lesson is thus, that one should try to involve and assure the support of all political parties when setting up this kind of
programmes and in formulating a new enabling policy framework. This makes the programme less vulnerable to change of government.

In addition, support to poor producers should not only focus on technical production and marketing aspects. Education, capacity building and support in leadership, political lobbying, organisation and financial management is just as important to limit vulnerability and dependency on external support.

Note

1 The strong involvement of farmers, or their relatives, in the processing and marketing of their products, can be termed as vertical integration or “verticalisation” when directly translated from Portuguese.

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Carvalho JLH de. 2001. O PROVE - Programa de Verticalização da Pequena Produção Familiar. Cuaderno de Trabajo 83. Programmea de Gestión Urbana - pgu@pgu.ecuanex.net.ec


Market proximity is a major incentive for the intensification of farming systems or change of systems to more profitable ones. A common example of such intensification is the production of perishable products, such as vegetables, in urban and peri-urban areas. Around Kumasi, many rain-fed maize-cassava farmers have started dry-season vegetable production along streams to generate additional income, while in the city itself, year-round open-space vegetable production is common, especially in bottomlands with access to water for irrigation. These systems are not only output intensive - with for example up to 11 lettuce harvests per year - but also manage to overcome shifting cultivation by farming on the same plot nearly continuously, despite often marginal soil quality. This is only possible through high inputs of manure, water, labour and skills (Drechsel et al. 2005). The motivation to start urban vegetable farming in Kumasi, despite the higher risk and dependency on in- and output market fluctuations, is largely economic.

Kumasi is the capital town of the Ashanti Region and the second largest city in Ghana, with a population of about 1,017,000. Kumasi has a semi-humid tropical climate with an average annual rainfall of 1,488 mm. The peri-urban area of Kumasi extends on average to 40 km from the city centre (Adam 2001). Urban vegetable farmers in Kumasi have informal land arrangements with the authorities or private owners and do not pay rent on the land. This is done in some cases in order to keep these areas clean and to prevent encroachment by squatters. Peri-urban or rural farmers, on the other hand, hold short-term (e.g., two year) renting or leasing agreements with the chiefs of their communities for traditional maize-cassava intercropping.

The major crops cultivated by urban vegetable farmers are lettuce (9-11 harvests/year), cabbage (2-3 harvests/year), spring onions (8-9 harvests/year), as well as “Ayoyo” (Corchorus sp.), “Alef” (Amaranth sp.), carrots, radish and cauliflower. Urban vegetable farmers cultivate all of these crops year-round, mostly with manual irrigation, and vary crops according to their own specialisation and the market demand. In peri-urban Kumasi, farmers still rely on traditional and largely subsistence maize and cassava rain-fed farming. Close to streams or where shallow wells can be dug, many of them take up dry-season cultivation of, for example, okra, tomatoes, peppers and cabbage for the urban market. Besides access to water, dry season vegetable production depends on a good road network.

Surveys carried out by the Kwame Nkrumah University of Science and Technology (KNUST) with the International Water Management Institute (IWMI) as well as different British research teams have covered about 300 farm households in total. Cost-benefit analysis comparisons were made of farm finances of common rural, peri-urban and urban farming systems (i.e., traditional maize-cassava farming, additional dry-season vegetable growing with irrigation, and open-space year-round urban vegetable farming).
Urban and periurban farmers use water from streams, drains and dugout wells, and in a few cases pipe-borne water. In the urban areas, farmers use watering cans, whilst periurban farmers often use pumping machines or carry water from streams to their farms. Manual irrigation needs to be carried out frequently and as such makes irrigation time-consuming and expensive (13 percent of total cost – excluding family labour – and 38 percent of time spent). Only weeding was rated as more expensive by the farmers (23 percent of total cost). The cost of hiring pumps is estimated to be from US $40-70 per dry season (ca. 3 months). Most farmers who use manual labour rarely pay for it as they depend on family labour, though occasionally they hire labourers, rarely paying more than US $11 per season. In general, manual labour is more expensive per volume of water delivered (US $3-6 per m³) as compared to the use of pumps (US $0.6-5 per m³) (Cornish et al. 2001).

Besides water, vegetable farmers also use significant amounts of different types of nutrient inputs as well as pesticides. In Kumasi, the use of poultry manure is very common due to its high availability and low price (US $0.1 per sack). Only a few farmers use mineral fertilisers in addition to this (mostly for cabbage). In periurban Kumasi, many more vegetable farmers use mineral fertilisers (US $14 per 50kg NPK) but combine it with poultry manure when possible.

Women, however, play a major role in crop production while urban vegetable farming is mostly done by men. Traders usually purchase vegetables at the farm gate. Prices vary significantly from one season to another. Occasionally, traders provide farmers with inputs (especially seeds) in order to get them to produce the type of crops needed for sale.

In the study area, vegetable farming is done for income generation. This applies especially to those farmers growing exotic vegetables, while farmers specialized on traditional ones might also consume 20 percent of their harvest. Urban farmers occupying open space in low- or bottomlands crop all year round and attain annual income levels of US $400 to $800 (see Table 7.11); this is 2-3 times the income they could earn from rural farming. However, being successful in this type of farming requires careful observation of market demand. As urban farming is land and labour constrained, the typical farm size is around 0.1 ha. Urban farmers thus earn at least twice as much as rural farmers on only about 20 percent of the farm area.

For periurban farmers, dry season vegetable farming with irrigation can add a significant amount of cash to their income; especially as large parts of their rain-fed maize and cassava harvest are used for household consumption. Without this additional income, cash availability might actually be less than US $100 per year. However, only a minority of periurban farmers shift to year-round vegetable farming (eg. tomatoes in the Akumadan area). There are three reasons for this: the importance of maize and cassava for home consumption (mentioned by 52 percent of the farmers interviewed); the lower price of vegetables in the rainy season (40 percent); and the increased risk of pest attacks (8 percent).

Irrigated vegetable production is not only a way out of shifting cultivation but also out of poverty. Where vegetable marketing is possible, periurban and especially urban vegetable farmers make a significant step over the poverty line.
Table 7.11 Revenue generated in different farming systems per ha (Danso et al., 2002)

<table>
<thead>
<tr>
<th>Location</th>
<th>Farming system</th>
<th>Typical farm size (ha)</th>
<th>Net revenue (US$)/ha/year</th>
<th>Net revenue US$/farm/holding/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural/PUA</td>
<td>Rain-fed maize or maize/ cassava farming</td>
<td>0.5-0.9</td>
<td>350-550</td>
<td>200-450</td>
</tr>
<tr>
<td>PUA</td>
<td>Dry season vegetable farming; irrigation only</td>
<td>0.4-0.6</td>
<td>300-350</td>
<td>140-170</td>
</tr>
<tr>
<td>PUA</td>
<td>Dry-season, irrigated vegetables and rain-fed maize (or vegetables)</td>
<td>0.7-1.3</td>
<td>500-700</td>
<td>300-500</td>
</tr>
<tr>
<td>UA</td>
<td>Year-round irrigated vegetable farming</td>
<td>0.1-0.2</td>
<td>2,000-8,000</td>
<td>400-800</td>
</tr>
</tbody>
</table>

These are typical values; subsistence production has been converted to market values.  
PUA = peri-urban agriculture; UA = urban agriculture

References


Dima, S.J. and A.A. Ogunmokun

Department of Agricultural Economics and Extension, University of Namibia. 2001.

This paper provides an overview of the resources available, and the technologies used for urban and peri-urban horticulture in Namibia, followed by a survey of the recent literature on urban and peri-urban agriculture in Africa and a case study of urban and peri-urban horticulture in the city of Windhoek.

The Impact of Urban Agriculture on the Household and Local Economies


This chapter explores urban agriculture and its significance at household and at city level. The author discusses urbanisation and food requirements, the conditions of urban agriculture among the poor practitioners, the benefits and costs of urban farming, and the obstacles to urban farming.

Food production, urban areas and policy responses.


A challenging economist’s vision on the (in)efficiency of urban agriculture in relation to the use of economic resources, and on the lack of legitimacy of public support (that targets urban rather than rural agriculture), written at the time attention to urban agriculture started to lead to programmes like RUAF.

For hunger-proof cities : sustainable urban food systems.


This book contains a review of the rationale to protect food provisioning areas close from consumers rather than importing from distant sources; includes diverse case studies, in particular in Cuba.


This publication (in French) includes a chapter with some insights on the conceptual frameworks at use when analysing urban agriculture, and two chapters focused on the economic and technical aspects of peri-urban food commodity chains (for vegetables and meat).

The isolated state.


This publication is referred to in several publications on urban agriculture (including this book) and cannot be missed for an economist analysing urban agriculture, for its in-depth explanation of the distribution of commodities relative to the distance to the city, plus a thorough study on land rent around cities.

The Economics of Urban Agriculture


www.avrdc.org/susper/

The SUSPER regional project was initiated in January 2002 for a period of three years. On this site you will find the overview of publications. Supported by France with the Kingdom of Cambodia, Lao PDR, Vietnam RS, AVRDC, and CIRAD

www.cipotato.org/urbanharvest/home.htm

In late 1999 the CGIAR launched a system-wide initiative to direct and coordinate the collective knowledge and technologies of the Future Harvest Centers towards strengthening urban and peri-urban agriculture. The Initiative, formerly known by its acronym SHUPA, but renamed Urban Harvest has been involved supporting and implementing research and development projects in regional settings, as well as in alliance-building initiatives at global and regional level.