

## **Local Economic Development and Marketing of Urban Produced Food<sup>1</sup>**

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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. 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

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An update of this paper (and the whole book) is under preparation (publication expected August 2014).

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, p. 78 and p. 90) 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, e.g., manure, wastes or fertilisers... a typical poverty trap.

Yet, 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. The number of case studies on urban and peri-urban agriculture has increased rapidly and is 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% of families in Libreville (Congo), 68% of urban dwellers in six Tanzanian cities, 45% in Lusaka (Zambia), 37% in Maputo (Mozambique), 36% in Ouagadougou (Burkina Faso), 35% 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 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)

**Table 1 Summary of typology of UA Socio-Economic profiles**

	Home subsistence farmers	Family-type commercial farmers	Entrepreneurs	Multicropping peri-urban farmers
<b>Location</b>	U(P)	UP	P	P
<b>Outlets</b>	Home	Urban market	Urban market + export	Home + urban markets
<b>Objective</b>	Home consumption	Income for subsistence	Additional income Leisure	Home consumption and income for subsistence
<b>Size</b>	Usually < 100m <sup>2</sup>	Usually <1000m <sup>2</sup>	Usually >2000 m <sup>2</sup>	Usually>5000m <sup>2</sup>
<b>Products</b>	Leafy vegetables, cassava, plantain, maize, rice, goats and sheep, poultry, fruits,	Leafy vegetables, temperate vegetables Poultry (Sheep) (Milk)	Temperate vegetables, fruits, poultry, livestock, fish	Staple food crops, local vegetables
<b>Intensification (inputs/ha)</b>	2	2 to 3	4	1
<b>Gender</b>	F	F+M	M	F+M
<b>Limiting factor</b>	Size	Size, land insecurity, access to inputs, water and services, marketing risks	Technical expertise, marketing risks	Access to inputs Fertility

Quantitative indicators of the relative importance of each type are scarce, in particular because studies on urban agriculture are often focused either on self-consumption or on provision of income. The few studies that have analysed these types of urban farming in West and Central Africa suggest the dominance of family commercial farmers:

- in Dakar, out of 5025 urban farmers, 70% were family commercial farmers, 25% were entrepreneurs and 5% were characterised as subsistence (Mbaye and Moustier, 2000);
- in Thiès (Senegal), among 880 farmers in vegetable production, the percentages were as follows in 2005: 51% for family commercial type, 34% for multi-cropping, 6% for entrepreneurs and 9% for subsistence (Broutin et al, 2005)
- in Brazzaville, out of 1015 vegetable farmers in 1989, 89,5% belonged to the family commercial type while 1,5% were entrepreneurs (Moustier and David, 1997).

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).

### ***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 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% of intra-urban farmers do not have other occupations (Temple-Boyer, 2002); this figure is 85% in Abidjan (Yappi Affou, 1999). In Yaoundé, again, 70% of commercial producers cited agriculture as their principal source of income, 21% cited a job in the formal sector and the remaining 9% cited petty commerce. By contrast to these figures, 67% of household food producers cited a formal sector job as their principal source of income, 20% cited petty commerce, and the remaining 13% 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 Ore, 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, 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% 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, e.g. leafy vegetables, versus more risky and longer cycle crops, e.g. 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 move 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, e.g. 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, e.g.

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 (e.g. 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, e.g., 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 (e.g., 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 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.

**Table 2 Monthly net income from mixed vegetable farming with irrigation**

<i>City</i>	Typical nett income in US\$/ month per farm (upper limit in brackets) *	GNI per capita (US\$/month)
Accra	40-50	27
Bamako	20- (200)	24
Bangui	320	22
Banjul	Ca. 30	26
Bissau	24	12
Brazzaville	80-130 (270)	53
Cotonou	50-70 (110)	36
Dakar	40- 66 (250)	46
Kumasi	35-85 (120-160)	27
Lagos	120	27
Lome	13-25 (270-330)	26
Nairobi	10-163 (279)	33
Niamey	40 (gross)	17
Ouagadougou	25-70 (100)	25
Dar Es Salaam	60	24
Yaounde	34-67	53

Source: Danso et al.,2003(b); Drechsel et al, 2005

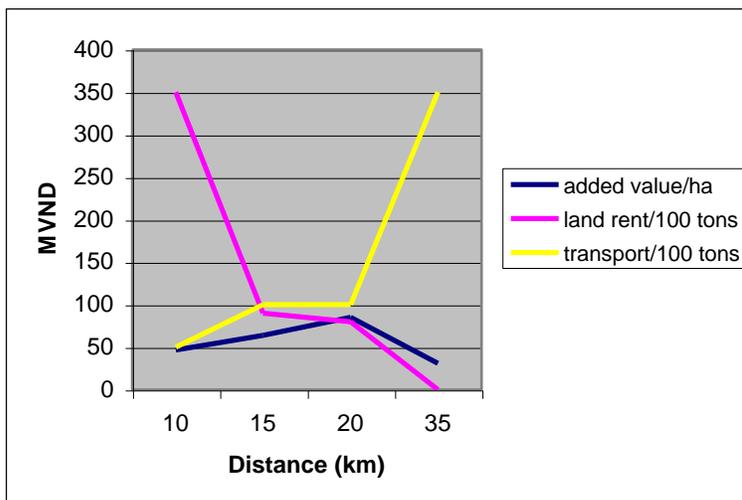
*\* Many reports lack information on the exact time period (number of harvests or seasons) and area (actual farm size or one hectare) the revenues are based on. Only cases with relatively reliable data are considered here.*

In Kumasi, the incomes of urban farmers occupying open space in low- or bottomlands were estimated at US\$ 400 to 800 that 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% 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 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).

**Figure 1 Impact of distance from Hanoi on agricultural added value per hectare**



Source: Le Duc Think (data from 2002, to be published): 1\$=15850 VND

### 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- Moskow, 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% (without improvement) and 14% (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 and 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 is 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, eg. 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 importance of UA in the provision of fresh perishable vegetables, mainly leafy vegetables, poultry and dairy products mostly from peri-urban areas (see Table 3 for comprehensive data on Kumasi, Ghana and Table 4 for various cities in Africa, Asia and Latin America)

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%.

**Table 3 Origin of different Food Items Sold/Consumed in Kumasi, Ghana**

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

\* Imported are mainly rice, onions and part of the livestock (meat)

\*\* University farm (same in Accra) Source: Cofie *et al* 2003.

**Table 4 Percentage given to urban production in urban supply**

	Leafy vegetables	Tomato	All vegetables	Maize	Plantain	Milk
Brazzaville (1)	80%	20%				
Bangui (2)	80%	40%				
Yaoundé (4)	80%	25%		90%	60%	
Bissau (5)	90%	50%				
Nouakshott (6)	90%	10%				
Dar es Salaam (7)			90%			60%
Dakar (8)			60%			
Kumasi(9)		60%	90%	10%	15%	
Accra (10)			90%			
Hanoi (11)	70%	0 to 75% *)	40%			
Phnom Penh (12)	100%	0 to 50% *)				
Vientiane (13)	100%	20 to 100% *)				
Shanghai (14)			60%			90%
Havana (15)			58%			

\*) according to season

Sources: (1): Moustier (1999) ; (2) : David, 1992 ; (3) : Mbaye et Moustier, 2000; (4) Dongmo, 1990 ; (5) : David et Moustier, 1995; (6) : Laurent, 1999; (7): Jacobi and al (2000); (8): Mbaye and Moustier (2000); (9) and (10): Danso et al.,2003b; Cofie et al.,2003; (11) : An and al, 2003 ; and Phuong Anh and al., 2004; (12): Sokhen, Dianika and Moustier (2004); (13): Kethongsa, Khamtanh and Moustier (2004); (14): Yi-Zhang and Zhan(2000). See also Urban Agriculture Magazine 2002 special edition for world food summit for other figures).

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% 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% 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% of tomatoes sold during the cold season are grown less than 30 km from the city, 80% of tomatoes sold in the rainy season originate from China and 15% from Dalat, located more than 1000 km away from Hanoi (Hoang Bang An et al, 2003).

### **The advantage of proximity in market organisation**

#### ***Short marketing chains***

Urban products are distributed through very short marketing chains (see figure 2). The shortest is direct producer involvement in retail sales: this is the case of 30% of all sales in Bangui (David, 1992) and 70% 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; Kethongsa 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% of all wholesale market sellers are also producers; this percentage goes up to 100% for water convolvulus. Producers bring 100 to 200 kilos per day to wholesale markets on overloaded bicycles or scooters.

#### **Figure 2 Marketing chains for UA and rural agriculture**

<b>Short peri-urban vegetable Commodity Chain:</b> Farmer → (Collector) → Retailer → Consumer
<b>Long Rural Vegetable Commodity Chain:</b> Farmer → Wholesaler Collector → Wholesaler Distributor → Retailer → Consumer

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<sup>2</sup>. 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 (see references in footnote 2). 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% 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 % on leafy-vegetables, 35 % to 50% for cabbage and 75 % 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% of the marketing margin being absorbed in transport costs (Moustier, 1995). And in Havana, Cuba,

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<sup>2</sup> The basic theory on the relationship between transaction cost reduction and institutional arrangements was established by Williamson (1985). For applications in the horticultural sector, see Jaffee (1995), Lyon (2000), Moustier (1996).

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% 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% out of 100 interviewed, in Potutan et al, 1999). In Hanoi, freshness is the advantage of peri-urban vegetable production cited by 74% respondents out of 500 in 2003 (Figuié, 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 over other ‘landscape producers’ 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 multi-functionality of urban agriculture<sup>3</sup> makes it a ‘cheap’ producer of public goods. Table 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; financial support, research and extension for more profitable and sustainable intensive

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<sup>3</sup> 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 (Vollet, 2002; Véron, 2004).

commercial vegetable and animal systems (Midmore and Jansen, 2003; Smith et al, 2004); 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 5 Comparative Multi-functionality of three urban sectors**

	<b>Sectors</b>		
	Industry	Parks	Agriculture
<b>Products</b>			
Landscape	-	++	+
Economic good	++	-	+
Jobs – Social inclusion	+	-	+
Food Security	-	-	++

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.avrdc.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 and 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 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.

**Table 6 Summary of indicators of UA social and economic impact**

Level of analysis	Household	City
Income generation	Income per head of the different types of farmers and traders involved (compared with: subsistence income; alternative occupation; rural incomes)  Income per ha, income per labour unit, and income per capital invested of the different types of farmers involved (compared with alternative use of land, labour and capital)	Number of farmers involved in UA of the different socio-economic types  Number of traders (and other input-provision and post-harvest enterprises) involved in the marketing of UA of the different socio-economic types  Total incomes of and added values to the different stakeholders (farmers, traders, and related enterprises)

Food supply (subsistence)	Share of self-consumption	Share of self-consumption in total urban consumption, for the different food products, and different socio-economic profiles (including the poor)
Food supply (commercial)		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
Landscape and environmental preservation	Qualitative appreciation of UA for greening and environmental functions by non farmers	Combination of household based data
	Willingness to pay for UA preservation by urban residents	Urban stakeholder groups' appreciation of UA environmental advantages/drawbacks
		Use of compost for UA and savings in transport of waste
Social inclusion	Appreciation of "self-esteem" provided by urban agriculture	Number of unprivileged urban residents (migrants, former unemployed) involved in 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 Mc Michael, 1984; Reardon and Berdegúe, 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 monocultural 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% 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 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 RUAFA is seeking to establish working groups in the cities they are working in.

## References

- Akerlov, G.A. 1970. The market for “lemons”: quality uncertainty and the market mechanism. *Quarterly Journal of Economics*, vol. LXXXIV, 3, 488-500.
- Hoang Bang An, Isabelle Vagneron, et al., 2003. Spatial and institutional organization of vegetable markets in Hanoi. RIFAV, Gia Lam, 43 p, available on <http://www.avrdc.org/susper>.
- Mai Thi Phuong Anh, Ali, M., Hoang Lan Anh and To Thi Thu Ha, 2004. Urban and peri-urban agriculture in Hanoi: opportunities and constraints for safe and sustainable food production. AVRDC/CIRAD Technical bulletin n°32.
- Agbayani, A.L., Holmer, R.J., Potutan, G.E., Schnitzler, W.H. 2001. Quality and quantity: a survey in a Philippine urban setting on demand for vegetables. UAM n°5, pp. 56-57.
- Armay-Klemesu and Maxwell, D. 2000. Urban agriculture as an assist strategy, supplementing income and diets. A case study of Accra. In: Baker, N. et al. (eds.) *Growing cities, growing food*. DSE, Feldafing, Germany Pp: 183-205
- Bakker, N., Dubbeling, M., Gündel, S., Sabel-Koschella, U., de Zeeuw, H. 2000. *Growing cities, growing food: urban agriculture on the policy agenda. A reader on urban agriculture*. DSE/ETC, Feldafing, Allemagne,
- Cofie, O. Veenhuizen, R. and Drechsel, P. 2003. Contribution of Urban and Peri-urban Agriculture to Food Security in Sub-Saharan Africa. Paper presented at the Africa session of 3rd WWF, Kyoto, 17<sup>th</sup> March 2003.
- Cole and Fayissa, 1991. The urban subsistence labour force: Toward a policy-oriented and empirically accessible taxonomy, n°19, pp. 779-789.
- Craig, E., Falco, L. and Sabatte, L. 2002. Municipal strategies for agriculture in Moreno, Buenos Aires, *Urban Agriculture Magazine* N°7, pp. 7-9.
- Danso, G., Keraita, B, and Afrane, Y. 2002 (a). Farming systems in urban agriculture, Accra, Ghana. With special focus on its profitability, wastewater use and added malaria risk. Consultancy report submitted to FAO-Ghana office via International Water Management Institute, Ghana-office
- Danso, G., P. Drechsel, T. Wiafe-Antwi and L. Gyiele. 2002 (b). Income of farming systems around Kumasi, Ghana. *Urban Agriculture Magazine* 7: 5-6.
- Danso, G., S.Fialor and P. Drechsel. 2002(c). Farmers’ perception and willingness to pay for urban waste compost in Ghana. In: D. Almorza et al (eds). *International Conference on Waste Management and Environment*, Spain. WIT Press, p. 231-241
- Danso, G., P. Drechsel, S.S. Akinbolu and L. A. Gyiele. 2003 (a). Review of studies and literature on the profitability and sustainability of urban and peri-urban agriculture. FAO Final Report (PR 25314). Mimeo
- Danso, G., and Drechsel, P., 2003 (b). The marketing manager in Ghana. *Urban Agriculture Magazine* 9 :p.7. [www.ruaf.org](http://www.ruaf.org)
- Danso, G., Drechsel, P., Fialor, S., and Giordano, M. 2005. Estimating the demand for municipal waste compost via farmers’ willingness to pay in three Ghanaian Cities. Paper submitted to the *International of Journal of Integrated Waste Management Science and Technology*. . for final review, 22pages
- Drechsel, P., Cofie, O., Fink, M., Danso, G., Zakari, F.M. and R. Vasquez 2004. Closing the Rural-Urban Nutrient Cycle. Options for Municipal Waste Composting in Ghana. Final Scientific Report submitted to IDRC (project 100376). Executive summary under: [www.iwmi.cgiar.org/africa/west\\_africa/](http://www.iwmi.cgiar.org/africa/west_africa/)
- Drechsel, P., Graefe, S., Danso, G., Keraita, B., Obuobie E., Amoah P., Cofie, O.O., Gyiele, L. and Kunze, D. 2005. Irrigated urban agriculture in West Africa (I): A non-traditional farming system between public recognition and prosecution. IWMI Research Report (forthcoming).

- David O., 1992. Diagnostic de l'approvisionnement de Bangui en légumes. Mémoire de stage de l'ESAT, CNEARC/AFVP/CIRAD, 162 p.
- Deelstra, T., Boyd, D., van den Biggelaar, M. 2001. Multifunctional Land Use: an Opportunity for Promoting Urban Agriculture in Europe, *Urban Agriculture Magazine* n°4, pp. 33-35.
- Donadieu, P., Fleury, A., « L'agriculture, une nature pour la ville », *Annales de la recherche urbaine* n°74, 1997.
- Egziabher, A. G. 1994. Urban Farming, Cooperatives, and Urban poor in Addis Abeba. In: *Cities Feeding People: An Examination of Urban Agriculture in East Africa*. IDRC, Ottawa, Canada, p.85-104
- Ellis F., Sumberg J., 1998. Food production, urban areas and policy responses. *World Development*, 26, pp. 213-225.
- Gerstl, S. 2001. The Economic Costs and Impacts of Home Gardening in Ouagadougou, Burkina Faso. Inauguraldissertation zur Erlangung der Wuerde eine Doktorin der Philosophie, vorgelegt der Philosophisch-Naturwissenschaftlichen Fakultät der Universitaet Basel, pp. 424.
- Fall, A.S., Guèye, O., Ba, M., 2001. The network approach: the production-consumption chain in Senegal. *Urban Agriculture Magazine* n°5, p. 36.
- Fall, A., Maty Ba Diao, Denis Bastianelli and Aimé Nianogo. 2004. La gestion concertée et durable des filières animales urbaines. In : Smith, O., Moustier, P., Mougeot, L., and Fall, A. Développement durable de l'agriculture urbaine en Afrique francophone. Enjeux, concepts et méthodes. CRDI/CIRAD.
- Figuié, M. 2004. Consumers' perception of tomato and water convolvulus quality in Hanoi. Hanoi, SUSPER project, <http://www.avrdc.org/susper>, 44 p.
- Figuié, M. and Truyen, Nguyen, forthcoming. Poor consumers' access to supermarkets in Hanoi. <http://www/markets4poor.adb.org>, Hanoi, MALICA, ADB.
- Friedmann, H. 1994. Distance and durability: shaky foundations of the world food economy. In Mc Michael, op. cit., pp. 258-277.
- Gockowski, J.; Nelly N. Soua Mbo; Elong, P.; David, O. 2004. Livelihoods study of Urban Agriculturalists in Yaoundé. In: Nolte, C. (ed.), *Urban Harvest Pilot Site Yaoundé Final Report*, 23 p.
- Heller, M.C. and Keoleian, G.A. Life-cycle based sustainability indicators for assessment of the US food system. Report n°CSS00-04, Center for sustainable systems, university of Michigan, 61 p.
- Henderson, V. 2002. Urbanization in developing countries. *The World Bank Research Observer*, vol. 17, n°1, pp. 89-112.
- Homem de Carvalho, J.L., 2001. Prove: Small Agricultural Production Verticalisation Programme. In UAM N°5, pp. 54-55.
- Jaeger, D. and Huckabay, J.D., 1984. "The garden city of Lusaka: urban agriculture", in G.J. Williams (ed.), *Lusaka and its hinterland*, Handbook ser. 9, Zambia geographical association, Lusaka, pp. 267-277.
- Jacobi, P., Amend J. and Kiango, S. 2000. Urban agriculture in Dar es Salaam: providing for an indispensable part of the diet. In: Bakker and al, op. cit.
- Jaffee, S. 1995. Transaction costs, risk, and the organisation of private sector food commodity system. In S. Jaffee and J. Morton (eds). *Marketing Africa's high value food: comparative experiences of an emergent private sector*. Dubuque (Iowa) : Kendall/Hunt Publishing Company, pp. 21-62.
- Keraita, B.; Danso, G.; Drechsel, P. 2003. Urban irrigation methods and practices in Ghana and Togo. *Urban Agriculture Magazine*, 10: 6-7. [www.ruaf.org](http://www.ruaf.org)
- Kethongsa S., Thadavong K. and Moustier, P. 2004. Vegetable marketing in Vientiane, SUSPER project sery (AVRDC/CIRAD/French MOFA), Hanoi, 56 p (available on <http://www.avrdc.org/susper>).

- Kirwan, J. 2004. Alternative Strategies in the UK Agro-Food System: Interrogating the Alterity of Farmers' Markets. *Sociologia Ruralis*, Vol 44, Number 4, October 2004.
- LTC (Land Tenure Centre), OSU (Ohio State University), SARSA 'Systems Approach to Regional Income and Sustainable Resource Assistance), 1984. "Peri-urban studies in Africa. Ohio State University", processed report.
- Lecostey, N., Malvezin, C. 2001. Analyse diagnostic de la commune de Trung Trac en zone péri-urbaine de Hanoi, Vietnam. Mémoire de diplôme d'agronomie approfondie. Paris, INAPG/ENGREF, 32 p.
- Lipton, M. 1977. Why poor people stay poor: urban bias and world development. London, Temple Smith, 467 p.
- Lyon, F. (2000), "Trust, networks and norms: the creation of social capital in agricultural economies in Ghana", *World Development*, Vol. 28 No. 4, pp. 663-681.
- Mbaye A. et Moustier, P. 2000. Market-oriented urban agricultural production in Dakar. In : N. Bakker; M. Dubbeling; S. Gündel.; U. Sabel-Koschella; H. de Zeeuw. Growing cities, growing food: urban agriculture on the policy agenda. A reader on urban agriculture. DSE/ETC, Feldafing, Allemagne, pp. 235-257.
- Mc Michael, P. (ed.). 1994. The global restructuring of agro-food systems. Cornell University Press, 303 p.
- 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*
- Mireri, C. 2002. Private Investment in Urban Agriculture in Nairobi, Kenya. In : *Urban Agriculture Magazine* no. 7, Economics of Urban Agriculture. August 2002. RUAf
- Minagri. 1996. Cameroun enquête maraîchage. Environmental research initiative. Yaoundé, ministère de l'agriculture; 114p. Quoted in : L. Temple, P. Moustier. 2002. L'agriculture périurbaine en Afrique tropicale : caractéristiques, fonctions, contraintes et opportunités à partir d'études de cas. Communication au Danish Sahel workshop. Sahel-Sudan, Organisé par Institute of Geography, University of Copenhagen.
- Moskow, A. 1999. The contribution of urban agriculture to gardeners, their households and surrounding communities : the case of Havana, Cuba. In : M. Koc et al (eds), *For hunger-proof cities : sustainable urban food systems*. Ottawa, CRDI, pp. 77-84.
- Moustier, P., Figuié, M., Nguyen Thi Tan Loc et Ho Thanh Son, forthcoming. The role of coordination in the safe and organic vegetable chains supplying Hanoi. Forthcoming in *Acta Horticulturae* of January 2006, 18 p.
- Moumbélé, M. and Moustier P., 1995. Mise en place d'un observatoire économique. in P. Moustier (ed). *Filières maraîchères à Brazzaville : stratégies des acteurs et dynamique des échanges*. Montpellier, CIRAD.
- Moustier, P. 1995. Bilan socio-économique. In P. Moustier (ed). *Filières maraîchères à Brazzaville : stratégies des acteurs et dynamique des échanges*. Montpellier, CIRAD, pp. 277-281.
- Moustier, P., Mbaye, A. 1999. "Introduction générale" in Moustier P., A. Mbaye, H. De Bon, H. Guerin, J. Pages (éditeurs scientifiques). *Agriculture péri-urbaine en Afrique sub-saharienne*. Montpellier, France, CIRAD, colloques, pp. 7-17.
- Moustier, P., Moumbélé M. and Huat, J. 2004. Gestion concertée et durable des filières maraîchères urbaines. In : Smith, O., Moustier, P., Mougeot, L., and Fall, A. *Développement durable de l'agriculture urbaine en Afrique francophone. Enjeux, concepts et méthodes*. CRDI/CIRAD.
- Moustier P. et David, O., 1997. Etudes de cas de la dynamique du maraîchage périurbain en Afrique sub-saharienne. Document FAO N-DT/02/96, projet : «Approvisionnement et distribution alimentaires des villes d'Afrique Francophone», FAO, Rome, Italie, 36 p.
- Moustier P., 1996. Organisation in the Brazzavillian vegetable market. Ph.D. thesis, Imperial college at Wye, Montpellier, CIRAD, 271 p.
- Moustier, P. 1995. Bilan socio-économique. In P. Moustier (ed). *Filières maraîchères à Brazzaville : stratégies des acteurs et dynamique des échanges*. Montpellier, CIRAD, pp. 277-281.

- Niang S., 1998 - L'agriculture urbaine au Sénégal : bilan et perspectives. Communication à l'atelier CRDI " La contribution de l'agriculture urbaine à la sécurité alimentaire en Afrique ", CRDI, 26 p.
- Lemeilleur, S. 2002. Identification des systèmes de production de bananier dans l'agriculture périurbaine de Yaoundé. Mémoire ENSA Montpellier 55 p).
- Mwangi, A. 1995. The role of urban agriculture for food security in low-income areas in Nairobi. Leiden: African Studies Centre.
- Nugent, R. 2000. The impact of urban agriculture on the household and local economies. In N. Bakker; M. Dubbeling; S. Gündel.; U. Sabel-Koschella; H. de Zeeuw. Growing cities, growing food: urban agriculture on the policy agenda. A reader on urban agriculture. DSE/ETC, Feldafing, Allemagne, pp. 67-99.
- Obosu-Mensah, K., 1999. Food production in urban areas. A study of urban agriculture in Accra, Ghana. Ashgate, England. 227 pp.
- Page, B. 2002. Urban agriculture in Cameroon: an anti-politics machine in the making? *Geoforum*, 33, pp. 41-54.
- Parrot, L., Nounamo, L., Kahane R., Nantchouang, A., 2005. Prospering Peri-urban Horticulture: Evidence from South-West Cameroon between 1995 and 2004. Paper prepared for ISHS conference, 19-23 July in Chiang Mai, and submitted to *Acta Horticulturae*.
- Potutan, G.E., Sanatem, K., Janubas, L.G., Holmer, R.J., Schnitzler, W.H. 1999. The status of vegetable consumption, production and marketing in Vientiane. Cgayan de Oro, Xavier University College of Agriculture, Peri-urban Vegetable Production Project, 84 p. + app.
- Potutan, G. Schnitzler, W. Arnado, G. Janubas, L. and Holmer, R. 2000. Urban Agriculture in Cagayan De Oro: A Favourable Response of City Government and NGOs. In: Baker, N. et al. (eds.) *Growing cities, growing food*. DSE, Feldafing, Pp: 413-428.
- Sokhen, C., Kanika, D., Moustier, P. 2004. Vegetable market flows and chains in Phnom Penh., <http://www.avrdc.org/susper>, 45 p.
- Ho Thanh Son, Bui Thi Thai and Moustier, P. 2003. Strategies of stakeholders participating in the commodity chain of vegetables supplied to Hanoi markets. SUSPER project, AVRDC/CIRAD, Hanoi, <http://www.avrdc.org/susper>, 44 p.
- Reardon, T. and Berdegue, J.A. 2002. The rapid rise of supermarkets in Latin America : challenges and opportunities for development. In *Development Policy review*, 20 (4): 371-388.
- Richter, J. Schnitzler, W.H. and Gura, S. ed. 1995. Vegetable production in peri-urban areas in the tropics and sub-tropics –food, income, and quality of life. DES/ATSAP workshop proceedings. November 1994. DES/ZEL, Feldafing, Zschortau, pp. 14-17.
- Sawio, C.J. 1993. Urban agriculture research in East and Central Africa: CFP Report Series, Report 20, Ottawa, Canada.
- Sokhen, C., Diep Kanika, Moustier, P. 2004, 50 p. Vegetable market flows and chains in Phnom Penh.
- Smith, O., Moustier, P., Mougeot, L., and Fall, A. 2004. Développement durable de l'agriculture urbaine en Afrique francophone. Enjeux, concepts et méthodes. CRDI/CIRAD, Montpellier, Ottawa, 173 p.
- Phan Ti Giac Tam and Le Thanh Loan, 2005. Assessing poor farmers' participation in distribution value chains: the case of tomato and water convolvulus in Ho Chi Minh City, <http://www.markets4poor.adb.org>, 46 p.
- Tallego F. and Egg, J., 2003. Les apports de l'action collective à la construction de la qualité. Le cas des groupements de commerçants dans la filière des céréales sèches au Mali. Journée « action collective » du 5 mai 2003, Montpellier, ENSAM.

- Tegegne, A., Tadesse, M., Yami A., and Mekasha, Y. 2000. Market-oriented Urban and Peri-urban Dairy Systems. In UAM N°2, pp. 23-24.
- Temple-Boyer E., 2002. Dynamique de l'emprise spatiale et foncière de l'agriculture périurbaine dans les bas-fonds de Yaoundé (Cameroun). Rapport DEA Hêtre. Université de Paris I. Mars 2002.
- United Nations, 2003. World Urbanization prospects. The 2001 revision, United Nations, New York, 180 p.
- UNDP. 1996. Urban agriculture. Food, jobs and sustainable cities. UNDP, New York, 302 p.
- Mougeot, L. et Moustier, P. 2004. Introduction. In Smith, O.B., Moustier, P., Mougeot, L.J.A., Fall, A. (eds) 2004. Développement durable de l'agriculture urbaine en Afrique : enjeux, concepts et méthodes. Co-édition CIRAD-CRDI, Montpellier, Ottawa, pp. 11-21.
- Vagneron I., Pagès J. and Moustier P. 2003. Economic appraisal of profitability and sustainability of peri-urban agriculture in Bangkok. Rome, FAO, Montpellier, CIRAD, 38 p.
- Vollet, D. 2002. Présentation de la problématique de l'atelier "multifonctionnalité et territoires", In : Les cahiers de la multifonctionnalité, pp. 5-7.
- Van den Berg, L., Drescher A., Iaquina, D., Timmermans W. and Vasques R. (eds), forthcoming. Agriculture and the city. 240 p.
- Véron, F. 2004. Avant-propos. In: Les cahiers de la multifonctionnalité, n°6, pp. 5.
- Williamson, O.E. 1985. The economic institutions of capitalism, New York : Free Press, 404 p.
- Yappi Affou S., 1999. Agriculture intra-urbaine en Côte d'Ivoire : les cultures et les acteurs. In : Agriculture périurbaine en Afrique subsaharienne. Actes de l'atelier international du 20 au 24 avril 1998, Montpellier, France ; Moustier P., A. Mbaye, H. De Bon, H. Guerin, J. Pages (éditeurs scientifiques). Montpellier, France, CIRAD, colloques.
- Yi-Zhanh Cai and Zhagen Zhang, 2000. Shanghai: trends towards specialised and capital-intensive urban agriculture. In N. Bakker; M. Dubbeling; S. Gündel.; U. Sabel-Koschella; H. de Zeeuw. Growing cities, growing food: urban agriculture on the policy agenda. A reader on urban agriculture. DSE/ETC, Feldafing, Allemagne, pp. 467-476.