

Urban horticulture in Africa and Asia, an efficient corner food supplier

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Abstract

Peri-urban agriculture is still the subject of intense debate as regards its viability, its efficiency in urban food supply relative to rural production, and the rationale for the state to protect it from urban development. The paper investigates the role of urban horticulture in the supply of African and Asian cities and the importance of maintaining proximity between farmers and consumers of vegetables. It draws on insights of spatial economics as regards physical proximity and institutional economics as regards relational proximity. It is based on market surveys in various cities of Africa and South-East Asia, especially on the origin of food products, and the relationships between buyers and purchasers. The results show the importance of urban agriculture in the overall supply of the most perishable vegetables, i.e., leafy vegetables, and its complementarity with rural areas for other vegetables in seasonal supply. In addition to the advantage of quickly bringing fresh perishable products, proximity has advantages in terms of short marketing chains with low marketing costs. In some situations, it also helps in building confidence between farmers and consumers, in particular as regards vegetable safety. Finally it contributes to food sovereignty. The paper concludes by arguing why it is legitimate for the public sector to support a non-polluting multi-functional urban agriculture.

INTRODUCTION

Since the 1990's, the subject of peri-urban agriculture has drawn the attention of a growing number of scholars around the world. This is mostly due to the present context of fast urban growth, together with rising urban poverty. While urban population accounted for less than 25% of the total population in 1950, it will bypass the rural population by 2007, and account for 60% of the total population in 2030 (United Nations, 2003). Growth is especially fast in the cities of developing countries, which will absorb most of the population growth in the period 2000-2030, with an increase in population from 2 to 4 billions. While at the end of the 1970s, the urban bias of the public policies was denounced by Michael Lipton as a bias in favour of the wealthiest population, we are now witnessing the urbanisation of poverty which will rise from 30% in 2001 to 40% in 2002 and 50% in 2030 (Ravaillion, 2001). The dramatic urban growth has not been paralleled with the development of enterprises and infrastructures necessary to absorb the new employment needs (Henderson, 2002). Hence the income gap is widening between a class of wealthy civil servants and traders versus the poor working in the informal sector.

In addition to employment needs, urbanisation creates food requirements, both in quantity and diversity, particularly in favour of vegetables, fruits, fish and meat. Finally, urban development poses huge environmental challenges. It is estimated that production of wastes will be multiplied by four in cities in the next thirty years (Mougeot and Moustier, 2003). If urban agriculture attracts a growing attention of researchers and development stakeholders, it is mostly because it brings some answers to these social, economic and environmental challenges (see Figure 1).

In relation with these three types of impacts, a growing body of the literature presents the virtues of urban agriculture. Yet peri-urban agriculture is the subject of intense debate as regards its viability and the necessity for political support. In a challenging paper, Ellis and Sumberg (1998) provided a number of reasons why scarce public resources should not target urban agriculture. The paper stressed that in light of the high land costs in the urban areas and the fact that the land is still not enough to cater for housing and infrastructure needs, it would seem legitimate to let agriculture move towards rural areas whilst at the same time improving the transport infrastructures, as occurred 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. The advantages in terms of quality brought by proximity between suppliers and customers, in particular trust, may also be a transient consequence of quality regulations not being adequately enforced. But most to the points, the authors looked at lacking rigorous quantitative data to assess the social, economic and environmental impact of urban agriculture.

It is the purpose of our paper to contribute in answering this research deficiency and to bring original data which measures the contribution of urban agriculture to urban vegetable supply. It uses the insights of spatial economics, grounded by Von Thünen (1851-translated by Huriot, 1994), which enables us to better understand the economic reasons behind the location of supplying sources, in particular the relationship between the proximity between production and consumption areas and the perishable nature of the products. Institutional economics and sociology go further in the analysis of the influence of market proximity on production characteristics: beyond sole physical attributes of transport, storage or land costs, which can be termed as physical proximity, relational proximity is brought to the fore, in the sense of regular interactions between farmers and market agents, farmers and consumers, and also within the farming community itself (Torre, 2000).

MATERIAL AND METHOD

The revelation of the specific role of UA in urban food supply implies original sources of data. Putting in parallel what is produced in a year in the city with what is consumed in the city with available statistics gives a useful indication of the potential contribution of UA in urban food supply (see Mai thi Phuong Anh and al, 2004; Ali, de Bon and Moustier, 2005) Yet it has some limitations, including the difficulties in grasping the perishable, seasonal products; and also the fact that it does not consider the destination of products. Appraising precisely the role of UA in urban food supply implies surveys in wholesale and retail markets, and questions on origin and quantities of products traded. This should be conducted at different times of the year to take account of seasonal variations (between twice and four times a year according to the regions). This data collection implies a lot of difficulties, as most fresh products are sold either early in the morning or late in the evening or in the night. When time is limited, the studies have to focus on some products, at least the fresh vegetables as they provide the bulk of what is supplied by urban areas. Hence these surveys have also their limitations as they do not cover all days of the year and all markets. But they often provide unique material on the contribution of urban agriculture to food marketed in the major urban wholesale and retail markets.

Figures on the importance of UA in urban food markets using such surveys have been gathered in Cirad case studies in Central Africa conducted between 1990 and 1995. Details on surveys and results are given in David, 1992 (for Bangui), David and Moustier, 1993 (for Bissau), Moustier, 1996 (for Brazzaville), Laurent, 1999 (for Nouakshott). More recently, between 2002 and 2005, similar surveys were conducted in Vietnam

(Hoang Bang An and al, 2003), Laos (Kethongsa and al, 2004) and Cambodia (Sokhen and al, 2004; Moustier and al, 2004). The IDRC supported similar studies in Ghana via IWMI (Drechsel et al., 2004). Secondary data on contribution of urban agriculture to food supply was also used in the paper for other cities, and for staple food crops (see references in Table 1). Besides, Cirad studies involved in-depth interviews on a sample of farmers and traders on the relationships between buyers and sellers, in particular, the regular nature of the relationship and the possible commitments in terms of quality.

In the paper UA is defined as agriculture located inside the city (intra-urban agriculture) and at its close periphery (peri-urban agriculture) for which there is an alternative between agricultural and non agricultural urban use of resources. This alternative generates possible competition and complementarity between resource uses: land for housing versus agricultural purposes; water for drinking versus irrigation; urban wastes possibly recycled for agriculture (Moustier and Mbaye, 1999; Mougeot, 1999). While the location of intra-urban agriculture may be defined by the administrative boundaries of the city, the delineation of peri-urban agriculture is more difficult, even with the above specifications, and encompasses some level of arbitrary choice. In the cities we investigate (see references above for Africa and Asia), the boundaries of UA as previously defined extend until around thirty to fifty kilometres from the city centre.

MAIN RESULTS

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

The available data confirm the importance of UA in the provision of perishable food commodities, including fresh perishable vegetables, dairy products and plantain banana (see Table 1, Table 2, Table 3). Fresh vegetables supplied by UA are especially leafy vegetables, like amaranth, sorrel, morel, cabbage, lettuce and chives. These vegetables top the list of vegetables consumed, in Africa and in Asia, with onion and tomatoes (Moustier and David, 1997; Ali, 2000). They are well known for their fragility: after one day they are no longer fresh - in countries where freshness is an important criterion for consumers who do not often have 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 UA origin represents more than 70% of the quotations in all the cities investigated. In Hanoi in 2002, more than 70% of all leafy vegetables came from a production radius of 30 kilometres around the city. 95-100% of all lettuce comes from less than 20 kilometres away, while 73-100% of water convolvulus is harvested less than 10 kilometres from the city (Hoan Bang An et al, 2003). In Phnom Penh, urban areas, i.e., those located inside the municipality, are supplying all the kangkong marketed in Phnom Penh (estimated from our market surveys at 2,000 tons per year). This is a vegetable particularly important for the consumption of the poor (Agrisud, 2000). Kangkong is especially produced in Dangkor and Mean Chey districts.

In the case of less perishable vegetables, such as tomato and cabbage, which can stay fresh for a few days, supply varies from peri-urban to rural production and the share of peri-urban percentage of supply is highly variable according to the city under study and season. Dry onion, which is even less perishable, originates only from rural areas or from imports in the investigated cities of Africa. As regards staple food, like rice, plantain banana and maize, the situation is highly variable according to the cities. In Asia, the share of rice supplied by the city to urban residents ranges from 7% (in Phnom Penh) to 100% (in Vientiane, where pressure on land is low), Hanoi being an intermediary case with 58% (Mai Thi Phuong Anh and al, 2004; Ali and al, 2006), and a steady decrease in the production of rice in favour of vegetables.

Complementarities in Time

A comparative advantage of urban agriculture may be in the period of the supply as compared with rural areas, either because of specific natural conditions (the positioning of cities has sometimes be related to the agricultural potential of the hinterland, this is the case of Dakar), or because the urban farmers are able to have more continuous supply because of more specialised and irrigated production– a characteristics they may share with some specialised rural areas. This comparative advantage is especially observed in areas of dry climate and in the dry season for the temperate vegetables, while in the rainy season, the access to non-flooded areas is easier in rural areas: in Mauritania, 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. In Hanoi, while 75% of tomato is grown less than 30 km from Hanoi during the cold dry season, 80% of tomatoes originate from China and 15% from Dalat, located more than 1000 km from Hanoi, in the rainy season (Hoang Bang An et al, 2003). In Phnom Penh and Vientiane, the market is supplied with peri-urban tomatoes in the dry season, extending from November to April, and by a combination of peri-urban, imported and rural sources the rest of the year (Sokhen et al, 2004).

The characteristics of proximity in market organisation

1. Short marketing chains

Urban-produced commodities are distributed through short marketing chains relative to rural commodities (see Figure 2). The extreme case is direct producer involvement in retail sales: this is the case of 30% of all transactions 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 in the field or in 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. In Hanoi, more than 40% of all wholesale market sellers are also producers; this percentage goes up to 100% for water convolvulus (kangkong).

Quantities collected are small: between 5 and 10 kilos of collected and sold produce per day per retailer/collector in Brazzaville. In Hanoi, producers bring 100 to 200 kilos per day to wholesale markets on overloaded bicycles or scooters. For Vietnamese rural producers, the wholesaler/collector step is more systematic, as it exists for more than 70% of all produce from rural areas. Wholesalers bringing vegetables between the North and the South of the country can sell up to 100 tons a day (Bui Thi Thai, 2000). In Phnom Penh, the marketing chains of kangkong are short, and 57% of retailers are directly supplied by the farmers, who get more than 50% of the final price. Hence the kangkong growing areas are important from a poverty point of view both for farmers and consumers (Sokhen et al, 2004). On the other hand, tomato, which mostly originates from Vietnam, is traded through collectors and wholesalers between reaching the retail stage for more than 60% of transactions.

Some cities display variations relative to the described situation of short marketing chains between production and consumption for peri-urban vegetables. In Vientiane, despite the short distance between farms and markets, the marketing chains are characterised by a certain complexity. The combination between wholesale and retail, collection and wholesale, is frequent: more than half the traders combine different functions. The typical chain involves farmers, collectors, wholesalers and retailers. More than 65% of quantities traded involve more than one intermediary between farmers and retailers, even for a perishable vegetable like water convolvulus. The frequent

overlapping of functions may be explained by the absence of a specific location for wholesale marketing which takes place at the same places than retail transactions, and also by the small volumes transacted (less than 200kg/day for wholesalers and retailers) and the modes of transport (tuk-tuk is dominant).

The strong involvement of farmers, or their relatives, in the marketing of their products, can be termed as vertical integration, which bears a positive impact as regards the reduction of transaction costs implied with the marketing of perishable products, of varying quality characteristics (see basic theory on the relationship between transaction cost reduction and institutional arrangements in Williamson (1985) and applications in the horticultural sector in Jaffee (1995), Lyon (2000), Moustier (1996)). It is also explained by the small-scale of production and low final 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 even more to the fragmentation of the final supply, while economies of scale could be reached by more collective marketing. Experiences of collective marketing are little developed in periurban areas though, or little successful, 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 draw marketing results downwards. Yet there are some successful examples when farmers share similar characteristics, and have identified reliable marketing outlets, e.g., the safe vegetable cooperatives in Hanoi and Ho Chi Minh City (see Moustier and al, 2006), as well as 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). Yet such experiences, and especially their economic efficiency relative to individual marketing, are not enough documented. Besides, the lack of concentration of production in place and time makes the circulation of market information difficult among farmers as regards the state of market supply. A solution to this problem is the reliable information to both producers and traders regarding untapped outlets, and also to facilitate discussions among them on strategies for adapting supply to demand. Such a vegetable market information and consultation system has been set up in Vietnam (see Hoang Bang An and Moustier, 2006).

2. Relational proximity Relational proximity is a common feature of the relationships between farmers and traders in developing countries, especially for perishable products. It has been documented by a number of research for marketing chains from rural as well as urban areas (see Lyon, 2000, Cadilhon and al, 2006), and as such is characteristic of urban areas in the only aspect that perishable products are more frequently found there. What may be more specific of urban areas is the existence of relational proximity between farmers and consumers, and the possible existence of direct relationships between them. Farmers’ markets where farmers meet consumers directly have been especially well documented by Kirwan (2004) in England. In developing countries, direct sales are also observed as a way of promoting organic or IPM vegetables, like the farmers’ direct delivery to a list of consumers is organised in Hanoi and in Phnom Penh with the support of a marketing company and of an NGO respectively. This has also been observed for mushroom farmers in Accra with their door-to-door delivery of fresh mushrooms to targeted consumers (Danso et al., 2005). Marketing chains are all the more short that the farmers try to promote the safety of their products (see below).

The advantages of proximity

1. Low price differential Short marketing chains enable low price differential between farm and final consumption: these account for 30 % on leafy vegetables in Hanoi, 35 % to 50% for cabbage and 75 to 80 % for tomato, while they are more than 100% for vegetables brought from Dalat or China, and more than 200% for vegetables traded from Red River

Delta to Ho Chi Minh City (Gia B.T., 1999; Thai, 2000; Son et al, 2002; Moustier, 2006). In the rural chains, wholesalers' incomes may be up to ten times higher than that of farmers (but the risks of bankruptcies are also higher for wholesalers and they also make more investment). Price differentials are higher for rural products due to higher transportation costs and higher wholesalers' margin rate. While the prices of periurban 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, the price of tomato, onion, pork and fruits fell from 3 to 1 between 1999 and 1994, the period when the urban agricultural programme was launched (Novo, 2002). The government has provided free land access for more than 26000 gardeners, technical training on organic and hydroponic cultivation (Moskow, 1999).

2. Freshness In a situation of limited access to fridges, freshness is especially valued by urban consumers. In Thiès (Senegal), more than 90% of 150 interviewed housewives declared they thought it is important that vegetables are grown nearby, for freshness and quick access (Broutin et al, 2005). In Vientiane, freshness is the criteria of vegetable choice quoted by the highest number of consumers (71% out of 100 interviewed, in Potutan et al, 1999). In Hanoi, freshness is the advantage of periurban vegetable production quoted by 74% respondents out of 500 in 2003 (Figué, 2004).

3. Information and control of food safety It is commonly believed that food safety risks are higher in the production in urban areas than in rural areas, because of the various sources of pollution (e.g., heavy metal in water used for irrigation), and limited land area pushing the farmers towards an excess use of fertilisers and pesticides. Yet studies comparing safety risks in urban and rural areas are difficult to find. When measuring pesticide residues in peri-urban Hanoi, Phnom Penh, Vientiane, as well as in Dalat, a rural area of Vietnam, excess pesticide residues were found for some types of leafy vegetables in all locations, apart from peri-urban Vientiane (Sokhen and al, 2004; Kethongsa and al, 2004). Besides, many variations were found in peri-urban Hanoi according to the location of the vegetable field depending on farmers having gone through regular IPM training. Yet growing vegetables in wastewater is indeed a source of concern. In Mean Chey district of Phnom Penh, there is a specific production of 35 hectares of water spinach in the wastewater basin (Boeung Tumpon), where 838 families of fishermen are living (according to the statistics of department of statistics in 2001). Some analysis of water spinach carried out by Susper project shows excess residues of heavy metal in the water spinach. A project of the municipality to treat the waste water for reuse in agriculture may solve this problem.

On the other hand, the proximity of production areas with consumers provides them with advantages for easier quality control. In Hanoi, supermarkets, shops and restaurants are mostly supplied by three cooperatives located in the peri-urban areas where production along IPM or organic standards is certified by government bodies (Moustier and al, 2006). Proximity enables frequent contacts between farmers, traders, and consumers and the checking of the production process. This is particularly the case for Van Tri cooperative, whose members sell vegetables directly retail to consumers, or of organic farmers, who may deliver directly baskets of vegetables to households. Proximity between farmers and consumers is not a perfect substitute to public independent control, which is still deficient in Vietnam, but it indeed reinforces incentives for farmers not to deceive their purchasers' trust. The Van Tri cooperative is an interesting example of successful collective action and vertical integration in the chain. It comprises thirteen members who grow about 100 tonnes of vegetables per year on an area of 3 hectares,

along the guidelines on safe vegetable production developed by the ministry of agriculture. In 2004, the Van Tri cooperative's vegetables were retailed via ten points of sale managed by a member of the cooperative, selling an average of 200 kilograms of vegetables per day. 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. The collective action of the Van Tri producers allows them to create a collective good, the reputation for quality, which could not be achieved through individual actions (Tallec and Egg, 2003). At the moment, the system needs some improvement as regards the control of vegetable quality, as it is mostly an internal system of control by farmers themselves and extension agents. 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 (Tam and Loan, 2005).

In India farmers located around Aurangabad sell their vegetables through urban organic bazaars organised on a fortnight basis. Local certification is obtained through "eco-volunteers", people usually working in the vicinity of the vegetable farmers (Mukhi, 2005; den Braber, 2006). The irregular nature of vegetable production is a major drawback of all direct sales by organic or IPM farmers, as they are tempted to buy from other sources than their own, which then creates more difficulties to guarantee the safety of the product (den Braber, 2006).

DISCUSSION AND CONCLUSION

The importance of peri-urban areas in supplying fresh, perishable products, while the rural areas supply more bulky and easy to store product, is in line with Von Thünen predictions. Besides, peri-urban areas have transport cost advantage relative to rural areas which translate into lower final price. Yet it could be argued that the situation is distorted by land costs which do not reflect the real value of land if the free land market was in operation. But in the same way, it could be argued that the cost of transport from rural to urban areas is distorted by the lack of taking account of the externalities created by negative environmental impact of transport by road. The growing shortage of oil will indeed make corner food supply even more valuable than at present.

The paper shows that rather than opposing rural and urban areas, it is better to consider them in a complementary way as none of them taken separately can entirely provide for the urban consumption needs (illustrated in Figure 3). It also suggests that in addition to the reduction of physical transport costs, bringing production close to consumption reduces the information and transaction costs related to marketing by favouring direct contacts between producers and consumers. This is especially important when guaranteeing food safety is at stake.

Other factors than distance also give specific advantages to urban agriculture. In certain cases the hinterland of cities is especially favourable for agriculture, and the city was indeed established in a given location because of a rich agricultural hinterland. Besides, compared to rural areas, farmers are motivated to earn regular cash income all year-round out of small plots to buy food and ensure a regular livelihood – while in rural areas some land can be reserved for subsistence food production. This explains why urban production tends to be less seasonal than rural production, an important factor for guaranteeing food security in urban areas.

The possibility for citizens to exert control on the way food is produced can indeed be considered as a legitimate right: « From a food-democracy viewpoint, one's right to be fed needs to embrace one's right to feed oneself » (Koc et al, 1999). Yet, the

development of international trade, as well as the globalization of capital in food distribution is now widely documented (see in particular Mc Michael, 1984; Reardon and Berdegué, 2002). This creates risks of growing distance between producers and consumers. 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 relink them through buying and selling (Friedmann, 1994, p. 272). The pressures to regionally reconstruct links between producers and consumers is apparent in many places, whether from economic desperation or from urban politics that place a higher priority on ecologically sound land use and uncontaminated foods than on the social and technical imperatives of monocultural farming” (Friedmann, 1994, p. 272 and p. 274).

The impact of supermarkets and restaurants development on the characteristics of supplying chains including proximity versus distance should be paid greater attention: as seen in the previous section, the proximity between production and distribution can confer advantages to urban farmers in terms of promotion of their product quality, itself an advantage for the supply of supermarkets – if urban farmers can ensure regularity of product supply through large-scale production with the characteristics of entrepreneurial or farmers’ group production.

Finally, in addition to its role in urban food supply, urban agriculture plays a number of environmental, social and economic functions, which still has to be recognised by the urban authorities. Multifunctionality, usually defined as the multiple roles or objectives that society assigns to agriculture, including economic, social and environmental roles, is a typical characteristic of urban agriculture (Vollet, 2002; Véron, 2004; Duvernoy and al, 2005; Ali and al. 2006). Urban agriculture creates landscape, i.e. a public good, from which users cannot be excluded. This makes 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 (in Southern countries and in Northern countries as well with family gardens); social insertion and jobs. Within cities, other sectors create landscape, such as parks, to which UA can be compared. 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.

The multi-functionality of urban agriculture makes it a ‘cheap’ producer of public good. Table 4 compares the ‘scores’ of three urban sectors: industry, parks and agriculture in terms of the production of different goods and services. It shows that agriculture gets the highest combined mark.

Increasing distances between urban centres and agriculture is, however, irreversible, if market forces are given a free hand. This is due to the fact that it is more economically sound to develop land than farm it, other than such exceptions as swamps. Hence, from a political economy viewpoint, it is legitimate that the public sector supports UA agriculture. In fact for urban agriculture to be successfully maintained in the city, farmers and non farmers should share some objectives, duties and rights to examine (from the urban residents’ side, on landscape and environment; from the farmers’ side, on protection relative to land development). Instead of claiming a specific space for urban agriculture, farmers have to negotiate its sharing with other users (Mbiba and van Veenhuizen). In the Southern Holland city of Delft, a farmer was able to negotiate a 12-year term lease for 35 hectares of land with the municipality thanks to his commitment into producing organic vegetables and milk, and also the setting aside of 5 hectares of land for nature preservation (Deelstra et al, 2001).

Four areas of support are particularly relevant for public support to UA: (i) integration in urban planning; (ii) financial support, (iii) research and extension for more

profitable and sustainable intensive commercial vegetable and animal systems (Midmore and Jansen); (iv) innovative marketing, including quality labelling. The municipality has a crucial role to play to organise such a support, in collaboration with national and international programmes.

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REFERENCES

- Agrisud, 2000. Approvisionnement et consommation des ménages en produits alimentaires à Phnom Penh. Agrisud international, Bordeaux, 45p.
- Ali, M. 2000. Dynamics of vegetable production, distribution and consumption in Asia. Asian Vegetable Research and Development Center, 470 p.
- Ali, M., de Bon H. and Moustier, P. 2005. Promoting the multifunctionality of urban and peri-urban agriculture. In *Urban Agriculture Magazine*, n°15, pp. 9-11.
- Braber, Koen den, 2006. Developing local marketing initiatives for organic products in Asia. A guide for small and medium enterprises. IFOAM, 45 p.
- 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>.
- Hoang Bang An and Moustier, P. 2006. Proceedings of regional workshop on market information and consultation systems, Hanoi, CIRAD, RIFAV, 154 p.
- 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.
- Cadilhon, J.J., Fearn, A.P., Phan Thi Giac Tam, Moustier, P., Poole, N.D., 2006. Traditional versus modern distribution systems: Insights from vegetable supply chains to Ho Chi Minh City, *Development Policy Review*, vol 24, n°1, pp. 31-49.
- 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, 17th March 2003.
- Danso, G., Keraita, B. and Afrane, Y. 2002. 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., and Drechsel, P., 2003. The marketing manager in Ghana. *Urban Agriculture Magazine* 9 :p.7. www.ruaf.org
- 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/
- David O., 1992. Diagnostic de l'approvisionnement de Bangui en légumes. Mémoire de stage de l'ESAT, CNEARC/AFVP/CIRAD, 162 p.
- David, O., Moustier, P., 1993. "Systèmes maraîchers approvisionnant Bissau: résultats des enquêtes". Montpellier, CIRAD/UR ECO-FIL, n° 7, 57 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.
- Dongmo, J.L. 1990. Approvisionnement alimentaire de Yaoundé, CEPER, Yaoundé, 229 p.
- Duvernoy I., Jarrige F., Moustier P., Serrano J. 2005. Une agriculture multifonctionnelle dans le projet urbain : quelle reconnaissance, quelle gouvernance ? Les cahiers de la multifonctionnalité n°8, pp. 87-105.
- Ellis F., Sumberg J., 1998. Food production, urban areas and policy responses. *World Development*, 26, pp. 213-225.

Gia, B.T. 1999. Vegetable production and marketing in Hanoi. In: Hanoi Agricultural University and HAU-JICA ERCB project, Agricultural products marketing in Japan and Vietnam, proceedings of the first joint workshop at faculty of economics and rural development, pp. 37-47.

Figuié, M. 2004. Consumers' perception of tomato and water convolvulus quality in Hanoi. Hanoi, SUSPER project, <http://www.avrdc.org/susper>, 44 p.

Friedmann, H. 1994. Distance and durability: shaky foundations of the world food economy. In Mc Michael, op. cit., pp. 258-277.

Henderson, V. 2002. Urbanization in developing countries. The World Bank Research Observer, vol. 17, n°1, pp. 89-112.

Huriot J.M., 1994. Von Thünen : économie et espace. Paris, France, Economica, 352 p.

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.

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.

Koc, M., Mac Rae, R., Mougeot, L.A. et Welsh, J. 1999. For hunger-proof cities : sustainable urban food systems. Ottawa, CRDI, 239 p.

Laurent, M. 1999. L'approvisionnement de Nouakshott en légumes. Montpellier, mémoire de master, CNEARC/CIRAD/CNRADA, 206 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.

Mbiba, B. et Van Veenhuizen, R. 2001. L'intégration de l'agriculture urbaine et périurbaine dans l'urbanisme. Editorial. Magazine Agriculture Urbaine, Leusden, RUAUF, pp. 1-6.

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

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.

Mougeot L., 1999. Urban agriculture: definition, presence, potentials and risks, and policy challenges. Paper presented at International Workshop on Growing Cities Growing Food: Urban Agriculture on the Policy Agenda, La Habana, Cuba, October 11-15, 51 p.

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., 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. 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., Figuié, M., N.T.T. Loc and H.T. Son, 2006. The role of coordination in the safe and organic vegetable chains supplying Hanoi. In *Acta Horticulturae*, n°699, pp 297-307.

Moustier, P. 2006. Market development for fresh peri-urban produce: summary of Susper project activities. Hanoi, CIRAD, 23 p. (on line on <http://www.avrdc.org/susper>).

Moustier, P., Chhean Sokhen, Chan Sipana. 2005. Opportunities for vegetable marketing in Phnom Penh from peri-urban areas, 10 p. (on line on <http://www.avrdc.org/susper>).

Novo, M.G. Urban agriculture: reduction of prices in Havana. *Urban agriculture magazine* n°7, 2 p.

Prochander, S. 2003. Hopcoms: a success story of horticultural cooperative marketing. *Urban Agriculture Magazine*, pp. 18-19.

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.

Sokhen, C., Kanika, D., Moustier, P. 2004. Vegetable market flows and chains in Phnom Penh., <http://www.avrdc.org/susper>, 45 p.

Phan Ti Giac Tam and Le Thanh Loan, 2005. Assessing poor farmers' participation in DVCs: the case of water convolvulus and tomato in HCMC, MALICA/MMWB4P, Hanoi, 46 p.

Tallec 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.

Thai, B.T. 2000. Commercialisation des légumes d'hiver dans la zone de Bac Hung Hai. Programme Fleuve Rouge, INCO/VASI/GRET, hanoi, 42 p.

Torre, A. Economie de la proximité et activités agricoles et agro-alimentaires. Elements d'un programme de recherche. In *Revue d'Economie Regionale et Urbaine*, n°3, pp. 407-427.

United Nations, 2003. World Urbanization prospects. The 2001 revision, United Nations, New York, 180 p.

Vollet, D. 2002. Présentation de la problématique de l'atelier "multifonctionnalité et territoires", In : Les cahiers de la multifonctionnalité, pp. 5-7.

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.

Yi-Zhanh Cai and Zhagen Zhang, 2000. Shanghai: trends towards specialised and capital-intensive urban agriculture. In Bakker and al, op. cit.

Figure 1– Urban agriculture, a response to urbanisation challenges

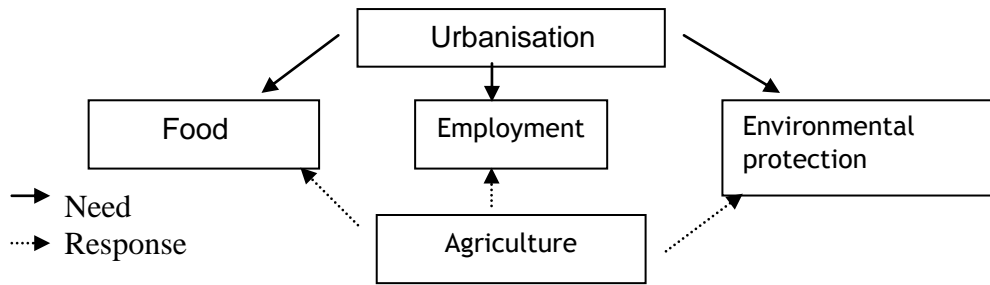


Figure 2-Marketing chains for UA and rural agriculture

<p>Short urban vegetable Commodity Chain Farmer → (Collector) → (Retailer) → Consumer</p>
<p>Long rural vegetable Commodity Chain Farmer → Collector → Wholesaler → Retailer → Consumer</p>

Figure 3-Complementary rural and UA vegetable flows

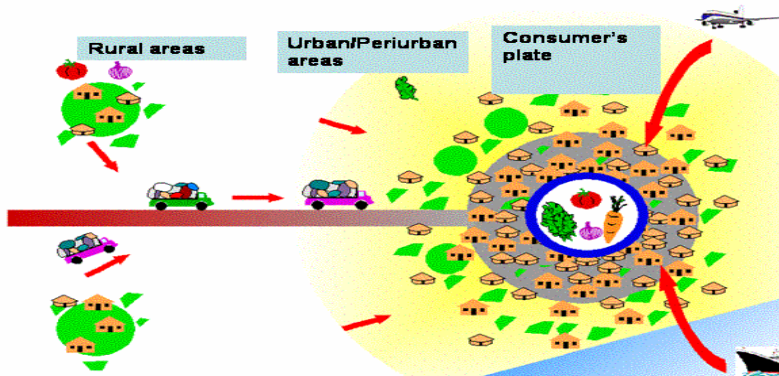


Table 1- Percentage given to urban production in urban supply in various cities of Africa and Asia

	Leafy vegetables	Tomato	All vegetables	Maize	Plantain banana	Rice	Milk	Dry onion	All
Brazzaville (1)	80%	20%				0%		0%	
Bangui (2)	80%	40%				0%		0%	
Yaoundé (4)	80%	25%		90%	60%	0%		0%	
Bissau (5)	90%	50%				0%		0%	
Nouakshott (6)	90%	10%				0%			
Dar es Salaam (7)			90%				60%		
Dakar (8)			60%					0%	
Kumasi(9)		60%	90%	10%	15%				
Accra (10)			90%						
Hanoi (11)	70%	0 to 75% according to season	40%			58% (12)			44% (12)
Phnom Penh (13)	100%	0 to 50% according to season				7%			
Vientiane (14)	100%	20 to 100% according to season				100%			
Shanghai (15)			60%				90%		
Havana (16)			58 %						

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.,2003;Cofie et al.,2003; (11) : An et al, 2003 ; (12): Mai Thi Phuong Anh et al., 2004; (13): Sokhen, Dianika and Moustier (2004); (14): Kethongsa, Khamtanh and Moustier (2004); (15): Yi-Zhang and Zhangen(2000). See also Urban Agriculture Magazine 2002 special edition for world food summit for other figures).

Table 2- Typology of vegetables according to their origin in Phnom Penh

- origin represents more than 90% of flows in 2002 and 2003 (surveys done in January, April, July and October)-

Phnom Penh vegetables	Kandal vegetables	Vietnam vegetables
0 to 20 kilometers	20 to 40 kilometers	400 kilometers
Kangkong	Choysum Lettuce Yard longbean	Tomato (*) Cabbage Chinese cabbage

(*) except in January 2003 and 2004 when tomato originates from Cambodia (peri-urban and rural areas).

Source: Sokhen and al (2004); Moustier and al (2005)

Table 3- Typology of vegetables according to their origin in Vientiane

- origin represents more than 90% of flows in 2002

Vientiane vegetables 0 to 30 kilometers	Thailand vegetables 30 to 500 kilometers
Kangkong Pakchoi Chinese mustard Lettuce Eggplant Tomato, Chinese kale and cucumber between September and July	Tomato, Chinese kale and cucumber (between July and September)

Source: Kethongsa and al, 2004.

Table 4- Comparative Multi-functionality of three urban sectors

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

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