

THE IMPACT OF URBAN AGRICULTURE ON THE HOUSEHOLD AND LOCAL ECONOMIES

Rachel Nugent

1. Urban growth and livability

As cities grow, they add jobs and services, becoming more complex economically as well as physically. The need for new jobs places huge demands on cities that are struggling to provide the public services that growth demands, often in the face of existing unemployment. In the developing world, many of the new jobs needed are for unskilled and relatively uneducated workers, both migrants and those born in the city.

With labour forces growing by 2-3% per year in the fastest urbanising countries (East and West Africa, Southeast Asia, East Asia), thousands of new jobs must be created each year in each of the major cities in those regions. For example, in order to keep the unemployment rate from rising, more than 250,000 new jobs are needed each year in Jakarta, more than 77,000 jobs in Ouagadougou, and more than 44,000 in Dar es Salaam. Partly as a result of the job market lagging behind urban growth, urban poverty and the share of the poor living in cities are rising (IFPRI 1999). These trends have serious implications for food security.

This paper explores economic conditions and policies in urban areas that create the impetus for urban agriculture to exist, and which affect its viability. In doing so, it focuses on the conventional scope of economic impacts – such as employment, income and value of production – and leaves in-depth discussion of cultural and environmental impacts to other contributions. This paper relies on a series of case studies as well as first-hand knowledge and information from other sources. The effort is made to draw conclusions about the economic relevance of urban agriculture based on both quantitative and qualitative knowledge.

1.1 Labour markets in growing cities

The prolonged structural unemployment that exists in many cities is of serious concern. It is caused by a mismatch between labour force skills and needs of local employers, an inflow of workers that is consistently higher than the ability of an area to absorb them, generally low job availability in weak economies, or a combination of the above.

Official unemployment statistics may understate the severity of unemployment because they are not gathered frequently and quickly become out of date in fast-growing cities. Another reason is that many people find work in the informal sector, where they may move easily and often from one job opportunity to the next. What appears to be employment is often disguised underemployment, especially when economic conditions are weak. An estimated 56% of urban employment throughout Africa is based in the informal sector, as is 40% in the Asia/Pacific region and 30% in Latin America (UNCHS 1999).

A few examples will illustrate the dramatic conditions existing in labour markets around the world, and the effect of sudden shocks on already shaky economic foundations. The official tally of unemployment in Jakarta is estimated to have risen from 4.9% to 21% following the 1997 Asian financial crisis (IMF 1999). One in every five formal-sector jobs disappeared and 37% of formal-sector workers in Indonesia became underemployed. This means that they became obliged to work informally to augment their formal sector wages. A large share of the informally employed workers – estimated before the crisis as 33% of the labour force – were likely forced into unemployment or to the countryside.

In Nairobi, enduring economic recession and structural adjustment severely restricted employment opportunities during the 1990s, even as the population grew by 51%. Between 1994 and 1997, informal unemployment increased by 65% to two-thirds of the workforce (Foeken & Mwangi 2000).

The population of urban poor and informally employed is growing absolutely and relatively in cities across the world. Universally, they are seeking a livable city, one that provides ways of earning money and meeting basic needs, whether within or outside the formal labour market. One of the activities they turn to is agriculture.

1.2 Agriculture in urban areas

As officially measured, agriculture does not make a substantial contribution to urban employment and GDP. Countries lose primary sector jobs, such as agriculture, forestry and fisheries, as they become more urban. In their place, they create industrial and service jobs. The same is true within cities themselves and the areas surrounding them. What were once villages become towns, and towns become cities. Land faces greater demands and fetches higher prices as buildings and infrastructure multiply and density increases. Multiple uses of land emerge, people desire proximity to jobs and services, and land

“improvement” spreads. As this process evolves, cities change and the agriculture practised within and around them changes.

Urban agriculture takes various forms at different levels of development. With a given set of topographical features, climate and traditions, urban agriculture changes in response to income growth and urban development. Certain conditions are necessary for urban agriculture to exist, but not sufficient to bring it about.

For instance, Mexico City saw its officially recorded agricultural labour force decline from 9% of the total in 1980 to less than 1% in 1990 (Duque et al. 1999), at the same time, the city’s overall labour force fell slightly. The conditions leading to this decline are not atypical of growing cities in Latin America: land speculation and expansion of commercial buildings, mechanisation and concentration of agricultural activity, and concentration of food marketing in large supermarkets. What remains is an active, commercial periurban agriculture that provides a substantial number of jobs, but relatively little contribution to food security for the poor (*ibid.*).

Conversely, because it progressed less, urbanisation in Africa so far represents a different phenomenon with differing implications for urban agriculture. On account of lower population densities and traditional social behaviours that persist even after migration, urbanising areas in Africa are generally hospitable to household food production.¹ They still contain large amounts of arable open space, people are more likely to raise small livestock for home consumption, and municipal policies may be more congenial to food production (though exceptions will be noted further in this paper). The effect on measured agricultural employment appears minor, while the effect on food security is significant.

Asia’s aggregate urbanisation level is relatively low because of populous countries (China, India, Pakistan) that are largely rural. In fact, by 2025, Asia will be home to 12 of the 15 largest cities in the world (FAO 1998). This demographic diversity implies that urban agriculture exists in different forms in the region: those with dense, crowded and relatively industrialised populations; and those with open spaces, greenbelts, strong agricultural tradition, and much cultivation and small livestock rearing. Examples of each are readily seen in the case studies prepared for this Reader.

¹ Population density in Dakar is 3,527 inhabitants/km², in Harare 1,695 inhabitants/km² and in Mexico City 5,700 inhabitants/km².

Another type of urban agriculture predominates in North American and European cities, though scattered examples can be found in cities around the world. It is conducted in backyards, community or allotment gardens, is relatively intensive and productive, and usually for home consumption. These northern farmers seek recreational benefits, organic or otherwise healthy foods, and social interaction. Poor farmers are also found in the cities of developed countries and, like their counterparts in the rest of the world, they farm to enhance their food security. Likewise, commercial farming in periurban areas is a major economic contributor in developed country cities. These farmers exist in smaller numbers and different circumstances than those in developing countries, whose agriculturists are the focus of this paper.

The aforementioned regional patterns are suggestive only and are not meant to imply that all cities in those regions fit the patterns. Climate is a critical factor determining the role that local production can play in the urban food market. In the humid tropics and temperate zones with adequate water, planting can be done through multiple growing cycles and harvests provide year-round fresh crops. In arid and semiarid climatic zones, the production is more likely to be seasonal.

Urban dwellers everywhere face a combination of density, climate, resource availability, cultural and policy conditions that will make a city more or less hospitable to farming activity, in addition to the household-level decisions that will be discussed below. Together they determine the level of effort that will be devoted to urban agriculture in a given locale.

1.3 Sufficient conditions that create urban agriculture

Depending on local conditions (primarily economic, but also social, cultural and political), the opportunity to grow or acquire locally-produced food is a critical component of the ability to live in the urban environment. Some of the food enters formal marketing channels, while some is bartered, given away and consumed by the growers.

The poor are not the only people who produce food locally, but they are more dependent on it for income and nutrition. While it is not hard to imagine rural dwellers feeding themselves largely from their own agricultural production, it is rare that urban people – either rich or poor – can or even wish to obtain a large proportion of their caloric and micronutrient intake from their own gardens. It is reasonable to ask, therefore, under what combination of circumstances urban agriculture is most likely to emerge and to make an important contribution to

urban welfare. These circumstances can arise suddenly or develop over time; they can be temporary or permanent.

The conditions in which food production suddenly becomes important in a city are emergencies from civil, weather or macroeconomic upheaval, often combined with a high incidence of poverty, inaccessibility to adequate food supplies from rural areas or imports, and good growing conditions.

Civil upheaval and conflict spurs urban dwellers to plant fast-growing crops on unused land to replace the normal food supplies disrupted by war (e.g. Kosovo). Likewise, a very unstable macroeconomic climate characterised by spiralling prices, shortages and other market fluctuations has frequently engendered the spontaneous creation of community and backyard gardens (e.g. Ecuador, Indonesia).

The transformation of the Russian economy from the early 1990s led to greater quantities of food produced for self-sufficiency in both urban and rural areas (Seeth et al.1998). Home production in 1994 (both urban and rural) had risen to 38% of agricultural output from 24% in 1990. Similarly, Sofia went through food crises in 1990-91 and 1996-97, and urban agriculture contributed substantially to food availability and stability.

In Accra, a programme of “Operation Feed Yourself” was instituted during a food shortage period of the mid-1970s. Residents grew food in backyards and open spaces. Eventually the programme declined as land was developed and the food supplies improved. A very similar situation existed in Dar es Salaam during the early 1970s, as government encouraged residents to grow food and made space available. After a pause in local cultivation in the late 1970s, food production is once again common.

In addition to temporary and emergency events, urban populations farm or garden because of long-standing traditions of urban food production (e.g. Cairo, Nairobi) or because political and economic factors create the incentives to do so on a regular basis (e.g. Havana, London). For instance, cultural factors among Muslims in Cairo make it imperative to raise small livestock for ritual food preparation surrounding holidays and funerals (see Cairo case study). In Havana, the loss of economic support following the break-up of the Soviet Union led policy-makers to devise incentives for community production (see Havana case study). In London, residents who seek a greater community involvement, greening and fresh healthy food, become involved in community gardening (see London case study).

Increasing urban poverty is a contributing factor that appears not to be temporary (IFPRI 1998). Most of the food consumed in cities must be purchased. Poor families can spend 60-80% of their income on food and still be food insecure. Consumer food prices in many cities of the developing world have spiked upward since the removal of subsidies and price controls accompanying structural adjustment policies in the 1980s and 1990s. For instance, food prices in Harare rose 534% between 1991 and 1992, spurring poor urban consumers to get access to food outside of marketing channels through home production and barter (Tevera 1996). Even after a more stable macroeconomic environment was restored, urban gardening has remained an important source of food for the large urban food-insecure population. In La Paz, where poverty has reached 73% in slum areas, subsistence production is cited as a way to reduce household expenditures on food, which averages 52-83% of income.

2. Urban agriculture at the household level

Households face choices in how to allocate their labour and their expenditures in order to maximise their welfare within a constraint of limited resources. A simple economic model predicts behaviour that would bring the most income into the family. This means family members jointly choose how to allocate their work time to the most remunerative income-generating activities over a given time horizon.

However, urban farmers are simultaneously suppliers of labour to agriculture, and producers and consumers of food. This makes the maximisation problem more complex. In order to understand household behaviour with respect to urban agriculture, the existence of other factors that affect income expectations must be brought into the analysis.

The major economic complications are imperfect labour and land markets in urban areas, unreliable or sporadic market information available to some urban dwellers, and poor quality or non-existent markets for inputs, such as credit and fertiliser. Such conditions imply that a household is likely to have a complicated definition of welfare that could include diversification of income sources, adaptation to underemployment, and other goals that will help assure its well-being under conditions of uncertainty. Additionally, other factors, such as social expectations, risk perceptions, cultural mores and family gender relationships also come into play and may be even more important than economic factors.

This section outlines the behavioural process of urban households facing the decision of whether to farm. On a microeconomic scale, the decision to engage in urban agriculture will lead to changes in how a household allocates its time and expenditures. Therefore, from the perspective of suppliers of labour, households will produce food themselves if the farming activity provides a higher return (either monetary or in-kind) for the effort expended than other activities. Added to that decision process is the perspective of households as food consumers. A household will produce its own food when it is less costly (in terms of time and money) than purchasing food.

The effort put into urban agriculture can be derived from the household's constrained welfare maximisation problem:

Goal: Maximise household welfare from among employment alternatives, including leisure.

Given: Household resources, such as labour, capital and set of skills;
Prices of and access to foodstuffs and other consumables;
Prices of and access to needed inputs, including land;
Risks and uncertainty about markets, policies, and weather.

2.1 Why do households engage in urban agriculture?

As commonly happens, the simple economic model set out above faces a reality much more complicated than implied by theory. Interviews with urban farmers (from the case studies) reveal that the kinds of behavioural and economic incentives facing the household vary, even within the same city and culture. The decision to farm and the level of effort spent on urban agriculture do not have a clear-cut relationship to income, wages, prices or employment opportunities. Despite these complications, the model provides some insights into household behaviour, and suggests which other factors and incentives should be investigated (and perhaps modelled) in order to better understand household decisions.

2.1.i Factors affecting household decision to farm

Seventeen city case studies have been reviewed as background for this analysis (Accra, Cairo, Cayan de Oro, Dakar, Dar es Salaam, Harare, London, Mexico City, Sofia, Jakarta, Lima, Havana, Shanghai, La Paz, Ho Chi Minh City, Hubli-Dharwad and Nairobi), along with surveys and data from other research. The city case studies are extremely variable in their sampling methods, scope and presentation of data. Nonetheless, some conclusions can be drawn at this stage

regarding household economic behaviour and urban agriculture. As the research in the field is refined and elaborated, the conclusions presented here will also be reviewed and corroborated or recast.²

Ranked in order of importance (numbers indicating occurrences), survey respondents give the following reasons for engaging in urban agriculture:

1. Production for home consumption (13)
2. Income enhancement (8)
3. Economic crisis (6)
4. High prices of market food (5)
5. Income or asset diversification (4)
6. Supplementary employment (3)
7. Conflict (1)
8. Poor weather (1)

Note that the top six motivating factors for these urban farmers are economic. Further, the reasons given are not mutually exclusive, as farmers were allowed to list multiple reasons. It is evident that some of the reasons listed above could have identical interpretations.

Food insecurity or the perceived risk of food insecurity is a common concern among almost all urban farmers. Households across the income spectrum engage in urban gardening (with some country exceptions and commodity variation), but income level does influence the amount of effort devoted to urban farming. Even in non-poor populations, a household's perception of food insecurity risk will affect its farming effort because of the insurance value of own food production (Seeth et al. 1998).

For example, many urban households in Hubli-Dharwad keep buffalo as a sort of savings account to be sold in times of extreme hardship. At the same time, the buffalo provide milk and fuel in the form of dung. Likewise, in Accra, small livestock are maintained as assets in case of emergency. This is very common within the city and families often prepare to sell livestock to pay for educational fees or funeral costs. The average value of assets held in Accra households is \$50.

2 Note that, with the exception of London, all the commissioned city case studies are from developing or transition countries. Thus, the discussion in the paper focuses on households in developing countries. The results would be very different if the focus were on developed country household behaviour.

Other reasons for urban farming not mentioned in the surveys are ethnic traditions of recent migrants (La Paz) or lack of employment opportunities (Nairobi).

Among the clear patterns that emerge from the survey data is that urban farmers say they wish to enhance household food supplies, rather than increase cash income or obtain employment. In addition to the high frequency with which respondents cited the need to produce for home consumption (13), the surveys imply a similar impulse is behind the motivation of an economic crisis (6) and high prices of market food (5). If this interpretation is correct, then production for home use is almost three times as important as income enhancement, as a motivating factor for urban farmers.

However, this distinction should not be taken too far. From an economic perspective, farming yields direct income through sales and employment, or indirect income through reduction of expenditures on food. Whether the income is money or “in-kind”, it has value to the urban farmer. Indeed, food produced in urban areas has value even if it is fed to animals, given to needy populations in the community, or traded for other products.

A comprehensive view of the incentives to farm include both the in-kind income flow, as well as actual income earned from any sales or employment in urban farming. Income from urban farming is discussed in the next section. Wage-labour aspects of urban agriculture are discussed in the section on aggregate economic impacts.

2.1.ii Income from urban farming

Some survey data are available about the level of income earned from urban farming. However, it is risky to generalise because the farming conditions vary enormously from season to season and city to city. Examples are given here primarily as illustrations of the variability of earnings from urban farming.

In African countries, it is generally the poor who are cultivating in urban areas, but the Harare survey of 720 households shows that higher-income farmers engage in more gardening and cropping activity, such as maize growing (ENDA 1999). The highest income earned was the equivalent of 7 months’ salary at the industry minimum wage, while the average earnings were equivalent to about two weeks of an industrial salary (US\$7) (ENDA 1996). Other research from Harare puts income earnings at 10% of total for the 40% of high-density-area producers that sell their output.

In several African cities, income earned by urban farmers was found to be a significant contributor to household maintenance. Home gardens in Lusaka produced an average of three months' income at the average worker level in 1992 (15,000 Zambian Kwachas in 1992), but was extremely seasonal (Drescher 1999). An earlier study found that low-income households in Lusaka obtained one-third of their total food consumption from farming (Sanyal 1986, cited in Tevera 1986). Farmers in Accra earned very little cash, but produced 1-8 months' supply of staple food for their families, and used their farm output as a consumption-smoothing and income-diversification strategy. Especially for vegetable growers, income from farming could represent significant amounts and proportions of total income.

Estimates from Dar es Salaam indicate that full-time production of certain vegetables or keeping a few dairy cattle and a garden can produce an income of \$US 60/month – 30% greater than the average salary. The same is true for Nairobi families in slum areas, although they sold relatively little and consumed their own output. These families' standard of living exceeded that of neighbouring non-farming families.

In Sofia, a large proportion (28%) of households earned something from urban gardening. Official statistics show 1-2.6% of total income comes from this source, but this likely excludes a large number of the informally employed in agriculture.

A comprehensive household survey in Russia revealed that urban gardeners in three capital cities earned an average of 12% of their income from gardening in 1995, while in smaller cities the proportion of income earned was 10.6% (Seeth et al. 1998). Based on average monthly incomes, the earnings from gardening in Russia are much higher in rural than in urban areas, but the poverty level is higher in the latter.

2.1.iii The calculation of income from urban farming

The economic consideration facing a potential urban farmer includes a variety of external factors, along with the non-economic factors mentioned above. Once a decision is made to put effort into farming – based on the factors listed above – the next decision is to choose the appropriate level of effort to invest in farming. The net income flow depends on:

- farming effort;
- availability and cost of basic inputs;
- yields, as determined by technology;
- access to market or other buyers;

- ability to store, transport, process and preserve products;
- prices, as determined by supplies and demand of related products.

Farming effort

Because agriculture is rarely the sole or even primary source of household earnings, effort devoted to it fluctuates in response to potential earnings from other endeavours. In this sense, urban agricultural income is a residual; its level is determined by forces in external markets or other events. For instance, agricultural work is used as a buffer for low-income families who face periods of unemployment from other seasonal employment, such as in construction. Further, during periods of high expenses – such as just before school opens or holidays – families might reduce expenditure on agricultural activity (for seeds, implements, etc.), and thereby reduce expected income earned from the plot, or they might increase effort in farming in order to sell the surplus product.

In Russia, the average level of effort applied to urban gardening is about four days per month. The effort declines significantly with an increase in wages or travel time to the farm (greater opportunity cost of farming), and this effect is stronger among the high- and middle-income gardeners than among the poor. The survey responses demonstrate that the poor are less likely to reduce their farming effort in response to these other factors, as food production provides them with insurance against food insecurity (Seeth et al. 1998). This shows that the better-off gardeners have more choices of alternative activities, and less urgent need of the food produced in their gardens, while the poor in Russia (despite high transportation costs to reach their plots) have low elasticity of labour supply.

Availability and cost of basic inputs

The ability to obtain needed inputs also affects the level and timing of income from farming. Access to land is the factor that urban farmers identify as most critical to their success, in terms of both the decision to enter urban farming and the level and variability of income. In densely-populated cities, lack of land clearly inhibits farming activity (e.g. see case studies from Cairo, Lusaka, London), while the ready availability of public spaces or unused land in other cities (e.g. Dar es Salaam, Harare until recently, Dakar) make urban agriculture attractive even if public policies do not encourage it. In some cities, the farmers are those who have their own land area – however small – that provides security. This is true in La Paz, where many surveyed residents say lack of owned land prevents them from farming. Conversely, in Nairobi, though farmers rarely own their own land, they also did not indicate major concern about eviction.

Households that can obtain credit are less likely to sacrifice their agricultural needs for other expenditures, and instead will develop a sophisticated cash-flow behaviour in which they invest during planting season with borrowed funds, and repay from sales after harvest. They may even accumulate savings from agricultural surpluses. Frequently, livestock are used as a form of savings when credit is unavailable. This behaviour mirrors that of well-off rural farmers and illustrates the importance of risk-management techniques for enabling rational economic behaviour. This is another area in which appropriate policy development can change the landscape of urban agriculture.

Access to and costs of other inputs, such as seeds, implements and chemicals, is not frequently mentioned as a critical issue – though pest control and lack of water are known to be serious problems in many cities. This lack of attention in the surveys may simply reflect the seriousness of the other obstacles mentioned – serious enough to keep many from engaging in urban farming – or the acceptance of these barriers as a normal part of farming practice. Further, it probably again reflects that urban agriculture is a residual activity within imperfect markets. As such, it is conducted opportunistically and with relatively little investment.

Yields

A third determinant of the income flow from urban agriculture is the yield obtained from a given amount of inputs. The yield will depend on the quality of the factors used in farming, climate and the level of technology available. One common assumption about urban agriculture is that yields are quite low – largely because of poor-quality inputs, low-technology farm practices and high losses from a variety of sources.

Such conditions are common in urban agriculture and could help explain the observed household behaviour of not maximising income. However, such conditions are not universal. High yields have been documented by urban farmers in some cases (see cases cited in Nugent 1999a and FAO 1998b, Smit et al. 1996), and clearly are potentially available to many urban farmers. Addressing yields through availability of good quality inputs and technical advice is a key area of policy intervention.

Market access

The ease of access to a market is a factor in assessing the net income provided from urban agriculture. If the urban farmer ends up with a surplus of food that cannot be consumed or sold, the income is lost, though the food will have some social value if it can be given away. Such social value will generally not enter into the urban farmer's calculations to expend private effort or resources on

urban farming. Sometimes, it is lack of easy access to a market that encourages urban food production to develop. In such cases, an informal market will often develop spontaneously and the farmers' perceptions of being able to sell surplus product will determine in part the effort devoted to farming. Thus, a heterogeneous neighbourhood, in which not all residents are producing food, and the presence of some purchasing power are factors which encourage farming in the absence of formal markets.

Ability to store, transport, process and preserve

The urban farmer with knowledge, space and equipment to store and/or process her output is likely to increase her income potential. A strong presence of street foods in a city is likely to create links between producers and vendors, sometimes within the same family. The risk of income loss from spoilage, theft or damage to crops and livestock can be reduced with storage and preserving facilities. These factors enter into the risk evaluation done by a potential urban farmer, especially when the available land is not secure or is far from the residence.

Prices

A final factor determining income flow for urban farmers is the prices of related products. In general, when prices of garden foods in the markets are low, urban dwellers will have one less reason to produce their own food, and when prices are high, that should increase incentive to produce. This factor is strongly related to income levels, the poor being more vulnerable to the effects of price fluctuations in the markets.

2.2 Gender aspects of urban agriculture

The household labour (who and how much) devoted to urban agriculture is determined by non-economic factors more than by what can be earned in other activities. One reason may be an absent or incomplete labour market, especially for women, in cities in developing countries.

Research in India shows that women make up a disproportionate share of unpaid helpers in household enterprises, and are concentrated more than men in the agricultural sector. Wages for women in agriculture averaged roughly to 20% of men's wages (Duchin & Sinha 1999). A survey made in Turkey revealed that women who worked in traditional sectors and non-market activities received significantly lower incomes than men in the same circumstances (Esim 1999).

In general, Africa has the largest proportion of women involved in urban agriculture, except in Dakar and Accra, where men make up the majority of urban farmers. Explaining the latter, Armar-Klemesu and Maxwell (1999) point to traditional cultural behaviour, intra-household income behaviour, and other female responsibilities. In Harare and other cities where urban agriculture has less official support as a sector, women provide most of the work. This derives from their responsibility for household food provision and preparation. The same pattern is evident in Dar es Salaam, where the more commercial ventures are dominated by men and the subsistence farms belong to women.

However, in many of the cities studied, the majority of market vendors are women. Proximity to the home and neighbourhood make this a more logical enterprise for women. Conversely, in Cairo, women are primarily responsible for the rearing of small livestock, but are prevented by *purdah* or other social prohibitions from marketing the product. In Cagayan de Oro City, men do most of the farming, while women attend to all other household tasks (Potutan et al. 2000).

If the primary gardener is a man, often his wife serves as back-up labour, whereas this is not always true in the reverse. The evidence is that children's labour is used in urban farming, especially when a woman is head of the household. In Dakar, women and children work for the family plot which is controlled in about 75% of the cases by a male adult in the family. This is especially true when there are significant start-up costs, as in poultry raising and floriculture. Women are more represented among vegetable gardeners.

2.3 Conclusions about urban agriculture in the household economy

It would appear from the case studies, as well as from other research, that urban farmers engage in a mixed strategy of risk minimisation and food supplementation. Various motivations for farming in the city demand varying levels of effort; sometimes a minor part-time effort can result in adequate amounts of food to satisfy a family's needs for e.g. green leafy vegetables, plantain, fruit and/or eggs. Rarely is produce from one's own garden the sole source of food for an urban family. Urban farmers respond to opportunities, such as available land, income enhancement potential and a supportive local environment.

3. Urban agriculture and regional impacts

3.1 Measuring the aggregate impacts of urban agriculture

Moving from the household level to the aggregate economy, one tries to measure urban agriculture's contribution to a city's overall economy by calculating the value of the output created by this sub-sector. This is determined by the quantity and market value or price of the goods. However, because much of the output from urban farming is not sold in markets and prices cannot be easily determined, official statistics usually do not capture most of this activity. A few studies have estimates of total value, while others indicate volume of production, or share of urban food needs produced by urban agriculture.

Table 1: *Food provided by urban and periurban agriculture*

City and year of estimation	Local needs met by UPA (in %)	Amount produced annually (in tons, unless noted)
Havana, 1998		541,000 (vegetables)
Dakar, 1994/95	70 (vegetables) 65-70 (poultry)	43,000 (vegetables)
Harare, 1999	small	
Dar es Salaam, 1999	60 (milk) 90 (vegetables)	
Jakarta, 1999	10 (vegetables) 16 (fruit) 2 (rice)	
La Paz, 1999	30 (vegetables)	
Hubli-Dharwad, 1999	small	40,000 litres/day
London, 1999		8,400 (vegetables)
Ho Chi Minh City, 1999	high	217,000 (rice) 214,000 (vegetables) 8,700 (poultry) 241,000 (sugar) 27,900 (milk) 4,500 (beef)
Sofia, 1999	48 (milk) 53 (potatoes) 50 (vegetables)	
Accra, 1999	1 (total)	
Shanghai, 1999	60 (vegetables) 100 (milk) 90 (eggs) 50 (pork, poultry)	

(Sources: case studies prepared for this Reader)

The existing estimates of economic output provided by urban agriculture give a range of values for different cities (annual contribution for the years cited):

- Lima (case study 1999) 4% city GDP in 1995
- Shanghai (case study 1999) 2% of city GDP
- Dar es Salaam (Howarth 1996) \$25 million
- Hartford, USA (Nugent 1999a) \$ 4-10 million, depending on area included
- Harare (ENDA 1996) \$ 5 million, maize production only
- Nairobi (Mazingira 1985) \$ 4 million

Because these studies used different methods and different years and apply to different commodities, no attempt is made here to make the results comparable. These results highlight the necessity to develop a standard research methodology for assessing the economic impact of urban agriculture globally.

3.1.i Aggregate employment effects of urban agriculture

In this section, we examine the aggregate impacts of urban agriculture from the perspective of jobs created in the subsector. Those involved in urban farming are rarely formally employed in that activity, though they may have other formal-sector jobs. The paper earlier described the magnitude of the informal employment sector, pointing out that accurate statistics are generally not available. This is particularly true at a subsectoral level, though progress has been made in estimating the magnitude of informal employment at city level.

Table 2: *Employment in urban and periurban agriculture*

City and year of estimation	UPA employment share (in %)	Total employment	Wage-labour employment
Dar es Salaam, 1999		35,000 households	
Shanghai, 1999		3.6 million jobs	
London, 1999	0.04 of labour force	3000 jobs	
Jakarta, 1997	1.0 of labour force	100,000 jobs	92,500 jobs
Sofia, 1999	High, part-time	13,400 jobs	
La Paz, 1997		3970 jobs	
El Alto area, 1997		1975 jobs	
Nairobi, 1999	25 of population	150,000 households	
Havana, 1999		117,000 ft and pt	30,000
Mexico City, 1999	1-19 of employed		
Accra, 1999	13.6 of sample		
Dakar, 1999		15,000 official	
Hubli-Dharwad, 1991	20 female 11 male		

Sources: Case studies prepared for this Reader.

3.1.ii Wage labour in urban agriculture

There appears to be relatively little use of wage labour in urban agriculture, except for seasonal work in some areas. Exceptions are Jakarta, Havana, Shanghai and other cities characterised by substantial official support to agriculture and a strong commercial sector. As mentioned above, the statistics on informal-sector labour patterns are not yet disaggregated to a level from which strong conclusions can be drawn. The anecdotal evidence from the case studies suggests what our earlier evidence pointed to at the household level: for most poor urban farmers, the employment market is too fragmented and imperfect for wage opportunities in this subsector to be relied upon.

A study of a small number of urban farmers in Nairobi revealed that they only rarely received volunteer help with agricultural tasks, because most of their family and friends were not interested in this type of work. The study was unclear about whether these farmers considered hiring workers during the busy period, but it is hinted that temporary opportunities to engage in non-agricultural wage labour were more lucrative to the urban farmers themselves than their own farm harvests (Dennerly 1996). In a Harare study, 12% of those cultivating in the urban area hired labour to work their fields (Mbiba 1995, cited in Tevera 1996).

3.2 Relationship of urban farming to upstream and downstream economic activities

Urban agriculture contributes to the economy of a city both as a user of inputs (thereby providing a market for products) and as a producer of inputs for other economic entities.

Economists typically examine those input-output relationships using accounting matrices. Analysis of the contributions made by urban agriculture should include informal sector and non-market activities, along with gender disaggregation (see Duchin & Sinha 1999).

Another common approach is to examine the impacts of urban agriculture on related sectors through an impact analysis, or cost-benefit framework. Such methods can point to both positive and negative effects of the urban agricultural activities, and sometimes quantify those impacts (see Nugent 1999a).

Neither of these methods has been extensively developed in analysis of urban agriculture. However, many opportunities to increase these economic linkages are apparent.

3.2.i Urban agriculture as a purchaser of inputs

As a user of inputs (land, water, seeds, chemicals, labour), urban agriculture provides very little economic injection into the local market economy because the inputs used are minimal, often available free and not of high value. These low costs of production are a primary reason that urban agriculture is attractive to low-income people, as they can take up the activity with relatively little investment and operating expenses.

The clear exception to this conclusion is the use of labour in urban agriculture. It was stated earlier that there is relatively little visible use of wage labour in the subsector. Nonetheless, it is clear that unpaid workers with a low opportunity cost, especially female, are relied upon to produce and market the vast majority of the sector's output. As already mentioned, informal employment in urban agriculture can provide supplementary opportunities to the underemployed, temporarily unemployed or chronically unemployed in cities where formal sector opportunities are few.

Most acquisition of other essential inputs in urban agriculture is also outside of the market system, and difficult to value. The primary barrier-to-entry facing urban farmers is not the expense of capital equipment purchases, but access to land. Land is rarely purchased for purposes of urban farming, though a great deal of urban and periurban production takes place on land that once was rural, before city growth encroached onto it. More often, the land used is leased on a temporary basis or obtained informally through customary use.

Land used for urban farming is generally of low value in other uses; i.e., it has a low opportunity cost. Therefore, the contribution may not appear high in monetary terms, but can be seen as producing something of value from a low-value input. When the opportunity cost rises sufficiently, the land is removed from agricultural use (e.g. New York City community gardens). This fact tends to impede any investment for agricultural use of the land, and keeps the land relatively unproductive and thereby of low value in agriculture. One of the greatest risks in urban farming is that the land will eventually become more valuable for other uses and be withdrawn from farming. With appropriate land-tenure alternatives, such as leasehold rights for farming, policies could alter this outcome.

The other important inputs to urban agriculture are seeds, tools, water and fertiliser, most of which are obtained virtually free, thereby contributing little to the economic base of the city. Sometimes, seeds and tools are purchased by urban farmers, providing some revenue to their sellers, but these are used over

many years, sometimes shared among farmers, and are not of high value. Often, implements are hand-made.

As with land, competition for water is a serious barrier to urban agriculture in many cities. Clean water is a scarce commodity in most cities in developing countries and is sometimes priced accordingly (UNCHS 1999) Even when water is priced low, the need for clean drinking water is far from met and the highest value is not for agricultural use. Nonetheless, many users avoid legal taps and metres, and obtain the water surreptitiously.

In Mexico City, water scarcity and contamination are among the important factors impeding urban agricultural development (Duque et al. 1999). Respondents to the Harare survey indicated that lack of water or drought conditions were their most serious problem – this applies to both crop farmers and gardeners (ENDA 1998). In La Paz, for instance, some farmers use expensive potable water from the city water supply, others have deep wells installed, and others draw contaminated water from the nearby Rio Choqueyapu. It is recognised that this water use threatens both the farming activities and urban development.

In the many cases where free-flowing water sources are used, contamination is a major concern (see Armar-Klemesu 1999). Stabilisation ponds from the local sewage-treatment plant provided urban farmers in Accra a source of irrigation water until the plant broke down. Raw wastewater is now often used. Studies have shown that lower contamination occurs when vegetables are irrigated with ponded wastewater (primary treatment), compared to vegetables sold in the market stalls coming from rural areas. This is believed to be because of the many incidences of unsanitary handling of vegetables received from rural suppliers.

In Shanghai, low-pressure irrigation systems are installed across a large portion of the farmed land in the city.

One way in which urban agriculture can contribute to the environmental sustainability of cities – as well as avoid costs of waste disposal – is to provide nutrient recycling of organic wastes from numerous urban sources (see Drechsel & Kunze 1999). Organic fertiliser is used by urban farmers when they have access to it, especially in the form of animal droppings and tree clippings. Other inputs used for fertiliser are kitchen waste, ashes, sand and lime.

In Nairobi, 30% of urban farmers use manure that is either purchased or produced by their own livestock. In Dar es Salaam, the supply relationships

between poultry keepers and vegetable farmers are well established for fertiliser provision. In Hubli-Dharwad, however, the fodder for urban dairies is purchased from nearby rural areas.

Predictably, the use of chemical fertiliser among urban farmers increases as incomes rise; yet, even among high-income urban gardeners, chemical fertiliser use is low. In Harare, 10% of the highest-income farmers report using chemical fertiliser, compared to 49% who use organic fertiliser (ENDA 1998). However, in this instance again, generalisations about urban farmers are dangerous. In Lusaka, 61% of urban farmers and 78% of periurban farmers report using chemical pesticide, and 50% of urban farmers use chemical fertiliser (Drescher 1996).

3.2.ii Urban agriculture as a provider of inputs

As a producer of inputs for downstream use, urban agriculture contributes to food processing, marketing and packaging activities that generate economic earnings and some employment. For instance, a dozen types of food processing are done in Cagayan de Oro, Philippines (Potutan et al. 2000). In Dakar, the case study reports that downstream activities are a significant economic subsector, though no quantification of the magnitude is provided (Mbaye & Moustier 2000).

However great the potential, downstream activities cannot become significant enterprises contributing to the urban economy as long as the flow of urban food production is uneven and unpredictable. Investments in processing facilities cannot be based on the urban agriculture seen in most cities today. The anecdotal evidence is that the existing activities are small-scale, kitchen preservation and packaging for the market, food preparation for street sale and preservation for home use. In Sofia, most farming households preserve food supplies for winter and small enterprises for canning and preserving food occasionally arise. One area for policy intervention that promises beneficial returns in employment is to create value-added products from the farm through kitchen co-operatives that prepare food for the market.

3.3 Diversification of the urban economy

A less visible but important way in which urban agriculture contributes to local economies is by diversifying the economic base. An economy that is heavily dependent on a small number of economic sectors faces vulnerability to shocks in those sectors. Urban agriculture provides a particularly good buffer against

sectoral shocks: people can enter into it easily with few barriers; and it provides food, the most essential commodity in times of economic downturn.

This raises the important point of social and environmental benefits and costs from urban agriculture (see Nugent 1999a for analytical approach to measuring social and environmental benefits and costs). These aspects are covered in other papers for this workshop. It is sufficient to point out that there are clear social benefits (diversification of economy, community cohesion, reduction of food insecurity, etc.) and costs (illegal land and water use, theft of output) that should be considered in policy discussions about the future of urban agriculture.

3.4 Summary of macroeconomic impacts of urban agriculture

The conclusions that can safely be drawn from the studies are consistent with the lessons drawn from looking at the household-level effects of urban agriculture. That is, urban agriculture can make a difference to those who use it as one among an array of strategies. Furthermore, where it is encouraged by policy, it can provide a very significant portion of food needs. Yet it is unlikely to be a major economic driver in any city, even in one where it is heavily supported. In Havana and other cities where urban farming contributes importantly to relieving food insecurity, the potential for a greater macroeconomic contribution must be weighed against the costs of supporting the activity. In most cities, these (economic) costs are low and the benefits of ameliorating food insecurity are high.

The major macroeconomic effects of urban agriculture are provision of food of value to relatively poor urban dwellers, lower food prices, and increased food security. The evidence on the magnitude of the latter two effects is weak, in the sense that these impacts have not been carefully measured across a broad spectrum of cities. Nonetheless, they are strongly implied. In the process, urban agriculture diversifies the economic and food-access opportunities of the urban population.

Urban agriculture also presents a plethora of missed opportunities. Agricultural productivity appears to be extremely low, the labour market ad hoc and mostly voluntary, and downstream processing enterprises relatively insubstantial because of the unreliability of inputs.

The net contribution of urban agriculture to a city's liveability seems positive – otherwise, we would have to ask why so many people engage in it. Yet the contribution to a city's economy seems far less than the potential, given all the resources involved in the subsector. What is needed is to find ways to improve

the productivity of these resources – especially labour – in order to increase returns, provide a steady and predictable flow of output, and create real opportunities for urban dwellers seeking a liveable existence in growing cities of the world.

4. Urban policy issues and recommendations

The presence of agriculture in the urban environment affects the local economy, the natural environment, social relations and household economic behaviour. It may contribute to the liveability of the city, adding diversity and a safety net, or it may detract from liveability, creating health risks and misusing scarce resources.

At a macro level, the most critical economic policy needs are those that create sound and supportive infrastructure – specifically directed at efficient market and non-market transactions, and reaping social benefits. At a micro level, policies should address households' incentives by providing timely and accurate information, reducing uncertainties, and increasing the efficiency and productivity of urban farmers by assuring resource needs and streamlining market opportunities.

Specific suggestions to address these needs are discussed in turn.

4.1 Policy responsibility for urban agriculture

Local governments and their agencies are the most important policy influences on the viability of urban farming. These authorities are responsible for determining where an activity can occur, if at all, through zoning; what resources are available and in what condition; provision of informational services and orderly marketing arrangements; and provision of a secure legal and economic environment (Van den Berg 1997).

The current policy treatment of urban agriculture at the municipal level is mixed, with a tendency toward suspicion about its uncontrolled nature. Livestock rearing is more restricted than crop production in most places, but some cities prohibit all agricultural activities (Kampala, Lusaka), or require permits and impose restrictions on farming methods (Harare). Whether official regulations prohibit, restrict or ignore urban agriculture, municipal officials often treat the activity with benign neglect (e.g. Nairobi, more recently Lusaka). However, there are significant contrary examples. In Ho Chi Minh City, Mexico City, Shanghai, Jakarta, Havana and Accra there are municipal laws, urban

gardening offices and/or extension services that promote and regulate urban agriculture. Van den Berg (1997) points to support in Durban and Cape Town, South Africa, for community gardening. Armar-Klemesu and Maxwell (1998) describe supportive programs in Accra for urban gardening, including a newly established office to manage and co-ordinate assistance to farmers. Until recently, there was no policy concerning agriculture in Mexico City (Duque et al.1999). In September 1998, a new law created a commission to monitor land and soil, and to resolve conflicts over agricultural uses. The law explicitly addresses urban agriculture within Mexico City, in addition to periurban production issues. This kind of recognition could lead to further developments.

4.2 Policies related to infrastructure

Infrastructure is defined for this section to include physical and informational facilities, which are most often provided by public authorities because their benefits have the nature of being public goods. It also includes other municipal services normally provided by public authorities. These services and facilities together determine the nature and efficacy of a city government's activities and are paramount in contributing toward the liveability of a city.

4.2.i Public infrastructure and land-use planning

The infrastructure and land-use policies needed by urban farmers are scarcely different from those that support other industries. Farmers need safe and adequate transportation for goods and people, including a well-planned road system between the farming land and residential areas and road linkages between rural and urban areas. They also need reliable public utility services (water, wastewater with appropriate level of treatment for re-use, waste collection and disposal, and electricity). Finally, they need land-use regulations and planning that allows proximity of needed services and inputs at reasonable prices – including labour and wholesale and retail food markets.

Such an infrastructure is costly to provide in a large city, but practically prohibitive in most developing country cities that are experiencing fast population growth. Policy-makers must realistically assess the needs urban farmers have for these resources and consider feasible alternatives to expensive infrastructure. This means that solutions must be identified that encourage small-scale, inexpensive systems designed to address directly the most serious problems. With relatively little investment, such efforts can greatly increase the productivity of urban farms. One innovation to consider is to include farmers in stakeholder discussions of zoning decisions.

Small-scale solutions to problems of waste could include establishing convenient collection points for organic waste and small-scale distribution systems (carts or 3-wheeled trucks) to deliver it periodically to farm plots. Another successful system is the use of ponds for primary wastewater treatment, along with hoses or trucks that convey the water in a sanitary manner to urban or periurban farms.

4.2.ii Markets and information systems

A lack of knowledge among small-scale urban farmers impedes their access to markets or prevents them from producing for markets, even when it could be lucrative to do so. This can happen because small producers are not welcome at established markets, or because they do not know what consumers prefer or what prices their products would obtain in the official market. They also have little training or time to assure the quality of their products, often only primitive means of packaging and transporting to market, and little choice among market outlets (Drechsel & Kunze 1999).

As a result, most small farmers are more oriented toward providing supplementary food for their families, rather than investigating the potential returns from the resources they put into farming (Van den Berg 1997). While we have established that factors apart from income-maximising behaviour influence household choices for urban farming, the market imperfections faced by small farmers are a serious impediment for those who wish to earn income in the market. Agricultural field schools and extension services oriented to the needs of urban farmers should be established.

Among the small-scale solutions to be considered are areas for decentralised market activity adjacent to targeted residential neighbourhoods and along transportation routes from urban farming zones. Further, urban farmers could increase their market power by developing co-operatives for marketing their output. These co-operatives could also be used for sharing packaging, processing and transportation costs (see also the marketing recommendations from the FAO Regional Programme “Food Supply and Distribution to Cities”).

4.2.iii Policies addressing urban uncertainty

The most serious problem faced by urban farmers is medium- to long-term access to the critical resource of land. Lack of secure land tenure creates disincentives for urban farmers to invest in productivity-increasing measures, including improved mechanisation, better-quality seeds and soil amendments. Such measures would eventually lead to greater and more predictable output,

more employment opportunities and greater potential for linkages to downstream agroindustrial activities.

The conditions for acquiring land for agriculture in cities are often informal and should be regularised. Among the solutions are medium- to long-term lease possibilities, land-swaps in cases where development encroaches on previously farmed land, and public guarantees of zoning that maintains green areas and space for agriculture.

Policy can also address the uncertainty faced by urban producers who wish to market their output by identifying viable downstream microindustrial activities that would add value to the basic foodstuffs being grown, as well as create semiskilled labour opportunities. As mentioned above, an important element of this overall policy solution is to create an environment where access to needed resources, along with a variety of suppliers, will assure these agroindustries a consistent availability of raw materials for processing.

4.3 Policies addressing micro-level household behaviour

4.3.i Provision of public services at the micro level

At the micro level of the household, policies should also be oriented toward efficient and timely provision of services which the market fails to provide, or where there is a public-good component. For instance, providing accurate market information at the level of the individual farmer can be instrumental in clarifying incentives for farmer choices, such as commodity selection and timing of production. Government authorities can also provide technical support and training through extension services geared to the needs of urban farmers, and help farmers become well-versed in the preferences of the urban consumer.

4.3.ii Provision of credit and other resources

A lack of market power can also be addressed if local governments encourage access to credit for small farmers. Currently, little or no credit is available because no collateral is offered and/or because urban farmers are poor women – both major impediments to gaining credit. As a result, if the small farmer works with a market trader to sell produce, she is often obliged to accept short-term credit from that person on terms that might be disadvantageous to her (Van den Berg 1997).

The purpose of small loans is to acquire additional capital or seeds or even as an advance on production to meet cash-flow needs of the household. In these cases,

the farmer often falls on the mercy of the traders, who take high risks themselves, but usually can pass them on through higher prices (FAO 1998).

The growing micro-credit industry is tailor-made for urban farmers. Its primary goal is to support income-generating activities of poor women. Micro-credit organisations have proliferated in recent years around the globe and are available in rural and urban areas. Local governments can facilitate the availability of micro-credit for urban farmers by eliminating official barriers to farming, creating access to formal market outlets for selling, and helping to form partnerships between farmers and small agroprocessors that can guarantee revenue streams for the farmers.

5. Final conclusions and implications for policy-makers

Many policy options have been described briefly in the preceding sections. The net result of these policies would be to establish urban farming as a legitimate and viable economic activity in many cities. This could mean that, over time, urban households would look upon agriculture as one among many choices of economic activities that could supplement income from formal jobs, or provide informal market income or enhance household food supply.

Under such conditions, the activity of urban farming would require certain kinds of investments and skills, and provide predictable returns. The greater the degree to which the output can be commercialised, the greater will be incentives to increase productivity, respond to market demand and improve earnings. Concurrently, conditions and productivity will improve for those urban farmers who wish only to provide for their families, resulting in less effort to increase food security.

This scenario presupposes a positive policy environment that minimises uncertainties faced by the farmers and the industries they supply, and provides the means to manage risks, including credit and insurance. Beyond the household and subsectoral level, policies should also address urban agriculture holistically, as part of the entire urban food system. This includes rural-urban supply linkages, food trade and sometimes food aid. Also influencing the urban food system at a macro level are underlying trends in demographics, economic cycles and forces affecting land development in cities. In turn, the presence of urban agriculture creates impacts on the environment, on social relations, and on household economic and cultural behaviour.

A holistic perspective for policy-making would take into account the macro, sectoral and micro relationships, and consider the following in policy development:

- incentives facing households regarding food production and consumption;
- resources available to local government in providing infrastructure and services;
- trends in regional and national agricultural markets, especially supplies; and
- linkages between urban, periurban and rural farmers and processors.

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