4. Financial and Economic Aspects of Urban Vegetable Farming

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This chapter explores some of the financial and economic aspects of urban and peri-urban agriculture in Ghana. Cost-benefit analysis comparisons were made of farm finances of common rural, peri-urban and urban farming systems. Substudies also tried to quantify benefits for society and to cost externalities related to soil nutrient depletion, pesticide use and urban malaria.

While a financial cost-benefit analysis which reflects the perspective of the farmer is as a procedure straightforward, the comparison of vegetable farming systems using freshwater or wastewater can be difficult. There are hardly any locations where both systems are next to each other, which increases the number of confounding factors which have to be controlled. Also comparing the cost and benefits of wastewater-irrigated vegetable farming between locations is difficult as most farmers fetch water from polluted streams, where both, the (value of) beneficial nutrients as well as the detrimental pathogens can vary in large ranges depending on the degree of dilution, although all might be called 'wastewater irrigation'. The largest challenge concerns the assessment and valuation of possible impacts on farmers' health where polluted water sources are used as these have to rely on farmers' perception of risks, knowledge of symptoms and memory (Weldesilassie et al. 2011). Thus, all examples and data reported in this section have to be taken with caution.

4.1 Financial Aspects of Irrigated Vegetable Farming

In terms of labor input, Tallaki (2005) analyzed costs and returns of urban vegetable farming, and found that manual irrigation was the most time-intensive activity (38% of total hours), followed by weeding (23%). While irrigation is mostly done by the farmer, land preparation activities, like clearing and bed formation, as well as weeding are larger cost factors as they rely more on hired labor as also observed in peri-urban Kumasi (Cornish et al. 2001; Cornish and Lawrence 2001). Once the land is cleared cultivation can run within cities year-round reducing the initial costs. Use of hired or family labor varies considerably between locations, with more family involvement in peri-urban areas.

Labor input also depends on soil quality, not only for bed preparation but also irrigation. Up to 70% of farmers' time was spent on irrigation on sandy soils, such as along the beaches of

Lomé (Tallaki 2005). Pump access can reduce time input for watering by more than half, and might be the best argument for hiring a pump if the time can be spent in a better way (Cornish and Lawrence 2001).

Though wastewater-polluted irrigation water carries crop nutrients, the concentrations are usually low due to dilution (Erni et al. 2010) and vegetable farmers rely significantly on other nutrient sources as well as pesticides. In Kumasi and Accra, the use of poultry manure is very common due to its easy availability and relatively low price which varied between USD0.2 and 1.5/50 kg over the last decade. Only a few farmers use mineral fertilizer in addition to this (mostly for cabbage). In peri-urban Kumasi, many more vegetable farmers use mineral fertilizer (USD14/50kg NPK in 2004 and about USD19 in 2010), but combine it with poultry manure when possible (Drechsel et al. 2004). Variations are related to the crops cultivated by the farmers. Table 4.1 shows farm income data based on costs and returns as recorded by farmers in Kumasi, Takoradi and Accra. The data correspond with records from other cities in West Africa (Drechsel et al. 2006). Income varies depending on the type of crop, season, farm size and investments in labor and improved irrigation facilities, like motor pumps.

TABLE 4.1. Monthly net income from irrigated mixed vegetable farming in Ghana assessed in 2002 (USD per actual farm size).

City	Monthly income (USD)
Accra	40-57
Kumasi	35-160
Takoradi	10-30

Comparing different farming systems, the data from the Kumasi study showed that urban farmers with access to irrigation water are able to cultivate year-round and can reach annual income levels of USD400 to 800 (see Table 4.2). This is twice the income they would earn in the rural setting. However, being successful this way requires careful observations of market demand (Danso and Drechsel 2003). The greatest factor influencing farmers' profits is not so much the yield obtained but producing at the right time what is in short demand and the ability to sell consistently at above average prices (Cornish and Lawrence 2001).

TABLE 4.2. Revenue generated in different farming systems in 2002.

Location	Farming system	Typical farm size (ha)	Net revenue (USD) per actual farm size per year (range)
Rural/peri-urban	Rainfed maize or maize/cassava	0.5-0.9	200-450 [a]
Peri-urban	Dry-season vegetable irrigation *only* (garden eggs, pepper, okro, cabbage)	0.4-0.6	140-170
Peri-urban	Rainfed maize combined with dry-season, irrigated vegetables	0.7-1.3	300-500 [a]
Urban	Year-round irrigated vegetable farming (lettuce, cabbage, spring onion)	0.05-0.2	400-800

[a] These are typical values; subsistence production has been converted to market values. In case farmers use parts of their maize and cassava harvest for home consumption, the actual net income would be lower.

Source: Danso et al (2002a).

As urban farming is land- and labor constrained, typical farm sizes range between 0.05 and 0.2 ha in Kumasi. Comparing the different farming systems, urban wastewater vegetable production in Ghana generates the highest net revenues per hectare based on a combination of lettuce, cabbage and spring onion. Even with plot sizes that are significantly smaller than in rural areas, urban farmers can earn at least twice as much as rural farmers.

An analysis of the different dry-season vegetable production systems in peri-urban Kumasi showed that the combination of pepper, cabbage, tomato and garden egg yielded the highest profit per hectare among the common peri-urban crop combinations being practiced in the survey area. It was obvious that whenever cabbage was part of the combination, the net profit was high. Cabbage has become a major component of street food and the modern diets of the urban middle and upper class income households (Gyiele 2002a).

Even though cabbage-based crop combinations were the most profitable crop enterprises, only about 10% of the farmers around Kumasi engaged in cabbage production. The reasons for this low figure are not hard to find. There is first of all the harsh competition from urban farms specialized in cabbage production. In contrast to urban sites in Accra, some farms in Kumasi have relatively higher tenure security (university land; less construction pressure) and more fertile soils.

In addition, cabbage production is very input-intensive, especially in view of irrigation and pest control. This entails a correspondingly higher expenditure on labor and plant protection chemicals. This is one instance where, despite high profits arising out of high physical efficiency in production, few farmers are willing to undertake it due to higher investment in cash and time. On the other hand, most vegetables offer a quick cash return. Comparing profit as percentage of production costs, the traditional mixed cultivation with oil palms ranked highest but would require much longer investment periods (Gyiele 2002a).

Abban (2003) compared vegetable production in the informal (urban) production sector (Accra city) and commercial irrigation in the Greater Accra Region. He interviewed 60 farmers in each system, most of them practicing multicropping. The author concluded that the gross revenues were four times higher in *formal* irrigation schemes but also eight times the (variable and fixed) production costs. The resulting net returns still favored formal irrigation with an income twice as high as in informal urban irrigation. The benefit-cost ratio in the production period, however, was two times higher in urban agriculture, making it an interesting venture for migrants trying to establish a livelihood with little start-up capital and in need of quick returns.

4.2 Socioeconomic Impact and Urban Food Supply

Urban agriculture can be market-oriented, subsistence-oriented or serving both purposes. It may be practiced as a sole source of income or to supplement immediate household food requirements and is often carried out alongside other forms of employment (Box 4.1).

Important is to differentiate under the general umbrella of ‘urban agriculture’ between on- and off-plot farming, or in other words: back yard gardening and open-space market farming (Table 1.2 in chapter 1). Both contribute to different development goals. While back yard gardening usually serves primarily subsistence purposes and improves farmers’ food security, market gardening aims at cash generation and contributes first of all to poverty reduction.

Moving out of poverty: For peri-urban farmers, dry-season vegetable irrigation adds 40 to 50% income to their rainfed income, especially as significant parts of their rainfed maize and cassava harvest are consumed by the household. Without this additional income, cash availability might actually be less than USD100 per year. Around Kumasi, about 60,000 people in 12,000 households are benefiting from dry-season irrigation (Cornish and Lawrence 2001). However, only a minority of peri-urban farmers shift to year-round vegetable farming.

BOX 4.1. Wastewater irrigation and livelihoods

Accra: Our farmer is a 51-year-old lady, regularly employed as a teacher, who farms part-time at a site using drain water. She is a Christian and is married with five children; she has secondary school education and lives in Osu, 1 km from the farm. She owns a food-processing machine (corn mill) from which she earns about USD25 per month. She earns the same amount from teaching and her husband, an administrative officer, also contributes USD25 per month. But more substantial is that she can add twice the amount from her vegetable beds per cropping period, and a crop like lettuce requires only one month for growing. She says “This small piece of land keeps my family in a better status and supports the education of our children”.

Kumasi: A 32-year-old female farmer who owns about 30 beds, cultivating mainly leafy vegetables explains: “I am a seamstress but I cannot survive without these vegetables. In most cases, I have to prefinance dress sewing with income derived from vegetable production because it can take somebody more than two months to pay for the cost of the dress. I am getting my everyday income from these beds”.

Tamale: ‘‘We started (cabbage) farming many years ago with our parents here. We depend on it. We had to change from wastewater to piped water due to our inability to access water anymore from the drains. Our colleagues are fortunate to have the wastewater still because it makes crops bigger in size and they look better than ours, while the prices of the crops are the same. We have to pay a monthly water bill while they do not pay anything”.

There are three reasons for this: the importance of maize and cassava for home consumption (mentioned by 52% of the farmers interviewed); the lower price of vegetables in the rainy season (40%); and the increased risk of pest attacks (8%) from monocropping. But those farmers who move to urban areas and take the risk make a remarkable step in overcoming poverty. As shown in Table 4.2, urban vegetable farmers can double the maize-cassava income of their rural colleagues and move over the poverty line of USD1.25 per capita.

Individual food supply: As exotic vegetables are most of all a cash crop, the food supply benefits for vegetable farmers are only indirect. The situation is different for farmers specialized in traditional vegetables, where any unsold amount is consumed at home, similar to back yard farming. In Accra and Kumasi, household surveys showed that in each city about 600,000 residents from all income categories benefit from their back yard gardens (IWMI, unpublished). These gardens can be very small (e.g. a few plantains, cassava and chickens). The cultivation for subsistence purposes mainly relieves the household of its necessary budget allocation for foodstuff. However due to space limitations in those cities, back yard gardening does not play a key role in household livelihood strategies regarding food supply (see Box 4.2), but is part of it and reduces to a limited extent households' vulnerability to a food crisis. The situation can be different in cities with lower housing density, like Tamale, where also many larger - so far unbuilt - plots are used for maize or okro farming.

BOX 4.2. Home gardens and food security

An IWMI survey of 120 households engaged in back yard gardening in Accra and Kumasi showed that 3 to 10% of the households take some temporary commercial advantage from the gardening while the large majority uses the gardens only for subsistence supply (Drechsel et al. 2009). The contribution of back yards to household food security has been estimated in terms of the saved cost on food expenditures and direct income from sales. Given the small size of the gardens, the annually saved cost varied between 1 and max. 10% of the overall food expenditures with the higher values in the lower wealth classes. This confirms the magnitude reported a decade ago by Maxwell et al. (2000) in their Accra study that households receive only 7 to 8 percent of their total food in terms of value and calories from their own production. Thus, the contribution of urban back yards to household food security is marginal. However, all households valued the contribution highly. They considered the supplementary food supply, even if the percentage are low, and related reduction in household expenditures as a significant contribution. This might apply in particular to women without any other source of income. Maxwell et al. (2000) also flag potential importance for times of cash-flow crisis.

Another reason for the discrepancy between the quantitative survey and household perception is that every saving counts, even small amounts. Most produced crops are heavy food items (plantain and tubers which constitute the main part of the local diet [*fufu*]). The survey showed that typical back yards in Accra can produce between 44 to 146 kg of cassava and 26 to 104 kg of plantains per year. Although they are in monetary percentages only a small part of the overall annual food expenditures, these households do not have to buy and carry 10 to 25% of their annual needs (Drechsel et al. 2009). For maize even larger degrees of self-sufficiency are possible. Maxwell et al. (2000) estimated that (off-plot) maize farmers might produce enough maize to cover their household maize needs for one to eight months of a year, unless they prefer to sell their produce.

Urban food supply: At the macro level, the contribution of urban agriculture to the Gross Domestic Product (GDP) will be small, but the importance for certain commodities, such as lettuce, cabbage, milk and poultry products might be substantial (Table 4.3 and 4.4), especially if we consider the whole value chain (Cofie et al. 2003; Drechsel et al. 2007). Nugent (2000) reported that urban agriculture can meet large parts of the urban demand for certain kinds of food such as fresh vegetables, poultry, potatoes, milk, fish and eggs. The proximity of production to consumption reduces traffic, (cold) storage and packaging, and related costs.

TABLE 4.3. Contribution of rural, peri-urban and market-oriented urban agriculture to urban food supply in Kumasi (Drechsel et al. 2007).

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

* Using a 40-km radius from the city center.
** Mainly rice, onions and part of the livestock are imported.
*** KNUST farm production.

Emphasizing the contribution of open-space urban agriculture to urban food supply in Kumasi, Table 4.3 shows that the demand for vegetables (like lettuce or spring onions) as well as fresh milk is nearly completely covered by inner-urban production. Food items like tomatoes, garden eggs and cassava as well as eggs and poultry meat are derived from the peri-urban area while staples, such as cocoyam, plantain, maize and rice come from rural areas or via import to the city markets in Kumasi. Another vital part of Kumasi's urban and peri-urban agriculture is poultry production, which is practiced by people from all social sectors. Vegetable farmers in and around Kumasi benefit from this, as it offers them access to cheap but high-quality organic fertilizers (Drechsel et al. 2000). In Tamale, the contribution appears to be smaller, but not all commodities were covered in the survey. There were also significant differences between the lean season (May to August) and the time after harvest.

TABLE 4.4. Contribution of rural, peri-urban and market-oriented urban agriculture to urban food supply in Tamale (IWMI, unpublished).

Crop	Urban %	Peri-urban %	Rural & import %
Yam	0	30	70
Cassava	0	0	100
Plantain	0	0	100
Cocoyam	N/A	N/A	N/A
Rice	15	25	60
Maize	10	25	65
Cabbage	80	20	0
Tomatoes	<5	0	95
Garden eggs	0	15	85
Bananas	0	0	100
Oranges	0	0	100
Okro	10	15	75
Cucumber	0	0	100
Carrot	25	0	75
Onions	0	0	100
Sorghum	<5	30	65

An FAO study based on living standard surveys reported for Accra that urban dwellers engaged in farming show greater dietary diversity and an 18% urban income share from agriculture, with higher percentages in the poorest section of the urban society (Zezza and Tasciotti 2008). However, this does not automatically imply ‘urban’ farming. In the local survey which informed the FAO conclusions households were asked about their activities for income generation. Unfortunately, the questions did not ask in the section on ‘farming’ about where the farm is located and many urban dwellers own plots in rural areas that are used for agriculture, or also so far unbuilt urban plots still used for rainfed production of maize.

Contributions to other urban development objectives: Urban farming can make substantial contributions to the city beyond the provision of livelihoods and food. These include among others contributions to buffer zone management and flood control, thus supporting climate change adaptation strategies, land reclamation, land protection, resource recovery (from waste), urban greening, biodiversity conservation etc. (see also chapter 15).

These contributions might be more important for some authorities than the food production itself but have not been quantified and assessed so far. An example is that urban open-space farming protects unused land from squatters and uncontrolled waste dumping, thus saving on expenditures on land maintenance and waste collection (Anku et al. 1998).

4.3 Possible Negative Externalities

When assessing the benefits of urban open-space vegetable production to society, there are also a number of possible negative externalities, which should not be ignored. A related checklist of environmental criteria applicable to urban agriculture was compiled by Anku et al. (1998). Examples of possible trade-offs are:

- The potential impact of polluted irrigation water on farmers' and consumers' health;
- The potential impact of pesticide use on farmers' and consumers' health;
- Increased urban malaria through the creation of mosquito breeding grounds;
- Soil nutrient depletion through frequent harvests and/or water pollution by farmers through the (over)use of manure, fertilizers and pesticides;
- Stream siltation and eutrophication through erosion from cultivated slopes.

In the following sections, available data from Ghana have been compiled to illustrate possible dimensions and implications of the abovementioned negative externalities. Many of these studies are based on geographically-limited thesis work and more extensive studies are recommended.

a) Possible Health Impact Through Pathogens in Irrigation Water

Analyses of water samples, harvested vegetables along the marketing chain and salad sold in fast food kitchens and restaurants in all major Ghanaian cities confirm a high pathogen threat. The vegetable contamination levels with fecal coliforms are seldom below 10^4-10^5 (MPN $100ml^{-1}$) and no vegetable leaves the farms with fewer than 2-6 helminth eggs per 100 g (Amoah et al. 2005, 2006, 2007a; Mensah et al. 2002; IWMI, unpublished). A microbial risk assessment estimated a possible loss of about 12,000 disability-adjusted life years (DALYs) annually in Ghana's major cities through the consumption of salad prepared from wastewater-irrigated lettuce (Drechsel and Seidu 2011). This figure represents nearly 10% of the World Health Organization (WHO)-reported DALY loss occurring in urban Ghana due to various types of water- and sanitation-related diarrhoea (Prüss-Üstün et al. 2008; GSS 2004).

A major challenge for the economic valuation of this risk is that most farmers and consumers are generally exposed to a variety of similar or even higher pathogen-related risk factors in their normal environment (poor sanitation, lack of potable water, unsafe food, etc.), which makes it difficult to distinguish and value individual risk factors, especially if the concerned persons do not perceive and record any particular work- or consumption-related symptoms.

b) Possible Health Impact Through Pesticide Misuse

A pilot assessment of the misuse of pesticides on farmers' health was attempted by KNUST-IWMI in the tomato-producing area of Akumadan, Ghana (Gyiele 2002b). The town of Bechem with dominantly traditional staple crop farming was used as a control. Sources of data were farmers, hospitals/health posts, pharmacy/chemist shops and traditional medicine practitioners (herbalists). Health records from January 2000 to May 2001 were analyzed from about 10,000 persons per study area. In addition, about 170 farmers were interviewed and 200 samples of tomato fruits analyzed for pesticide residues. Both locations do not fall under 'irrigated urban agriculture' where studies by Amoah et al. (2006) showed higher pathogen than pesticide risks. However, the Akumadan site could be considered an example of an irrigation system with a well-known high pesticide use, and a higher share of farmers reporting likely related symptoms. For example, records on burning sensation in the eye, watering eye, nausea and vomiting, were for Akumadan 56, 63 and 51% higher than for Bechem (Obuobie et al. 2006). The methods used for the economic assessment at the farmers' level were:

- Cost of medical treatment;
- Opportunity cost of labor, i.e. absence from farming activities due to pesticide poisoning;
- Cost of drugs for treating minor illnesses.

Considering these three approaches, the annual health costs amounted to USD125 per tomato farmer (Gyiele 2002b). With farm sizes under tomato cultivation ranging mostly from 0.3 to 2.0 ha, it becomes obvious that smallholders in particular have to pay a significant share.

These costs were compared with the gains from pesticide use compared to pesticide-free tomato production based on Integrated Pest Management (IPM) principles and biological pesticides. According to farmers' records it appeared that when there was no or little pest attack, both systems achieved the same yields and returns, while under severe attack the IPM farmers were at higher risk of loss than those using pesticides. These initial data still need reconfirmation. However, urban farmers in Accra also stated that despite lower investment costs, IPM appeared to them as too cumbersome and risky, compared to spraying 'plant medicine'.

c) Possible Health Impact Through Increased Urban Malaria

In comparison with rural areas, West African cities are relatively malaria-free due to general water pollution. The malaria vector *Anopheles* needs, in general, clean water for breeding. Mutations of the vector to less clean water could however occur (Chinery 1984). In a malaria study on a 10-ha urban farming site in Accra (Dzorwulu) with 77 farmer-built shallow water reservoirs filled with either tap water or polluted water, either water pollution or natural predators (e.g. tadpoles) effectively controlled larval development (Miah 2004). Nevertheless, studies conducted by IWMI in Kumasi and Accra (Afrane et al. 2004; Klinkenberg et al. 2005) showed that in some cases, significantly more mosquitoes were caught and/or more children affected in communities around irrigated farming sites than non-farming sites. However, as urban agriculture is often practiced in urban lowlands or other greener areas, which might generally offer more nesting and breeding grounds for mosquitoes than other city sites, an explicit link with urban *farming* activities could not (yet) be established in these cases. There is a need for urban malaria studies using green areas without farming as a control.

A preliminary economic assessment of the potential health expenditure of community members living near irrigated urban farming sites was based on a comparative study of urban areas with and without open-space farming considering treatment costs and working days lost. The analysis showed that on average, for all age groups, sites with urban agriculture increase the risk of a malaria attack by 0.22 attacks per person during a period of six months. In other words, every fourth to fifth person in the vicinity of irrigated urban agriculture will have malaria one time more than if he/she were living in a pure urban area. With a typical malaria treatment cost of USD1.0 per case, an urban household in the vicinity of urban agriculture will spend an extra amount of USD0.22 x 6.6 household members for malaria treatment, i.e. USD1.45 over the observation period (Obuobie et al. 2006).

In addition, about 0.5 extra days will be lost per adult person in communities with urban agriculture than in those without. Considering average estimated household income, the number of working household members and the unemployment rate, the loss will cost the household another one dollar. In total, USD2.45 was attributed to each household over the six-month period as extra malaria-related expenditure in urban communities with open spaces used for irrigated urban agriculture (Gyiele 2002b).

d) Possible Environmental Impacts

Water pollution: In view of water pollution through fertilizers and pesticides, Gyiele (2002b) and Bowyer-Bower and Tengbeh (1995) concluded that the observed or likely contributions from urban smallholder farms are insignificant in view of the general pollution by the city. This could be different in less densely populated towns or in rural areas where agriculture might be the only source of pollutants.

Run-off and erosion: In Ghana, the creation of the Buffer Zone Policy (see chapter 15) started a debate on whether urban farming along streams has more positive or negative impacts, i.e. does it help to reduce encroachment and illegal waste disposal or contribute to water pollution. The risk of erosion and stream siltation, for example, will depend on the topography, soil type, original vegetation cover along the streams and the cultivation practices of the farmers. It is possible that the year-round vegetable beds actually support soil conservation, increase infiltration and reduce run-off and erosion, thus contributing positively to flood control and urban drainage. On the other hand, studies in Harare, Zimbabwe, concluded that seasonal maize cultivation on slopes increased soil erosion. This led to a discussion on stream siltation and eutrophication through fertilizer use in urban farming (Bowyer-Bower et al. 1996; Mawoneke and King 1999).

Soil nutrient mining: With up to 10 lettuce harvests per year for example, soil nutrient mining is seriously forcing farmers to provide continuous nutrient input (see chapter 7). Especially on sandy soils, urban farmers enter into a vicious cycle of applying high rates of nutrients, which might either be taken up by the crop or be leached in the rainy season. However, the urban vicinity also offers many nutrient sources, like organic waste and wastewater, thus costs related to nutrient inputs can remain low. In and around Kumasi, for example, the poultry industry is very strong and farmers pay mostly for the transportation of poultry manure, and only very little for the manure itself (Drechsel et al. 2000). Thus, the related costs to intensive vegetable farming appear relatively lower than in rural areas where the most economical way to address soil nutrient depletion is still shifting cultivation. A preliminary and simplified comparison of both systems in presented in table 4.5.

TABLE 4.5. Externalities due to soil nutrient leaching in and around Kumasi

System	Maize-cassava intercrop	Year-round vegetable production
Cost assessment	The two-year rental of a new plot is about USD10-50 ha^{-1} depending – among others – on proximity to the city, and accessibility.	Nutrient losses account for only USD10 ha^{-1} $year^{-1}$ if replaced with cheap poultry manure. Mineral fertilizers would increase the replacement costs tenfold.
Costs per year	USD 5-25	USD 10
Percentage of net income	Up to 10%	Up to 1 %

Source: Drechsel et al. (2005).

4.4 Conclusions

Urban vegetable farmers cultivate year-round, which provides them with an earning capacity that is at least two times higher than that of their rural counterparts. This offers opportunities to move out of poverty. Open-space urban farming also contributes substantially to the perishable food requirements of Ghanaian cities. This is partly because food flow from outside the urban areas is constrained due to lack of cold transport and storage facilities, a common challenge in many less developed countries. Thus urban farming saves energy, transportation, storage and packaging costs. There are also a number of other possible benefits, such as flood control, climate change adaptation and land reclamation, which have not been quantified so far. On the other hand, there are different negative externalities, which can fluctuate widely with changing conditions, spatially and temporarily. Some of them relate, however, more to the general challenges of urbanization, poor sanitation and land and water pollution than to the farming practices *per se*. Examples of externalities for farmers are related to pesticide misuse, nutrient depletion and wastewater exposure. Externalities for society include for example possibly higher malaria risks near irrigated urban farming sites. Field data indicate that medical treatment related to the use of pesticides can be a significant cost factor for farmers. This, however, is not a typical problem of urban and peri-urban agriculture but of any farming system depending on pesticides. A comparative analysis of the risk from pathogens and pesticide uptake showed a much more acute and higher pathogen risk on normal urban vegetable sites (Amoah et al. 2006). These risks have been quantified in a variety of assessments as also presented in chapters 9 and 10 (Barker et al. 2014; Seidu et al. 2008; Drechsel and Seidu 2011).