

GARDENING TO REDUCE HAZARD: URBAN AGRICULTURE IN TANZANIA

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ABSTRACT

Urban agriculture is an illegal activity in most African towns and cities, as it is seen to be competing with other, higher value, urban land uses. Despite this, food production occurs throughout the African urban environment and is crucial to the urban economy; providing employment, food security and investment opportunity for a large proportion of the urban population. Urban agriculture also adds value to urban land, bringing unused land into production, reversing degradation and improving the urban landscape. In the context of a rapidly expanding urban population, food production in Dar es Salaam is playing a crucial role in sustaining the city, employing 210 000 people. Urban agriculture also has an important role to play in providing a viable land use in the hazard lands of Dar es Salaam, as an alternative to squatter housing which exposes the inhabitants to a substantial risk from flooding. This paper looks at the role that urban agriculture plays in Dar es Salaam and identifies the major actors. Copyright © 2001 John Wiley & Sons, Ltd.

KEY WORDS: urban agriculture; urban food production; Dar es Salaam; Tanzania; hazard lands; high-density areas; urban landscapes; adding value

INTRODUCTION

The city of Dar es Salaam is forecast to grow at a rapid rate (see Table I). The major problem is that employment and housing will have to be found for an additional three million people over the next five years. This will put unprecedented pressure on already overburdened resources. The city is likely to grow horizontally, spreading onto areas which have previously been little affected by the urbanization process. There is likely to be little vertical growth. What this means in terms of land-use planning is that the government agencies involved will have to ensure implementation of urban planning policies and advanced service payments in order to direct and control the high growth rates. Whether or not the financial capacity to do this can be found is another matter.

One of the areas of immediate concern is the development of unplanned habitation areas in the hazard lands of Dar es Salaam. Hazard lands include areas such as river valleys at high risk from flooding, marsh land and land on steep slopes. Already there is unplanned encroachment into these areas by a significant portion of the population, who are mostly the lower income group typically constructing low-cost, high-density housing. These people are at high risk from annual flooding and are doubly exposed to freak flash floods. Thus, there are household, community and wider social opportunity costs connected to present and projected land uses. A benefit exists to put such areas into alternative land uses such as urban agriculture.

At present, a significant portion of urban agriculture takes place in the hazard areas providing urban employment and income generation, albeit unlawful. A.G. Kimambo from the Ministry of Lands, Housing and Urban Development noted:

More attention should be paid to opportunities for urban agriculture to manage such areas. We need to review those areas, which were once defined as hazardous, and separate those that are clearly dangerous from those

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Table I. Population projections in Dar es Salaam

Year	Population Estimates	7.2% Growth
	3.5% Growth	
1995	3·000·000	3·000·000
2000	3·563·059	4·247·126
2005	4·231·796	6·012·694
2010	5·026·046	8·512·224
2015	5·969·367	12·050·830

Source: Percentage rates taken from Baruti *et al.*, 1992.

that can be protected through technological investments. Those occupied spaces like Msimbazi Valley' where people experience economic losses through flooding, need declaring unfit for human habitation. Subsequently, our enforcement measures need boosting to ensure no further invasions take place, if we are to develop a sustainable city within the constraints set by nature itself. (ETC UK, 1995: 19)

A possible solution to the problem of having a large proportion of the urban population exposed to natural disasters, as is the case in many Third World cities, is by having a policy plan that is conducive to alternative land uses, such as urban agriculture. In short adding an economic value to the hazard lands. Kimambo goes on to say, 'land management practices ([such] as urban agriculture) may be a way to reintroduce the ideas [of buffer zones] as practical solutions to the problem of land invasion' (ETC UK, 1995: 19).

This paper explores the importance that urban agriculture plays in Dar es Salaam in relation to food security, urban employment and in adding value to the urban environment.

URBAN AGRICULTURE IN DAR ES SALAAM

The city region of Dar es Salaam lies between 6°34' and 7°10' south on the Indian Ocean coastline, stretching about 100 km between the Mpiji River to the north and beyond the Mzinga River in the south, enclosing some 1350 km² of land. The climate of Dar es Salaam is tropical coastal, with a mean annual temperature of 26°C and an average humidity of 96 per cent in the morning and 67 per cent in the afternoon. The annual rainfall averages just over 1000 mm which is concentrated in two seasons: the short rains of November and December which provide an average of 75 to 100 mm of rainfall per month; and the long rains between March and May, where monthly averages of 150 to 300 mm can be expected. While Dodoma is the official national capital, Dar es Salaam is the *de facto* capital, as it remains the main administrative, commercial, industrial and transportation centre in Tanzania.

Dar es Salaam is one of the fastest growing cities in the world (Convery, unpublished thesis, 1996). Rural–urban migration is one of the most important factors contributing to the rapid population growth, fuelled primarily by rural poverty and the availability of urban economic opportunities. In addition to rural–urban migration, a high natural population increase has occurred due to high total fertility rates.

There is historical evidence that the production of food by urban households in Dar es Salaam has been common practice for some time. In the early 1900s, the colonial administration set aside urban land for agriculture in order to occupy the urban unemployed who were seen as politically dangerous (Bryceson, 1987). During this time, cultivation on the outskirts of Dar es Salaam was primarily of a subsistence nature. This, combined with direct farm supplies from the rural family homestead of the city-dweller, was a vital part of African urban household food supply.

Today, urban agriculture remains essential for large parts of the urban population: the urban poor for survival and the educated urban elite to maintain income levels and support family networks. The practice of urban agriculture is becoming more prolific in African cities as the pressures of the structural adjustment programmes have proved to be a double-edged sword: reducing prices of export crops, which encourage urban migration, reducing urban

employment levels and reducing the government's ability to buy food stocks due to inadequate foreign exchange earnings (Tinker, 1994).

Urban agriculture is located firmly in the informal sector and is often outlawed by city authorities (as is the case in Dar es Salaam) frequently because of the size of unplanned settlements. These settlements are associated with informal urban agriculture. Urban agriculture shares a number of characteristics with other elements of the informal economy including an ease of entry, reliance on indigenous resources, small scale of operations, labour intensive and adaptive technologies, a lack of formal training and unregulated markets (Lee-Smith and Memon, 1994). For the informal economy to thrive, with particular reference to urban agriculture, there needs to be a weak or accommodative urban planning, legislation and management system (Mbiba, paper presented by Department of Rural and Urban Planning, University of Zimbabwe 1993). This is a general statement which can apply to most situations in Africa. However, even in well developed cadastral and land development systems based on individual title, such as in Zimbabwe, urban agriculture still thrives (Mbiba, *ibid.*, 1993).

Recent satellite imagery indicates that 23 per cent of the total Dar es Salaam land area is utilized for agricultural production. This includes land on the urban fringe and within the built up areas, such as river valleys, squatter areas and vacant plots in the planned areas of Dar es Salaam. According to Materu (paper presented to a workshop in Dar es Salaam, 1993), some 5 700 dairy cattle and a similar number of goats, about 13 500 pigs, 237 000 broiler chickens, 445 000 laying hens, over 100 000 free range chickens and 8 100 ducks were recorded within the city limits during 1990. Materu (*ibid.*, 1993) also estimates that 100 000 tonnes of food crops are annually recorded as having been produced locally for markets in the city. Urban farming was the second largest employer in Dar es Salaam, involving 20 per cent of the working population (equal to 7 per cent of the whole population). Based on the current population estimate of three million this would indicate 210 000 people participate in agriculture in the Dar es Salaam region. These urban farmers are not represented by any organization, either in the city or at a national level, even though they constitute a major part of the population (Lee-Smith and Memon, 1994).

In a recent study carried out by ETC UK, it was estimated that urban agriculture (excluding animal husbandry) is worth 16 billion Tanzanian shillings (Tsh) (approximately US\$ 25 million at an exchange rate of Tsh 630 to US\$ 1) to the urban economy in Dar es Salaam. In high-density areas horticultural production provides a 10 per cent cost saving to total household expenditure and possibly as much as 60 per cent in the periurban areas. At both macro- and microeconomic levels urban agriculture plays a dominant economic role.

A major reason for engaging in horticultural production is to produce fruits and vegetables for home consumption and thus reduce household food expenditure (Stevenson *et al.*, 1994). Households engaged in vegetable production in Hanna Nassif, a typical high-density, unplanned area in Dar es Salaam, make a 10 per cent saving on their total monthly expenditure. In Hanna Nassif average household monthly expenditure is around Tsh 33 780. Stevenson *et al.* (1994) calculated that the average monthly expenditure on fruit and vegetables was Tsh 16 033 which represents half of the total monthly household expenditure. Any households engaged in vegetable production will make savings on their total monthly expenditure.

Table II indicates that fruit and vegetable contributions of around 20 per cent of household fruit and vegetable consumption would give cost savings of around Tsh 3 206 per month.

Table II. The cost savings of urban agriculture

Level of self-sufficiency of fruits and vegetables (%)	Estimated monthly cost savings on fruit and vegetable expenditure (Tsh) per household
100	16·033
50	7·150
20	3·207

Source: Data from Stevenson *et al.*, 1994.

A CLASSIFICATION OF URBAN AGRICULTURE

Practitioners of urban agriculture in Dar es Salaam have developed a remarkable range of farming systems and horticultural techniques (Mougeot, 1994a). Indeed, farming in the city requires much finer technological and organizational precision than rural agriculture because it must be more intensive, on more degraded land and more responsive to market behaviour (Mougeot, 1994b). To a certain extent, these characteristics depend on the urban farmers income levels, which, in turn, is dependent on where they live in the city (Bryceson, 1987).

It was found, in a study carried out by ETC UK (1995), that urban farmers in Dar es Salaam can be classified into four categories, according to their dominant characteristics. These are: the high density inner urban farmer, the open space farmer, the periurban farmer and the high income farmer. In the following section these classifications are explained and examples are provided.¹

High-density Inner Urban

These areas are generally unplanned with a high population density of relatively low income; the urban poor. There is a shortage of space and basic resources, most notably water but also refuse collection, road access and social services. Consequently agriculture in these areas is practised on limited land with plots ranging from 5–30 m². Purchased inputs are low because money security is low. Agriculture is carried out mainly for supplementing the diet, with any excess being sold locally, within the community rather than being taken to market. A range of vegetables is grown on a small area, such as tomatoes, Swiss chard, egg plant and amaranthus and, although they contribute to domestic consumption, they do not supply 100 per cent of household needs.

An example from Vingunguti. In the high-density area of Mtambani, a family of five has a vegetable plot of 10 m². It is the woman of the household who does most of the gardening. For water, they use a traditionally constructed local shallow well and they get some of their fertilizer from home-produced compost from their household waste and some from goat manure from the local slaughterhouse. They mix this with ash and apply it to the plots. They grow tomatoes, eggplant and spinach. They cannot grow amaranthus because their chickens eat the seedlings. They sell about half their vegetables to neighbours or occasionally they give them as gifts. The remaining half satisfies their domestic needs for these vegetables. One crop earned them Tsh 1000 from one harvest. There are four crops per calendar year.

Open Spaces

Agriculture in open spaces is dominated by vegetable gardening for commercial purposes. The types of land where agriculture takes place includes hazard lands (e.g. river floodplains), roadsides, undeveloped housing plots, institutional land and military land. Here, the gardeners receive the majority of their income from farming and, as such, are likely to invest in their vegetable plots. Purchases include manure (typically chicken manure), some pesticides and/or fungicides, water, land rent and possibly hired labour. The main crop that dominates open space agriculture is amaranthus as it is in high demand, with a high value. It is also a short-rotation crop, with sowing to harvesting taking only 28 days. The farmed area ranges from 0.25–1.25 ha.

An example from Kijitonyama. Just off Ali Hassan Mwinyi Road in the Kijitonyama area of Dar es Salaam there is a roadside vegetable farm of 1.5 ha. This land is rented by three men (from three different families) who pay Tsh 150 000 rent per month for the plot. They grow mainly amaranthus (about 90 per cent of production) and occasionally okra and Swiss chard. Agriculture is their full time job. Their monthly inputs are water at Tsh 60 000, chicken manure at Tsh 100 000 and Tsh 48 000 for urea. Their net profits are Tsh 60 000 each per month and they each consume about Tsh 1 000 worth of the vegetables from the farm.

¹This classification is based on ETC UK fieldwork, 1995.

Periurban

Periurban agriculture has all the characteristics of rural farming, the exception being exposure to a strong urban market. The farmed area may be up to 40 km away from the city centre, the transport costs of vegetables becomes an important factor in periurban agriculture. Water availability is the main limiting factor, and not land, as is the case in the inner-urban areas. Because of the abundance of land, crop choice will be dominated by relatively long rotation crops which need a large land area to make them economically attractive; crops such as tomato, okra, cassava leaf, pumpkin and pumpkin leaf and onion. Manure application is low, but pesticide and/or fungicide use is high, indicating a high level of insect and disease infestation as well as a lower application rate of fertilizer to the longer rotation crops. Farms may be up to 15 ha, but off-season vegetable areas are considerably smaller and are concentrated around shallow wells.

An example from Mbutu. About 30 km from the city centre in a rural situation, but classed as periurban, a farmers group of 11 members has a farm of 7 ha on which they work for three days of the week. The farm grows tomatoes, sweet potatoes and maize. They rely on the yearly rains for their water source so they only have one harvest. Their yearly inputs are fungicide which costs them Tsh 140 000, hired labour at Tsh 140 000 and transport costs them Tsh 100 000. From these inputs this year they grossed Tsh 2 500,000 for the tomato crop, Tsh 100 000 Tsh for the maize and Tsh 350 000 for sweet potatoes. Of the income, 50 per cent is put into the group's savings account and the rest is shared out among the members of the group.

The High-income Farmer

There is a fourth category in the sectors of the population involved in urban agriculture, but this last type is not restricted to any city subregion. The participants come from the higher income bracket of the population and include civil servants, administrators, professionals, military officers and university lecturers. They will own farm land but live elsewhere and employ a farmhand to run their farm. For example, they may live in Oyster Bay and own a farm in Salasala 15 km away. Their main agricultural activity is livestock and thus this sector dominates urban livestock keeping. They also are engaged in agriculture, including fruit production. The money that they earn from farming will often greatly exceed their yearly salaries and as such is a highly lucrative business opportunity. Their plot sizes can range from 2–10 ha.

An example from Oyster Bay. An army officer living in Oyster Bay has two farms, one around his house where he keeps his livestock and a few banana trees. His second farm, of 5 ha, is found in Salasala, approximately 15 km away from Oyster Bay. He hires two labourers, one to keep his livestock in Oyster Bay and one to run his farm in Salasala, he pays them Tsh 6 000 per month each (well below the minimum wage). He cultivates a wide range of horticultural crops; tomatoes, bananas, papaya, mango, pineapple, oranges, okra, eggplant, cassava, pigeon pea and amaranthus. He keeps 5 cows, 4 goats and 500 chickens. He uses his livestock manure on his farm. Every month he pays out Tsh 60 000 on veterinary medicines and Tsh 20 000 on cow feed. Each month he will earn approximately Tsh 400 000 net profit.

THE IMPACT OF URBAN AGRICULTURE ON THE URBAN ENVIRONMENT

The impact of urban agriculture on the urban environment arouses interest from environmentalists, authorities and the public not only because the effects are clearly visible, but also because its implementation is unplanned and uncontrolled. The government often publicizes the negative environmental impacts of urban agriculture in an effort to sway public opinion and legitimize anti-farming measures such as maize slashing in Zimbabwe. It is sometimes assumed that razing urban farming can help control squatter settlement, an assumption that is rarely tested.

The positive impacts of urban agriculture include the photosynthetic activity of plants, which consume carbon dioxide and produce oxygen. Having more green plants in a congested urban environment has a positive impact on air quality and by implication people's health. The presence of green areas in the city also has an aesthetic value.

Table III. Environmental impacts of urban farming

Positive aspects	Negative aspects
Improved nutrition (and thus greater resistance to disease and lower infant and child mortality)	Heavy metal contamination of roadside crops
Avoided health problems through improved diet	Increase in organic waste from crops leading to greater incidence in pests (vermin, flies) creating health hazard
'Adding value' to the local environment by improving urban aesthetic	Pollution of water courses from fertilizer and pesticides

Source: Howorth *et al.*, 1996.

Despite the charges levelled against the unplanned nature of urban farming, there are some examples of positive planning activities in Dar es Salaam. For example, the SUKITA agricultural enterprise in the Msimbazi Valley deepened and straightened a portion of the Msimbazi River. Without this intervention, it has been suggested that the floods which affected the valleys of Msimbazi, Jangwani and Tabata in early 1995 would have been more severe. Urban farming can also play a very important role in municipal waste management, through composting.

The negative environmental impacts of urban farming include problems of waterlogging in crop plots, which create breeding sites for malarial mosquitoes. Since sites are likely to be in the immediate vicinity of residential areas, this contributes to the increased incidence of malaria. However, it can be argued that the improved nutritional status gained from gardening has a more positive effect on human health than does the higher incidence of malaria. Pesticide use on urban crops can cause a threat to human health through run off and water contamination. This problem is likely to be less of a threat because of the limited pesticide use on quick-rotation crops that dominate urban farming. There are also the problems of heavy metal contamination of crops and the increase of organic waste. Table III shows the positive and negative environmental impacts.

CONCLUSION

Urban areas were once thought to be purely zones of consumption and areas of demand. However, as the growth of urban populations in Africa has surpassed forecasts, there has been an expansion of informal and farming activities and an increasing ruralization of the cities: the boundaries between the city and the countryside has become clouded (Lee-Smith and Memon, 1994). In the age of United Nations 'development speak', when there is talk of 'sustainable cities', it appears that the urban population is already making significant headway. This is despite legislation against urban agriculture in Dar es Salaam, because it is considered to compete with other higher-value land uses.

In reality, however, urban agriculture adds value to unused and degraded land, improving the landscape of the city and providing livelihoods for a significant section of the population. It also contributes a significant percentage of the cities, GDP. Urban farming is one of the ways in which the domestic economy functions for survival in modern Africa (Lee-Smith and Memon, 1994).

In conclusion, a number of statements can be made about urban agriculture in Dar es Salaam.

- Urban agriculture offers a viable alternative for an added-value land use in the hazard lands, instead of them being used for high-risk housing for vulnerable sections of urban society.
- City farming can protect land against pests, thieves, squatters, garbage dumping and vandals; it can reclaim, service and improve land, thus raising the use and rent value of land (Mougeot, 1994b).
- As urban populations are increasingly feeling the impact of government austerity measures, the role that urban food production plays in the domestic economy is gaining in importance.
- Urban agriculture provides employment for a significant proportion of the urban population and contributes substantial earnings to the city economy.

- Urban agriculture is an informal activity and is uncoordinated, spontaneous and creative and relies on indigenous knowledge and adaptable local technical systems.

The description this paper gives of the range of actors involved in food production in Dar es Salaam demonstrates the range of functions that urban agriculture provides: food for the poor, income for the entrepreneurs, livelihoods for periurban farmers and investment opportunities for the African bourgeoisie. Urban farming also alters the urban environment, reducing land degradation and adding value to unused land. City farmers, like rural farmers, are building landscapes.

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