Urban agriculture in Tanzania: issues of sustainability

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African Studies Centre
Research Report 75 / 2004

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This research project was made possible by a grant from the Netherlands-Israel Development Research Programme (NIRP).

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Published by:
African Studies Centre
P.O. Box 9555
2300 RB Leiden
The Netherlands
asc@fsw.leidenuniv.nl
http//:asc.leidenuniv.nl

Photographs: Dick Foeken

Printed by PrintPartners Ipskamp BV, Enschede

ISBN 90 5448.060.2

This book is dedicated to the late

Elizabeth Elias

who participated in the research project as an MSc student
but who sadly passed away in 2004

and to

the urban farmers of Morogoro and Mbeya

without whom it would not have been possible to write this book

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Acknowledgements

This book is the result of a collaborative study by researchers from Tanzania, Israel and the Netherlands. The study, which addresses issues of sustainability of urban agriculture in two Tanzanian towns, officially started on 1st April 1999 and fieldwork was carried out in 2000 and 2001.

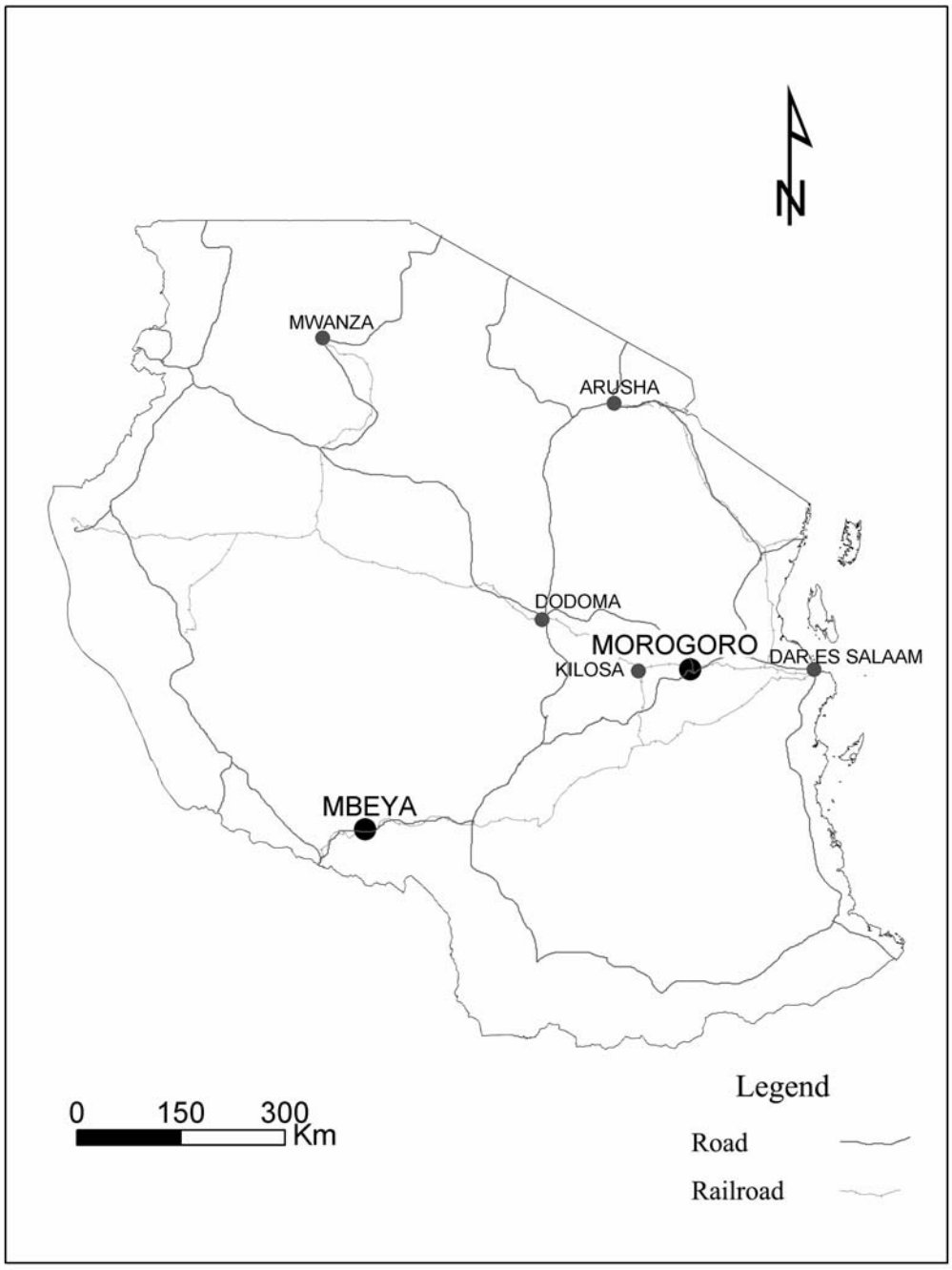
Many people and institutions contributed to the project in one way or another. First of all, we are very grateful to the NIRP Steering Committee for approving the research proposal and to the Dutch Government for funding it. Other persons who played an important role in the implementation of the project were Mr Henk Mastebroek and Ms Loes Minkman at the NIRP Secretariat in the Netherlands and Ms Miriam Bar-Lev from the NIRP Secretariat in Israel. We also extend our thanks to Sokoine University of Agriculture for hosting this project and for offering the good services without which a project like this cannot run smoothly.

In Morogoro and Mbeya, we talked to a number of officials who gave us valuable information about urban farming in their respective towns. These were Mr E. Kalunelo (Acting Municipal Director), Mr Maeda (Municipal Agriculture and Livestock Development Officer) and Mr Mkupete (Head, Department of Town Planning) in Morogoro, and Mr G. Asombwile (Acting Municipal Town Planner), Mr E. Lameck (Divisional Extension Officer of Sisimba Division), Mr M.O. Mhando (Municipal Agriculture and Livestock Development Officer), Mr L.M.E. Muliahela (District Agriculture and Livestock Development Officer), Mr J. Mwangoge (Municipal Town Planner) and Ms S. Siriwa (Acting Town Director) in Mbeya.

Several people assisted us during the fieldwork stages of the project. A special word of thanks goes to Ms Elizabeth Elias who participated in the preparation and production of the questionnaires, the baseline data collection, the enumeration process as well as supervision in Morogoro. Later on, she did her own study within the context of the larger project as part of her MSc degree, which she acquired in 2003. Sadly she died suddenly before the whole project finished and so never saw the end results. We hope she would have been proud of this final publication. Others who assisted us were Mr L.B. Silomba (data coding, data entry, data analysis), Ms M. Minja (data cleaning, data analysis), Ms G. Yona (data cleaning, data analysis), Mr M. Msaki (data cleaning and re-running), Ms F. Mwingirihela (typing questionnaires), Mr D. Pascal (video-shooting) and Mr M. Issote (pictures). We are very grateful to Jan Cappon (Leiden) who did the final data correction and Ann Reeves who did the language editing.

We also want to thank the many enumerators who worked with us during the surveys. In Morogoro these were (* = also for the in-depth survey): Mr P. Hayuma, Ms A. Juma, Ms F. Kaijage*, Ms Z. Kondo, Ms G. Macha, Ms R. Mali, Mr H. Mangi*, Mr M. Mkangila, Mr E. Mkeni, Mr B. Mkombachepa, Ms B. Ntauka, Mr T. Nyarusanda, Ms R. Saho and Ms O. Shoo. For the in-depth survey, seven other people were employed as well, namely Mr T. Mlasi, Ms R. Mtali, Ms J. Msuya, Mr A.I. Kibuta, Mr M.D. Malugu, Mr O. Kimambo and Mr J. Kahwa. In Mbeya, the following persons gave time and energy to the project: Mr S. Ipambalaga, Ms Z. Isimbula, Mr Y. Julius*, Mr E. Lameck*, Ms D. Moshi, Ms F. Mruttu, Ms L. Msaki, Ms A. Mwakubi, Mr G. Mwaluanda*, Mr D. Mwamalongo, Ms F. Mwanga, Mr S. Mwaselela, Ms A. Nalicho*, Mr A. Ndasalama and Ms S. Rwakilomba*.

Finally, we must thank all the 608 respondents (and 60 of them even twice!) in Morogoro and Mbeya for giving up their valuable time and for being so patient about answering the many questions we had. Without all these people, this book would never have seen the light of the day.



Location of the two study towns Morogoro and Mbeya.

Other places on the map refer to urban centres where earlier studies on urban agriculture in Tanzania have been done (see Annex 2).

1

Introduction

Urban agriculture in Sub-Saharan Africa

Farming in town[1] is a common feature of Sub-Saharan Africa (Obudho & Foeken 1999) and it is estimated that as many as 40% of the urban population in Africa is involved in urban agriculture (Mougeot 1994). Studies have been carried out across the continent[2] and from these the following picture arises.

Farming is undertaken wherever land is available. In built-up areas, this can be in one's own compound ('backyard farming' or 'on-plot farming') or on land belonging to someone else ('off-plot farming'), the owner being the government, an institution or a private individual. Farming is particularly common on the out-

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[1] The words 'urban centre', 'town' and 'city' are used interchangeably in this text. When referring to Tanzania, however, 'city' refers to Dar es Salaam, while for all other urban centres the word 'town' is used.

[2] The following list of references is presented in alphabetical order of the city/town and country/region concerned (and is not complete): Obosu-Mensah 1999 on *Accra* (Ghana); Egziaber 1994 on *Addis Ababa* (Ethiopia); Villien 1988 on *Bangui* (Central African Republic); Lourenço-Lindell 1996 on *Bissau* (Guinea-Bissau); Eberhard 1989 on *Cape Town* (South Africa); Brock 1999 on *Cotonou* (Benin); Dongus 2000, Mlozi 1996, Sawio 1993a and 1994 on *Dar es Salaam* (Tanzania); Tricaud 1987 on *Freetown* (Sierra Leone); Byerley 1996 on *Gaborone* (Botswana); Drakakis-Smith *et al.* 1995 and 1999, ENDA-Zimbabwe 1996 and Gumbo & Ndiripo 1996 on *Harare* (Zimbabwe); Gbadegesin 1991 and Tricaud 1987 on *Ibadan* (Nigeria); Atakunda & Maxwell 1996, Maxwell 1994 and 1995 on *Kampala'* (Uganda); Mianda 1996 on Kinshasa (Democratic Republic of Congo); Brook & Davila 2000 on *Kumasi* (Ghana); Schilter 1991 on *Lomé* (Togo); Drescher 1996, Rakodi 1988 and Sanyal 1985 on *Lusaka* (Zambia); Phororo 1999 on *Maseru* (Lesotho); Flynn 2001 on *Mwanza* (Tanzania); Foeken & Mwangi 2000, Freeman 1991 and Mwangi & Foeken 1996 on *Nairobi* (Kenya); Foeken & Owuor 2000 on *Nakuru* (Kenya); Vennetier 1961 on *Pointe Noire* (Congo); Gefu 1992 on *Zaria* (Nigeria); Lee-Smith *et al.* 1987 on *Kenya*; Sheldon 1991 on *Mozambique*; Baxter 1994 and Rogerson 1994 on *South Africa*; Mlozi *et al.* 1992 and Mosha 1991 on *Tanzania*; Diallo 1993 on *western Africa*; Mbiba 1995 on *Zimbabwe*.

skirts of urban centres on rural land that has become part of the town due to boundary extensions. In these zones, both small-scale and large-scale farming can be found. However, as the urban centre grows, these areas gradually lose their rural character and farming becomes increasingly of the other two types.

Urban farming has expanded enormously over the past two decades due to the economic crises in most African countries. For the poor, food security is usually the main motivation for farming in town, and for some it is even a survival strategy. Nevertheless, many of the poor sell some of their produce, partly to be able to afford other basic household needs but also because some crops are perishable and cannot be stored and/or because storage space is not available. For middle-income and high-income households, commercial considerations are usually more important than among the poor, although the consumption of self-produced vegetables and milk is often highly valued. But for most of these households, the primary reason for selling produce is the same as for the poor, namely "to subsidise my income", as is often stated by the farmers themselves.

Many of the African urban farmers are women, particularly in eastern and southern Africa. Traditionally in most parts of Africa, women are responsible for household food provision, and farming is relatively easy to combine with the care of children. Women also often have lower educational levels than men, so it is difficult for them to compete in a shrinking labour market. Farming may thus be the only option left to them when faced with unemployment and poverty. Several studies have found that the number of female-headed households is disproportionately high among urban farmers. It has also been shown that most recent migrants rarely practise urban farming: a person has to be settled and have access to various networks to be able to gain access to land for cultivation.

The crops grown are mostly basic food crops such as maize, beans, cassava, sorghum, rice and yams. A wide range of vegetables is cultivated as well, some of which are sold because of their perishability and because there is a ready market. Some urban farmers grow crops such as tomatoes, spinach and lettuce solely for commercial purposes but this is more common in western Africa than in eastern and southern Africa. Tree crops are not commonly found due to the uncertainty of land tenure that many urban farmers experience.

Although livestock keeping in town is less common than crop cultivation, many urbanites keep one or more animals, usually in their own compound behind their house, but often also 'free range', i.e. grazing freely along the road. The most common types of animals are dairy cattle and chicken. The commercial aspect of livestock keeping is generally of more importance than with crop cultivation, particularly when it concerns the selling of milk, eggs and chickens. As a result, compared with crop cultivation, livestock keeping is more a 'man's business'.

Urban farmers face constraints such as irregular rainfall, drought, flooding, water-logging, poor soils, pests and diseases, and the destruction of crops by animals, all of which are the same as the problems faced by rural farmers. Other problems, however, are more specifically related to the urban context and confront in particular those who practise off-plot crop cultivation and free grazing. Examples include uncertainty regarding land tenure, the theft of crops and animals, a lack of capital and inputs, the threat of eviction and the possible destruction of crops.

Until recently, urban farming was illegal in many African countries. By-laws frequently date from colonial times and forbid all agricultural activities within the boundaries of urban centres. However, as the practice has become increasingly widespread over the last two decades, a change in policy has occurred. During the 1960s and 1970s, policies were restrictive in the sense that harassment and the destruction of crops were measures commonly taken by the local authorities. In the 1980s, however, a gradual shift in attitude took place and nowadays urban farming is usually permitted as long as it does not become a nuisance. As far as crop cultivation is concerned, the height of a crop, especially maize, is important because it is said that criminals hide in them and mosquitoes are assumed to breed in the axils. In some urban centres, for example Dar es Salaam, the local authorities are encouraging the practice of urban farming to raise food-supply levels.

Urban agriculture is considered by many – and policy makers in particular – as an environmental hazard. Livestock can cause bad smells, noise, erosion and traffic accidents, and may be a source of diseases. Crops are sometimes irrigated with contaminated water, while those cultivated along roadsides are prone to air pollution. Since urban farming tends to be more intensive than rural farming, the use of chemical fertilisers, pesticides and insecticides can have a negative impact on the urban environment, causing pollution in not only the plants but also the soil and groundwater. The recycling of sewage and urban solid waste by turning them into compost is frequently put forward as a kind of panacea for both urban crop production and the improvement of the urban environment. Although environmental awareness is growing in Africa, such measures have not (yet) been put into practice.

Urban agriculture is attributed a potentially beneficial role in terms of the urban economy, urban food supply and urban development in general (Smit *et al.* 1996). Although largely an informal economic activity, urban farming provides employment as well as an income for those involved. This income can be realised directly through the sale of crops or indirectly because less food has to be bought (‘fungible income’). At the town or city level, urban farming contributes positively to the provision of affordable food for poorer urban dwellers.

However, because of its generally low productivity, the sector's potential in terms of food supply and employment is much higher than presently appreciated, as various studies have indicated (for an overview, see Nugent 2000).

Food producers in town, especially those in vulnerable groups, benefit directly in terms of increased food security (Armar-Klemesu 2000). In Nairobi, Mwangi (1995) found that farming households in a slum area were somewhat better off in terms of both energy and protein consumption when compared with non-farming households. Moreover, growing food helps improve the quality of people's diets by providing fresh fruit and vegetables.

The above offers a very concise and general summary of some of the findings of studies undertaken to date. Although numerous studies have been done (see Obudho & Foeken 1999), knowledge about urban agriculture in Africa is still fragmentary because the majority focus on only one or two aspects of urban farming and have mostly been carried out in one specific urban centre (usually the national capital) or even a specific part or project within that centre. The present study differs from most previous ones in the sense that (1) various aspects of urban farming are dealt with under the general heading of "sustainability of urban agriculture"; (2) the study was carried out in two medium-sized towns and not in the national capital; and (3) the two towns differ considerably in terms of climate and other physical characteristics.

The Tanzanian context

After a long period of performing poorly, the Tanzanian economy started to improve from 1995 onwards. Between 1995 and 2000 the economy grew at an average rate of 4%. The current account deficit declined by more than 50% and inflation fell from an average of 29% in 1990-94 to 4.5% in June 2002 (URT 2000c). Nevertheless, the achievements at macro level are not translating into improvement of the poor majority of the Tanzanian population, especially in rural areas (Likwelile 2003). The majority of the poor depend on agriculture for their livelihoods and the agricultural sector in Tanzania consists largely of smallholder farmers who have a low level of agronomic knowledge, who use traditional methods of production and who receive low prices at home and abroad for their produce. From a macroeconomic point of view, agriculture's share in the GNP showed a relative decline, implying that those still engaged in agriculture have experienced a decline in welfare level (URT 2002b).

Moreover, a number of policy measures following the problematic situation of the Tanzanian economy in the 1980s (acute shortages of foreign exchange, balance of payments deficits, budget deficits, and high rates of inflation) had a

negative impact on large segments of the population, both rural and urban. Abolishing subsidies on farm inputs has affected the income of smallholder farmers, while the massive retrenchment of workers in the government and parastatal sectors has increased the rates of unemployment,[3] especially in the urban areas, and the financial insecurity in urban centres. The introduction of cost-sharing in hospitals and schools has forced many households to seek cash incomes through employment diversification (URT 2002b).

As a result, levels of poverty are still high in Tanzania and despite the overall good economic performance show only marginal signs of improvement. The 2000/01 Household Budget Survey found that the proportion of the Tanzanian population living below the basic needs poverty line declined from 38.6% to 35.7% in 2000/01, while the proportion living below the food poverty line had declined from 21.6% in 1991/92 to 18.7% during the same period (URT 2002c). Only in Dar es Salaam, a significant decline of both poverty measures was recorded (URT 2002b).[4]

There is growing concern that there are specific social groups in both rural and urban areas that are likely to be poor and/or face the imminent risk of sliding into poverty or extreme poverty. These include the unemployed youth, orphans and street children, the elderly, as well as people involved in hazardous or precarious economic activities such as commercial sex, quarrying and domestic work. Women are also considered a vulnerable group. Even though according to the Gender-Related Development Index, gender inequality in Tanzania is relatively low (UNDP 2003), most women identified themselves as vulnerable and as having limited access to assets such as land and education. While the gender balance is relatively equal in primary-school enrolment, a wider gap exists in the enrolment rate at secondary level and in higher education. In urban areas, women tend to be engaged in unskilled and low-paid labour, and the unemployment rate for women is higher than that of males. The HIV/AIDS pandemic has hit many people, and its prevalence is highest among girls and young women (UNDP 2003).

Between 1967 and 2002, the Tanzanian population increased from 12.3 million to 34.5 million (URT 2003). The urban population has increased faster than the rural population as a result of a high natural increase, rural-urban migration and boundary extensions. Tanzanian towns are facing major problems due to

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[3] The unemployment rate for Dar es Salaam increased from 22% in 1990/91 to 26% in 2000/01. For the other urban centres, the rate almost doubled, namely from 6% to 10% during the same period (URT 2000b: 15).

[4] The sources do not give definitions of 'basic needs poverty line' and 'food poverty line'. The latter is usually defined as "the annual household income needed to purchase the amount of calories required to meet the minimum nutritional needs of household members" (see for instance Hoorweg *et al*. 1995: 122). However, in order to make a living, other expenditures besides food are also necessary, which is reflected in the 'basic needs poverty line' (or 'minimum existence level').

their inability to create jobs in the shrinking formal sector, housing shortages and delays in the development of social services and physical infrastructure. The urban poor thus face enormous challenges. In order to cope with economic austerity, urban dwellers, with some government encouragement, are turning to income-generating activities in the informal sector.

One such activity is urban agriculture whereby urban dwellers produce food, earn extra income and use available land and labour resources (Mlozi 1995b). In Tanzania's towns, urban agriculture is very common and involves the raising of livestock (dairy cattle, chickens, goats, pigs, etc.) and the cultivation of crops (maize, cassava, legumes, vegetables, fruits, etc.). Urban agriculture is undertaken for both subsistence and commercial purposes and has evolved to the point where it is regarded as a survival strategy for the urban poor and an economic imperative for wealthier households. It is seen as especially important for low-income households and for female-headed households in particular. The gender aspect is thought to be important because land and title deeds to land are less easily accessible to women and they are also less likely to use modern farming techniques and/or inputs.[5]

Another consequence of the loss of purchasing power for many urban dwellers means increasing dependency on *rural* food and/or other income sources for their livelihood. With few exceptions, urban residents have strong roots in rural areas through their annual visits, remittances, building of houses, and farm ownership. The town of Lindi and three neighbouring rural villages in south-eastern Tanzania can serve as an example (see Kibadu *et al.* 2001). There, it was found that a high proportion of the town's residents were engaged in agriculture: for subsistence, for cash production or as seasonal wage labourers. The low-income urban residents in particular tended to rely on employment and resources from the rural areas. Remittances from migrants in town to their kin in the rural areas were said to have decreased over time. Most migrants only found employment in the urban informal sector and could not afford to support relatives. This indicates a reversal of the rural-urban flows between relatives in town and in the rural 'home' in the sense that urban households have become more dependent on rural resources than in the past. This trend has been observed in other studies as well (see for example, Tacoli 2002; Foeken & Owuor 2001).

Sustainability of urban agriculture

Sustainable urban agriculture can be discussed at two levels: the household and the town (while the neighbourhood can be regarded as an intermediate level in some instances). At the *household* level, sustainability refers to the concept of

[5] Chapter 2 offers an overview of urban agriculture in Tanzania based on existing studies.

sustainable livelihood. A livelihood is sustainable "if it is adequate for the satisfaction of self-defined basic needs and proof against shocks and stresses" (de Haan 2000: 13). Sustainable urban agriculture at this level refers first and foremost to the provision of food and/or income in order to maintain a certain standard of living. At the *town* level, sustainable urban agriculture is usually only related to the environmental consequences of the practice: farming in town can only be sustainable as long as it does not harm the urban (ecological) environment. Although this is certainly important, other aspects are relevant as well, in particular employment creation, the marketing of produce and an enabling legal and policy setting. Table 1.1 shows a number of characteristics of each of these aspects of sustainable urban agriculture at both levels.

In terms of *food supply*, urban farming benefits the household directly through self-consumption (household level). This concerns both the quantity and the quality of the consumed food. When part of the produce is sold, others in town benefit as well, especially when the produce is sold below the market price (town level). Often, (a small) part of the produce is given away to neighbours or relatives (neighbourhood level). *Income generation* at household level can be directly, i.e. when (part of) the produce is sold, and/or indirectly, i.e. through saving on food costs ('fungible income'). At town level, many people can benefit directly from farming activities there, for example, through undertaking paid labour on urban farms, by selling inputs, transporting produce, and buying and selling produce. These people may pay taxes and/or market fees, thereby benefiting the municipality as well. *Employment creation* at household level concerns the labour carried out by the members of the household. At town level, employment creation is closely related to income generation for the categories mentioned under 'income' in Table 1.1, and it may have a multiplier effect generating employment in related activities. Without a good *marketing* system, the buying and selling of produce is difficult. There need to be smooth marketing channels (town level), so that households have easy access to potential clients and the market (household level).

Urban agriculture can only be sustainable if it does not disturb the urban *environmental balance*. At the household level this requires first of all an awareness of the environmental impact of farmers' activities and their willingness to take the environment into account in their farming activities. Practically, it means that the household should, for instance, practice organic farming, refrain from using polluted water for irrigation, prevent soil erosion, manage livestock waste properly, and practice recycling (for example, by integrating crop cultivation and livestock keeping). At the town level, the same awareness among local authorities regarding the urban environment and their willingness to actively improve it

Table 1.1 Characteristics of sustainable urban agriculture, by level

	Household level	Town level
Food supply (quantity and quality)	▪ self-consumption in producing household	▪ sales of produce to other urban dwellers ▪ donations to neighbours and relatives in town
Income generation	▪ direct income through sales of crops, animals and animal products ▪ indirect income through saving on food costs	▪ for labourers in urban gardens and on farms ▪ for suppliers of inputs ▪ for transporters of produce ▪ for traders of produce ▪ through taxes and fees from purchases and sales
Employment creation	▪ own (family) labour	▪ for labourers in urban gardens and on farms ▪ for suppliers of inputs ▪ for transporters of produce ▪ for traders of produce ▪ for extension officers
Marketing of produce	▪ ready access to markets	▪ smooth marketing channels for agricultural products produced in town
Environmental balance	▪ awareness of the impact of urban agriculture on the urban environment and willingness to take the environment into account ▪ practice organic farming ▪ abstain from use of polluted water for irrigation ▪ prevention of erosion ▪ proper management of livestock waste ▪ practice recycling	▪ awareness of the importance of a healthy urban environment and willingness to realise it ▪ solid and liquid waste management, including compost making, for recycling purposes ▪ generating the required infrastructure for recycling
Enabling legal and policy setting	▪ producers to abide by (by-)laws and regulations ▪ guaranteed access to open spaces for farming purposes for a certain period of time	▪ adaptation of restrictive (by-)laws and regulations to recognise the reality of urban farming ▪ enforcement of adapted (by-)laws and regulations ▪ encouragement of organic farming, proper waste management, and recycling ▪ creation of farming zones ▪ allocation of land for farming ▪ provision of production incentives

is as essential as among producers. One of the most important factors in this respect is solid and liquid waste management, as well as the initiating and operation of recycling processes.

Finally, there should be an *enabling legal and policy setting*. This is particularly important at the level of the city or town council. Often, existing (by-)laws and regulations are quite restrictive regarding urban farming, so these should be made more enabling, but at the same time be clear on what is allowed and what is

not. In addition, these (by-)laws and regulations should be enforced, so that producers have to abide by them (household level). The local authorities should also actively encourage organic farming, proper waste management and recycling. Other policy measures could include the creation of special farming zones within the municipality and the provision of production incentives, for example, guaranteed access for households to an open space for farming purposes for a clearly defined period of time (household level).

Objectives of the study and methodology

The overall aim of the study was to assess the sustainability of urban agriculture in two medium-sized Tanzanian towns: Morogoro and Mbeya. More specific objectives were related to the above-mentioned aspects of sustainability:

- to describe urban agricultural practices, i.e. crop cultivation and livestock keeping, in the two towns;
- to determine the importance of urban agriculture in providing food at household as well as town level;
- to assess the importance of urban agriculture for the income situation of households involved;
- to estimate the extent of employment created by the sector;
- to determine the environmental implications of farming practices in town;
- to assess the awareness, perceptions and attitudes of both urban farmers and non-farmers regarding the environmental implications of urban farming;
- to determine in how far urban farmers practice environmentally friendly ways of farming;
- to assess the importance of *rural* farming activities for urban households in terms of general food security; and
- to assess the formal policy of local authorities towards farming in town and to compare this with current farming practices.

As mentioned above, the study was located in the two medium-sized towns of Morogoro and Mbeya in Tanzania. They were chosen due to their size (both around 250,000 inhabitants), their position in the national hierarchy in terms of size and functions, and their differences in terms of climate and geomorphology.[6]

General survey

In order to create a representative sample and be able to analyse various subgroups, 300 households in each town were selected. For the distribution of the selected households, the criterion of *housing density* was thought to be important

[6] See Chapter 3 for a description of the two towns.

in relation to urban agriculture: (1) it is a socio-economic variable in the sense that to some extent it can be considered an indication of household welfare level; and (2) it is a geographical variable indicating the amount of space available for farming, 'on-plot' farming in particular. Moreover, it was decided to limit the sample to households in the *built-up areas* of the two towns for the simple reason that in the area between the built-up areas and the municipal boundary (in this study defined as the peri-urban area), farming is, by definition, a primary activity.

As for the sampling process, the two towns were divided into fifteen blocks over the three density areas and in each block 20 households were randomly selected (using a table of random numbers) to arrive at 300 respondents per town. The number of households selected in each density category had to be more or less in line with the actual population of each category. Hence, in Morogoro, two blocks were selected in the low-density areas, four in the medium-density areas and nine in the high-density areas, resulting in a distribution of 40, 80 and 180 households in the three density areas, respectively. For Mbeya, the distribution was slightly different: three blocks in both the low- and medium-density areas and nine in the high-density areas, resulting in 60, 60 and 180 households, respectively.[7]

For the exact selection of households, the procedure was as follows. In Tanzanian urban areas, a *mtaa* is the lowest level of administration. It comprises ten households and is headed by a so-called "ten-cell leader". In each block of several ten-cell leaders, two households per ten-cell leader were randomly selected.

Fifteen enumerators were trained and employed in both towns to fill in questionnaires, each in charge of one block. The Municipal Agricultural & Livestock Development Officers in Morogoro and Mbeya gave permission to use extension officers as enumerators. This had two advantages: (1) urban extension officers were acquainted with the topic to be studied, including the environmental issues related to urban farming; and (2) these officers knew all the farming households in their respective wards.

The survey questionnaire for the study was adapted from one used in a comparable urban-farming research project in Nakuru, Kenya by the Dutch counterpart in the Tanzania study. It was, however, adapted to Tanzanian conditions: minor points were deleted and certain questions and items were added. The questionnaire covered various general household characteristics (demography, migration history, income-generating activities), urban crop cultivation, urban livestock keeping, rural-urban links, and general food security issues.

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[7] For the exact distribution of blocks and households, see Annex 1, Table A1.1.

In-depth survey
For a second, more in-depth survey, 30 households in each town were randomly selected from the original study population of the main survey. These households were visited with detailed questions regarding their farming activities in town – be it crop cultivation, livestock keeping, or both – to gauge their opinions, perceptions and attitudes on the subject. A semi-structured questionnaire was used to gather both quantitative and qualitative data.

Additional methods of data collection
Two other data-collection methods were used. Firstly, interviews were held with various key informants, such as individual farmers and municipal council officials. Secondly, the gender aspect of urban farming received particular attention thanks to a master's student attached to the project who produced a master's thesis entitled *Women's role in urban agriculture: A case study of Morogoro and Mbeya municipalities* that looked into roles, the allocation of labour time, and the constraints and choices facing men, women, children and labourers in urban agriculture (Elias 2003). Livelihood frameworks were used to investigate the involvement of urban dwellers in urban agriculture, the use of land and capital, and the contribution of the practice to the respondents' livelihoods.

Structure of the book

The book is structured as follows. First of all, an overview of urban agriculture in Tanzania, based on the existing literature, is presented in Chapter 2 and considers the various aspects of sustainability. The overview shows that urban agriculture is a very important economic sector that provides employment, food and income to many. Chapter 3 presents a description of the two selected towns – Morogoro and Mbeya – as well as outlining characteristics of the study's population. These data confirm the general conclusions from Chapter 2.

Chapters 4 and 5 describe and analyse the ways people in the two towns carry out crop cultivation and livestock keeping respectively. Chapter 4 is concerned with access to land, the type and size of plots cultivated, the characteristics of crop cultivation, the end-use of production, use of inputs, as well as the advantages and obstacles related to the growing of crops in town. Chapter 5 deals with the types and numbers of animals kept in town, the ultimate destination of the produce, inputs for livestock keeping, and, like the previous chapter, the advantages and problems of rearing livestock in town. Chapter 6 deals with the first two aspects of sustainable urban agriculture: food and income. The data are partly quantitative and partly of a qualitative nature and indicate the importance of urban farming for people's food security as well as household income. In this

chapter, data on *rural* food and income sources are also presented. Chapter 7 discusses another major issue related to the sustainability of urban agriculture, namely the urban environment. Urban farmers' awareness and perceptions, as well as their actual behaviour towards this issue, are described and analysed. In Chapter 8, the three remaining aspects of sustainable urban farming are discussed – employment creation, the marketing of produce, and the legal and policy setting.

Chapter 9 is the concluding chapter and is divided into two sections. The first offers a summary of the main findings of the study and attempts to bring together the various aspects of sustainability discussed in the previous chapters. The second section deals with local residents' views on the future of urban agriculture in the two towns.

2

Urban agriculture in Tanzania: An overview

Introduction

The importance of urban agriculture in Tanzania can best be illustrated by highlighting some of the major conclusions from various recent studies:

- "Urban agriculture is an integral part of the urban economy" (Mvena *et al.* 1991).
- "Urban agriculture is found everywhere in Tanzania's towns and cities" (Mlozi 1996).
- "The cultivation of crops, and especially vegetables [in town], is a common and widespread phenomenon" (Jacobi 1997; Tesha 1996).
- "Intensive livestock production systems for milk, meat and poultry or eggs are omnipresent around and within town limits" (Mlozi 2001c).
- "Urban agriculture is a widely accepted fact of life" (Sawio 1993a).
- "Urban dwellers are compelled to undertake urban agriculture because of the adverse economic circumstances" (Benedict 1999).
- "Urban farmers are a complex mix of social groups" (Jacobi 1997; Sawio 1994).

Quotations like these suggest a number of things. First, farming in town – both crop cultivation and livestock keeping – is very common in Tanzania. Second, urban farming is, to some extent, an answer to adverse economic circumstances. And third, urban farming is practised by all social categories and not merely by the urban poor. At first sight, the latter two observations may seem to contradict

each other. However, adverse economic circumstances affect not only the poor, but (almost) all social strata. Urban farming is therefore generally seen as a means of diversifying one's income and of maintaining a certain standard of living. This is reflected in the often-heard answer about why people – be they rich or poor – practise urban farming: "to subsidise my income".

The Tanzanian government defines urban agriculture as "the cultivation of crops, horticulture, floriculture, dairy farming, keeping of pigs, poultry and aquaculture in areas designated 'urban' by the United Republic of Tanzania under the Town and Country Planning Ordinance CAP. 378 of 1956 reviewed in 1991" (Mlozi 2001c: 1). The fact that such a definition by the government even exists shows that urban agriculture is diverse and omnipresent in Tanzanian towns and cities. Unfortunately, exact data on the importance of urban agriculture at city or town level are not readily available, since general surveys representative of the population of a whole city/town and focusing specifically on urban farming are few in number.

From the scarce sources available, the link between farming in town on the one hand and economic decline on the other is to some extent confirmed for Dar es Salaam during World War II (Bryceson 1987) and during the 1980s (Tripp 1990b). Yet, farming in town is certainly not restricted to periods of economic hardship. Past surveys undertaken in Dar es Salaam show that the number of urban households practising farming in the city or in the peripheral areas has always been around 15% to 20% (Bryceson 1993; see also Sporrek 1985, Tripp 1990a). Figures for other towns are somewhat contradictory. For instance, according to the 1967 population census (cited in Bryceson 1993), 10% of the households in Mwanza were engaged in urban farming, but a survey carried out in the same period by Heijnen (1968) mentions 35% for married and 25% for unmarried respondents. In 1988, 15% of the Mwanza (urban) population was recorded as being involved in farming in town (URT 1992a). A nation-wide survey in the early 1990s reported that for 12% of urban household heads (both male and female), farming in town was their primary economic activity (URT 1992b).

Howorth *et al.* (2001) present some figures that clearly indicate the importance of the sector in Dar es Salaam. In the 1990s, almost a quarter of the city's total land was being used for agricultural production. Thousands of larger livestock and hundreds of thousands of chickens were recorded in 1990 and an estimated 100,000 tons of food crops were being produced annually for the local market. About 20% of the total working population was involved in urban agriculture, thus making the sector the city's second largest employer. Economically, the

sector contributed about US$ 25 million[1] (excluding animal husbandry) to the local economy.

Several of the studies mentioned above stress that urban farming is particularly a poor (wo)men's business (see for example, Bryceson 1987, Heijnen 1968, Tripp 1990a, Tripp 1990b). This was in the first instance confirmed by Flynn (2001) based on what she observed while in Mwanza in 1993-94. However, and to her own surprise, only five (20%) of her non-random sample of 25 low-income households appeared to practise urban farming (ibid.) against ten (48%) of the 21 middle-income households and all of the five high-income households. This finding is more in line with the quotations at the beginning of this chapter. A possible explanation for this discrepancy might be that urban farming by the poor is often more visible than that carried out by the relatively well-off, as many of the former are forced to practise off-plot farming, while the latter are generally able to farm in their compounds, in many cases behind their houses, and hence are 'invisible'.

The rest of this chapter presents an overview of the current state of affairs regarding urban agriculture in Tanzania based on the existing literature. Compared with other countries in Sub-Saharan Africa, there is a relatively rich literature on urban agriculture in Tanzania (see Obudho & Foeken 1999). Table A2.1 (Annex 2) lists no fewer than 66 publications on urban agriculture in Tanzania.[2] Table 2.1 gives a summary of three main characteristics of these publications, namely the year of publication, the city or town, and the type of urban agriculture it deals with. The table shows first of all that the number of publications has

Table 2.1 Summary of overview of publications on urban agriculture in Tanzania

Year of publication	Nr	Nr of publications per year		City/town	Nr	Type of farming	Nr
1987-89	5	1987-89	1.7	Dar es Salaam	44	crop cultivation	15
1990-94	21	1990-94	4.2	Morogoro	8	livestock keeping	17
1995-99	30	1995-99	6.0	Dodoma	4	urban agriculture	34
2000-01	9	2000-01	4.5	Arusha	2		
				Mbeya	2		
				Kilosa	1		
				Makombako	1		
				Mwanza	1		

Source: Annex 2, Table A2.1.

[1] At an exchange rate of Tsh 630 to the US dollar.

[2] The list includes unpublished theses, mainly at bachelors and masters levels. We do not pretend that the list is complete but it includes the bulk of what has been written on urban agriculture in Tanzania.

increased considerably over the years. The second half of the 1990s was a particularly productive period. These publications came mainly from two sources. The first concerns a series of reports on the cultivation of vegetables, mainly in Dar es Salaam, published by the Urban Vegetable Promotion Project. The second source is Sokoine University of Agriculture in Morogoro where Prof. Malongo R.S. Mlozi has published widely on urban agriculture, especially on livestock keeping. Most striking perhaps is the dominance of Dar es Salaam in the publications on Tanzanian urban agriculture (Table 2.1). More than 60% of the publications deal with this primate city only, while in four others, one or two smaller cities were included as well. Morogoro is the second most widely covered urban centre in Tanzania, though many of the publications are unpublished theses at bachelors or masters level. Big towns like Arusha, Dodoma and Mwanza have hardly been studied and the same applies to the medium-sized town of Mbeya. Other important towns, for example Tabora and Moshi, have not been researched at all. More than half of the studies deal with urban agriculture in general, i.e. both crop cultivation and livestock keeping. The other half are more or less equally divided between crops and livestock.

As mentioned earlier, the present study was undertaken in the two medium-sized towns of Morogoro and Mbeya. Moreover, since the study deals with the sustainability of urban agriculture, the literature overview presented below is structured according to the six aspects of sustainability mentioned in the previous chapter: food supply, income generation, employment creation, the marketing of produce, environmental balance, and the legal and policy setting.[3] First, however, some general observations regarding the practice of urban agriculture in Tanzania are dealt with, namely the characteristics of crop cultivation and livestock keeping, respectively.

General characteristics of urban agriculture in Tanzania

Crop cultivation

Three crop production systems can be distinguished: home-garden production, open-space production and peri-urban production (Jacobi 1997, 1998; Stevenson *et al.* 1994; Yachkaschi 1997). *Home-garden production*, or backyard farming, involves farming in people's compounds. Plots are usually small to very small,

[3] One can distinguish at least one other aspect of sustainability of urban agriculture, namely the linkages with other urban economic sectors. On the input side, urban farmers need to buy supplies in the form of tools, seeds and seedlings, fertilisers, pesticides, medicines, etc. The sellers of these inputs wholly or partly depend for their employment and income on these supplies. On the output side, the transport sector benefits from urban farming because a substantial part of the produce is sold. A whole trading sector exists providing employment and income for those involved. Indirectly, the municipality, too, can benefit through the raising of taxes and the selling of licences. Unfortunately, no study, including the present one, has ever covered these topics so this aspect is excluded from the discussion.

depending on the housing density of the area and production is mainly used for home consumption. Selling part of one's produce occurs more frequently when plots are bigger. Mostly women are responsible for the production. *Open-space cultivation* concerns crop cultivation in open areas within or very near to a built-up area. A wide variety of open spaces exists (Dongus 2000), varying in location and size. On average, however, these plots are bigger than the home gardens. Most of the land is owned by either institutions or the government but the people cultivating it do not pay rent. Production is mainly for commercial purposes and is dominated by men. In 2000, almost 650 hectares of open space in Dar es Salaam were being used for vegetable production (ibid.). It is estimated that at least half of the leafy vegetables on sale in Dar es Salaam markets are grown on these open spaces (Jacobi 1997). Finally, *peri-urban production* is defined here as farming in the areas between built-up areas and the municipal boundary.[4] Peri-urban plots are much larger than the open spaces and production is mainly commercial.

The choice of which crops to grow is determined by climatic conditions, the location of the plot, consumer preferences and the resource endowment of the site concerned (Stevenson *et al.* 1994). Amaranth (*mchicha*) is by far the most common crop, though less so in the peri-urban zone of Arusha. Okra is very popular in Dar es Salaam, but rarely found in Arusha. Onions do not grow well in Dar es Salaam's hot humid climate. The choice of crops cultivated in home gardens is mainly determined by the growers' consumption preferences, and to a lesser extent by the market, the amount of work involved in growing the crop and its cultivation period. Open-space cultivators are primarily swayed by the market and the crop's length of cultivation, while peri-urban producers mainly grow crops that are marketable.

Although most home gardens, open spaces and peri-urban plots are cultivated all year round, some seasonal differences do exist (Yachkaschi 1997). Amaranth is a typical dry-season crop because it cannot withstand heavy rain. Therefore, during the rainy season, a lot of maize and beans are planted, which both do well in rain-fed circumstances. The same applies to Arusha's peri-urban areas: during the dry season, more land is left fallow here than during the rainy season.

The types of *inputs* used are to some extent dependent on the cultivation system (and also on the costs involved). Organic fertilisers, particularly chicken droppings and cow manure, are widely used in all three systems but chemical fertilisers are more commonly applied in open space and peri-urban cultivation than in home gardening (Stevenson *et al.* 1994; Yachkaschi 1997). This is due to

[4] There are other definitions in which the peri-urban zone extends beyond the municipal boundary, thus including the rural areas around the urban centre. The usual criterion is whether production is for the urban market or not (see for example, Howorth *et al.* 1995, 2001; Jacobi 1997). For simplicity and clarity, the more limited definition of peri-urban is preferred here.

the more commercial character of the first two systems and to the comparatively high costs of chemical inputs. To control pests and fungal diseases, chemical pesticides and fungicides are fairly widely used (Kiango 2001; Stevenson *et al.* 1994), although according to Mlozi (1998: 49), "gardeners reduced the application rates (...) partly as a strategy to save costs".

Seeds and planting material are obtained from various sources – stores, own production, neighbours and relatives, food markets, hawkers and nurseries (Stevenson *et al.* 1994). Which source is used depends on the type of crop, the suppliers, the ease of self-propagation and the purchasing power of the buyer. Seed of amaranth, by far the most popular crop, is either self-propagated or, as is the case in Dar es Salaam, obtained from hawkers.

Irrigation is widespread, though the source of water varies with the location of the plot (Stevenson *et al.* 1994; Yachkaschi 1997). The large majority of home gardeners use tap water but it is scarce in Tanzania during the dry season, the supply is unreliable, and water shortages or low pressure are common (Yachkaschi 1997). The main sources of water for open spaces are piped water, rivers, channels from natural springs, and wells. Peri-urban plots are relatively more dependent on rainfall for their main water source, although other sources become accessible depending on the location of the plot. In general, the drying up of water sources in the dry season is a major problem in open-space as well as peri-urban crop cultivation.

The amount of labour as well as its source depends on the type of cultivation system too (Stevenson *et al.* 1994; Yachkaschi 1997). Home gardening is mainly carried out by the family involved, particularly the women, and is seldom a full-time job. Labour for the more commercially oriented cultivation practices in open spaces and in the peri-urban areas is provided by either the male household head or the whole family, assisted by hired labourers and sometimes also neighbours and/or relatives. In these systems, farm work is often a full-time occupation.

Relatively few crop cultivators are visited by extension workers (Stevenson *et al.* 1994; Yachkaschi 1997). In general, extension coverage is higher in the peri-urban areas than in the other two systems. Home gardeners are rarely visited by extension workers, except in Dodoma. According to Mlozi (2001b), the main reason for the extension workers' lack of interest in the urban crop cultivators is that they are biased towards, first, livestock keepers, and, second, *rural* farmers, being insufficiently trained to serve *urban* farmers.

A major constraint regarding the use of inputs is a lack of capital and the inaccessibility of credit and/or loans. Access to formal credit is difficult because of high interest rates and a lack of securities by the producer (Kiango 2001).

Little is known about the actual volume of urban-produced vegetables and fruits. Based on trial plots in Dar es Salaam, Arusha and Dodoma, average yields of a selection of leafy vegetables ranged from 0.7 kg/m^2 for pumpkin leaves to 6 kg/m^2 for Swiss chard leaves (Jacobi 1997). On an annual basis, 9,000 kg of amaranth (*mchicha*) could be produced on an open-space plot of 500 m^2, enough for 500 meals for a family of six persons.

The urban crop cultivators in Tanzania face various problems (Sawio 1993a; Stevenson *et al.* 1994; Kiango & Likoko 1996; Yachkaschi 1997). Although there are differences according to production system and town, the most common problems are pests and diseases, water shortages and input expenses. Other problems that were frequently mentioned, especially by the open-space and peri-urban farmers, concerned the availability of inputs (like chicken manure), the labour involved in watering, low market prices and transport costs.

The reasons for undertaking crop cultivation in town vary with production system (Stevenson *et al.* 1994; Yachkaschi 1997). Home gardening is largely for self-consumption and, hence, also for reducing food expenditures. For open-space cultivators, the income and employment aspects are predominant. For the peri-urban cultivators, both food and income/employment are the motives for farming. Some cultivators also mentioned 'tradition' or 'hobby' as a reason for cultivating crops, and one of the wealthier women in Mwanza "saw it as a way to help maintain gift-based alliances with others" (Flynn 2001: 683).

Livestock keeping

Keeping livestock in town is as common as cultivating crops. In the mid-1990s, there were some 18,000 cross-bred dairy cattle, 37,000 pigs, 40,000 goats, 1.2 million laying and 0.6 million broiler chickens, 132,000 local fowl and 37,000 ducks within Dar es Salaam's city boundaries. Over half of all these were kept in the built-up area (Mlozi 1996). Compared with the numbers only ten years before, the number of dairy cattle had increased fourfold, chicken 3.5-fold, pigs 4.5-fold and goats 15-fold (Mosha 1991). In general, livestock raising is more intensive where housing density is lower (Mlozi 1997b). In the city's low-density, high-income neighbourhoods, people run quite successful cattle and chicken enterprises. In Morogoro, too, thriving dairy, poultry and pig farming was observed (Shimbe 1997).

Most cattle are kept in zero-grazing, i.e. in people's own compounds. Pigs are kept in both zero-grazing as well as semi-intensive systems, i.e. partly confined in their compound and partly roaming around freely (Mtweve 1987). Surprisingly, in a study carried out in Morogoro municipality, it was found that cattle under zero-grazing management showed lower reproductive levels than natural grazing cows (Bwana 1997).

There is only one study presenting production figures concerning milk, eggs and broilers (Mlozi 1996). The average milk yield of 47 milking cows in Dar es Salaam in 1993 was 4.8 litres per day, which was well below the national average as well as the average for tropical Africa. Average egg production (0.7 per laying hen per day) was also lower than the African average. According to Mlozi (1996), this relatively poor performance was caused by poor management: insufficient feed, minerals and concentrates, and unhygienic housing conditions.

Livestock keepers face many problems. High costs of fodder, a lack of capital, and pests and diseases are amongst the most frequently mentioned constraints. As for pig farming, feed availability, capital and the marketing of pigs were the major bottlenecks in Morogoro town (Mtweve 1987). In relation to poultry farming, reliance on middlemen and individual consumers was also noted (Mbelwa 1993). Sumberg (1998) found that small-scale poultry farmers in Dar es Salaam were often forced to stop production temporarily due to a lack of money and the short supply of day-old chicks.

The reasons for keeping livestock in town are a mixture of 'economic survival' and the need for food (Mlozi 1996). In general, the income aspect is more important than the food aspect. Besides these direct needs, there are several circumstances creating a favourable context for keeping livestock in town: the poor national economy, low wages, the presence of foundation stock, feed, animal medications, extension services and markets, and the generally positive attitude towards urban agriculture shown by the authorities and the lack of means to enforce by-laws and regulations meant to control farming practices (Mlozi 2001c).

Aspects of sustainability of urban agriculture in Tanzania

Food supply

Although very little is known about the actual contribution of urban farming to the food supply at town level, indications for Dar es Salaam do exist, suggesting that urban horticulture plays a vital role as far as the supply of leafy vegetables is concerned. An estimated 50 to 60 million kg of leafy vegetables is produced annually within the city's boundaries and another 25 million kg of non-leafy vegetables in Dar es Salaam's peri-urban areas (Stevenson *et al.* 1996). Over 90% of the leafy vegetables on sale in Dar es Salaam's markets are produced in the city's open spaces and home gardens. The open spaces in particular are a vital production system, as the bulk of the amaranth is produced there. This has to do with the high perishability of the crop: it has to be sold within a few hours of harvesting, so production must be very close to the place where the crop is to be sold (Jacobi 1997).

For the households involved, farming in town means an additional food source besides the food that is purchased. Indeed, "need the food" is the most frequently mentioned motive for growing crops in town, especially among the home gardeners. Sawio (1993a) found that for about half the respondents in his survey, urban farming provided them with between 20 and 30% of their households' food supply. Moreover, friends and neighbours benefit as well, as a small part of the produce is usually given away (Kogi-Makau 1998; Mlozi 1998). For those who keep livestock, milk, eggs and meat (chicken) contribute to the household's food supply, even though for many the income aspect is more important than the food-supply side.

Besides quantitatively, urban farming also contributes to the households' food supply in qualitative terms. In many instances, an additional motive for growing crops is the availability of fresh fruit and vegetables and a wide variety of crops for a more balanced diet. Women especially tend to cultivate a broader range of crops than men, as was shown in a study in Nakuru, Kenya (Foeken *et al.* 2002). Fresh milk can be a very important contribution to a healthy diet, particularly in households with children.

Many studies show that the food aspect is more important for low-income households than for wealthier households. Food produced by poor households is mainly for home consumption. Based on her study in Mwanza and comparing her findings with studies elsewhere in Tanzania, Flynn (2001: 682) states that:

> Mwanza's poor continue to cultivate food to help meet their dietary needs; however, Mwanza's wealthier residents, like many in Dar es Salaam, Arusha and other Tanzanian towns, grow crops and/or raise livestock as a hobby, for food, for profit and as a form of insurance in case they lose their jobs or business (…).

Income generation

People engaged in urban agriculture can obtain an income from this activity in two ways: directly and/or indirectly. Money that is saved by growing vegetables or producing milk and eggs can be seen as an *indirect* income source ('fungible income'). Households engaged in vegetable production in the high-density, unplanned area of Hanna Nassif in Dar es Salaam saved 10% on their total monthly expenditure (Stevenson *et al.* 1994). Even so, the large majority of a group of gardeners in two high-density areas in Dar es Salaam reported significant savings on their food budget (Kogi-Makau 1998). About 60% of a group of home gardeners in a low-density area in Dar es Salaam saved an average of Tsh 19,000 per month this way (Mlozi 1998).

Several studies have tried to assess the importance of crop cultivation as a *direct* income source. According to Stevenson *et al.* (1996), home gardeners in Dar es Salaam, Arusha and Dodoma earned Tsh 5,000 to Tsh 8,000 per month from selling part of their crops. For the more commercially oriented open-space

cultivators in Dar es Salaam and Arusha, this was Tsh 22,000 and Tsh 10,000, respectively. For the home gardeners, these sales constituted 20 to 25% of the households' monthly income; for the open-space cultivators, these figures were 78% in Dar es Salaam and 45% in Arusha. Kiango & Likoko (1996) made an assessment of the net profit of amaranth growing at five different sites in Dar es Salaam and calculated an average net profit of Tsh 177/m^2. That means that with 12 harvests a year on a plot of 500 m^2, a net income of Tsh 1,000,000 could be realised.

In a study in Dar es Salaam and Dodoma, respondents were asked to indicate their first and second most important household income sources (Mgale 1998). For 73% of the households in the Mbuyuni area of Dar es Salaam, gardening was their second income source. The same applied to 17% of the households in another area in Dar called Manzese. In Dodoma, 28% of the households mentioned gardening as their first income source, while 20% said poultry was their second income source. All these figures seem to confirm the figure mentioned by the government (URT 1996), that 28% of urban households derive their income from agricultural production. Nyambaya (1991, cited in Mlozi 2001b) found that the average annual profit from urban farming in Dar es Salaam was 1.6 times higher than the official minimum wage at the time.

Livestock is even more important as an income source than crop cultivation. Several studies have indicated that the majority of urban livestock keepers are involved in this practice to alleviate poverty (Bongole 1998; Mlozi 1995b; Mlozi & Hella 2001; Sawio 1993a). Two-thirds of Sawio's respondents in Kinondoni, Dar es Salaam, said that their income from milk sales was higher than their regular salary (Sawio 1993a). Studies carried out in the mid-1990s mentioned profits from milk sales being 3-7 times higher than the annual salary of a senior government official and 7-10 times higher than the annual minimum wage, depending on the location of the study (Mlozi 1996; Mlozi 1997b). And if sales of eggs and broiler meat are included, earnings can be up to 15 times the minimum wage (Mlozi 1997b). Urban livestock keeping can therefore be a very profitable business.

Employment creation

Labour for urban farming is derived from two sources: members of the household involved and hired labour. Most of the labour is from the first source, mainly women and their children. Low-income households in particular have to rely on family labour because they cannot afford to hire labour. Flynn (2001) found among the farming households she studied that the average low-income household consisted of four members, compared with ten and nine members in the middle- and high-income households respectively. In other words, poor

households had insufficient hands to do all the labour required in farming in town. The age and health of the potential household labour force played a role as well.

Urban agriculture is (largely) part of the informal urban sector. It is estimated that the informal sector in Dar es Salaam provides 30% of the urban workforce with employment, and hence an income. At the beginning of the 1990s, about 6% of these (i.e. almost 18,000 people) worked in urban agriculture (Madihi 1991). This level of employment ranked fifth after the sale of cooked food (15%), restaurants/food stalls (12%), *duka* general (8%) and the sale of fruit and vegetables (7%). More recently, it was estimated that this figure had risen to 7%, which does not take into account the large numbers of home gardeners (Jacobi *et al.* 2000). For other urban areas of the Tanzanian mainland, the estimated number of workers in urban agriculture in 1991 was about 95,000 or 15% of the total number employed in the informal sector, the largest employment level in the industrial classification system (URT 1991).

Kiango & Likoko (1996), who carried out a study on open-space crop cultivation in Dar es Salaam, identified 406 gardeners in 11 open spaces covering an area of 644,700 m^2. For these people, vegetable production (on an average plot of almost 1,600 m^2) was their sole – or at least main – source of employment and income. Moreover, an additional 120 persons found employment as casual labourers. Extrapolating these figures to the whole Dar es Salaam area – based on the study by Dongus (2000) who identified an area of 641 ha of open-spaces used for vegetable production in the city – leads to a figure of 4,000 people who are self-employed in urban crop cultivation and for whom it is their main source of income, plus some 1,200 people who work as casual labourers in these fields. For the latter, according to the 1988 population census, paid labour in urban agriculture involves mainly men (URT 1992a).

Marketing of produce

The growth of the urban agriculture sector has been made possible by the presence of a ready, nearby market for fresh milk, eggs, meat and vegetables (Mosha 1991). Unfortunately, there are no data on the marketing of livestock products, so what follows deals solely with marketing of crops – vegetables in particular. On average, about 50 to 60% of the crop production in town is sold (Stevenson *et al.* 1994). This percentage is higher for open-space and peri-urban farmers than for home gardeners. The three most common market channels for urban produce are (1) indirect sales (i.e. to wholesalers and/or retailers) at the production site, (2) indirect sales at markets (either wholesale or retail markets), and (3) direct sales (directly to the consumers) at the production site (ibid.). In the first two cases, it

is the buyer who sets the price. In general, prices tend to be lower during the rainy season due to an increased availability of supplies on the market.

Despite the variety of market outlets, Sawio (1993a) recorded that a quarter of the producers had problems with the marketing of their products. A possible explanation might be that the Dar es Salaam City Council requires a licence for those wanting to sell farm produce in public (for example, at a stall or road stand), the cost of which many cannot afford. As a result, people place their products on the ground, where they risk contamination when it rains. Another alternative is the pick-your-own system whereby customers visit the production site and pick whatever they want. The disadvantage of this system is that crops may remain in the field for too long and get spoiled.

Not only producers but also traders are faced with marketing problems (Yachkaschi 1997). A general constraint among both wholesalers and retailers concerns transport, which is often said to be poor, unreliable and expensive. Other problems include low and unreliable demand, seasonal over-supply, price fluctuations, high competition, and high perishability of the produce. Finally, there are also problems at market places, with retail markets particularly being characterised by overcrowding and extremely unhygienic conditions (Yachkaschi 1997).

Environmental concerns

Although livestock keeping in town is usually seen as more harmful to the urban environment than crop cultivation, the latter can have a damaging effect as well. For instance, in Dar es Salaam, Arusha and Dodoma, the use of pesticides was widespread among crop cultivators (Yachkaschi 1997). The most commonly used chemicals were highly toxic.[5] Moreover, many producers appeared to spray almost ripe vegetables. Sometimes crops were harvested and consumed before the expiry of the pesticides' recommended safety period (Mlozi 1998). A special problem with the use of chemicals was observed by Flynn (2001) in Mwanza, where insecticides, fertilisers as well as animal waste were washed into Lake Victoria during heavy rains.[6] Another health risk concerns the use of polluted water for irrigation. According to Mlozi (1999: 187), "about 70% of all African spinach raised in the city of Dar es Salaam [is irrigated with] polluted water from the broken household sewerage system and from industrial effluents".

Plants can grow in polluted soils. In general, however, the levels of heavy metals in top soil found at several sites in Dar es Salaam were quite low, probably due to the city's relatively low level of industrialisation (Amend & Mwai-

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[5] In an interview with Karen Flynn (2001) in 1994, these observations were confirmed by Alphonce Kyessi, a researcher with the Ardhi Institute in Dar es Salaam.

[6] A comparable situation exists in the Kenyan town of Nakuru where the fragile ecosystem of the world-famous Lake Nakuru is (said to be) threatened by, amongst others, chemicals used by the farmers in town (see Foeken *et al.* 2002).

sango 1998). Nevertheless, there is still reason for concern, especially along main roads and rivers where fairly high levels of lead, cadmium and zinc were recorded, even though these levels were below the critical threshold (Amend & Mwaisango 1998; Sawio 1996).

Despite the use of chemicals and polluted water, there is a general lack of awareness among producers regarding the health risks involved in such practices. For instance, almost 80% of Mlozi's respondents in Dar es Salaam did not consider their gardening activities to be contributing to environmental pollution (Mlozi 1998). According to Yachkaschi (1997), not only producers but also many extension workers lack a basic understanding of the health risks from pesticides.

Livestock keeping in town can be negative for the urban environment in a number of ways (Mlozi 1997b; Mlozi 1999; Mosha 1991). Firstly, domestic animals transmit zoonoses or animal diseases that can afflict humans and be passed on to other animals. Secondly, animal dung left to decompose in compounds or along roads produces an unpleasant odour (for example, ammonia) and is a breeding ground for harmful bacteria and flies. Animal dung is also a source of tetanus. Slurry containing dung, urine and water, as seen in many compounds where cattle, chickens and pigs live, attracts disease-causing vectors such as mosquitoes. Shauri (1989) found that 72% of a group of livestock keepers in Dar es Salaam dumped their animals' dung along road verges, thus causing pollution of both the soil and drinking water. Thirdly, freely roaming livestock cause soil erosion and sometimes traffic accidents and can also destroy ornamental plants, lawns, water sources, telephone lines and fences.

Awareness of the damaging effects of livestock keeping in towns seems to be greater than those caused by crop cultivation. Mlozi (1996) found that the majority of livestock keepers in Dar es Salaam were generally aware of the harm being done to the soil, the impairment of the city landscape, accidents, political and legal issues, and to a lesser extent also the disease and health problems. The awareness was generally greater in the low-density (and hence high-income) areas than in the high-density (low-income) areas. Rather surprisingly, awareness levels among a group of students from Sokoine University in Morogoro was very low, as 84% of them claimed not to be aware of the (potential) damage and dangers resulting from raising animals in town (Msangi 1997).

At least potentially, crop cultivation and livestock keeping offer the possibility of recycling nutrients. For instance, among a group of crop cultivators in low-density areas in Dar es Salaam, 90% said they used organic matter in their gardens, be it chicken droppings, cattle manure or both (Mlozi 1998). Data on feeding livestock with crop residues are not available but the practice is common in Kenya, so it might well be in Tanzania too. On a larger scale, the composting

of urban solid waste can serve both the urban environment and the production of crops in town. Extension workers could play an important role in the propagation of organic farming but, as Nkonya (1997) observed in Morogoro town, urban farmers do not get adequate extension advice, mainly because the extension workers have no training in environmental issues.

Legal and policy settings

Both the national government and the urban authorities in Tanzania generally support urban agriculture. This positive attitude dates from the 1970s and 1980s, a period characterised by a poor economy and food shortages.[7] To enhance the food-security situation, government and political leaders time and again told urban dwellers to produce their own food and raise livestock in their backyards and on open spaces (Mlozi 2001a). Since then, several laws and regulations have been launched, which can be seen as recognition of the sector but, at the same time, as an attempt to control it. For instance, the 1997 Agricultural and Livestock Policy "observes that agriculture is not a principle function of towns but when properly organized [it] has the potential to provide employment, income and is a complementary source of food supply" (Kitilla 2001: 79). The Urban Farming Regulations of 1992 gives guidelines, amongst others on the maximum plot size, the number of cattle, the rearing system for livestock, and a prohibition of any farming activity whenever it causes a nuisance (ibid.). Further regulations were formulated in the National Human Settlements Development Policy of January 2000, for instance by designating special zones for urban agriculture, granting legal rights for the people involved in farming in these zones, as well as facilitating the construction of appropriate infrastructure in these areas. These measures were at the same time meant to prevent a disruption of planned urban development (ibid.).

The regulation of urban agriculture lies with the urban authorities. By-laws regulating both crop cultivation and livestock keeping exist in all Tanzanian towns and municipalities, and specific by-laws forbid the planting of crops in designated areas or restrict the planting of certain crops. For instance, crops taller than one metre are forbidden, which includes maize – one of the most common crops in Tanzanian towns. Penalties for breaking these by-laws are clearly laid out (Mlozi 2001a). By-laws concerning the keeping of animals include the required purchase of a special permit from the Town or City Director; a maximum of four head of cattle, only to be kept in zero-grazing and in specific struc-

[7] An example was the *Kilimo cha Kufa na Kupona* (Agriculture for Life or Death) campaign launched by the national government in 1974-75, with the aim of increasing food supplies by promoting agricultural production in both urban and rural areas (Flynn 2001).

tures; and the compulsory removal of manure, liquid waste material and other animal waste (Kitilla 2001; Mlozi 2001a).

However, virtually all the by-laws are ignored by most urban farmers (Mvena *et al.* 1991). Besides the mere fact that the municipal authorities do not have the means to effectively enforce them, there are other reasons as well. The very people who are supposed to see to it that the laws are enforced are the ones violating them. Or as Sawio (1993a: 348) describes it: "it appears impracticable for a junior officer to punish his or her boss who is found violating the law". Many senior officials living in the high-income, low-density areas of Dar es Salaam keep more than the permitted four head of cattle and allow them to graze openly on public land.

Another important legal factor concerns land tenure. In general, as Yachkaschi (1997: 25) rightly observes, land tenure has a long-term influence on the sustainability of urban agriculture: "clear property rights (...) determine producers' willingness to invest (...) in crop production", for instance the cultivation of perennials, irrigation systems, and soil and crop improvement measures. In Tanzania, "all land is officially controlled by the state which in turn grants rights of use and occupancy to different segments of the society including individuals, villages, companies, parastatal organisations and various investors" (Mlozi 2001a: 52). As a result, formal land markets do not exist.

Under President Nyerere, many housing schemes were established for government and parastatal employees, who benefited from almost free housing that was often combined with the right to grow crops on a small piece of land close to their homes. Hence, the large majority of the home gardeners in Dar es Salaam, Arusha and Dodoma cultivate on land formally owned by the state and for which they do not have to pay rent (Yachkaschi 1997). The same applies to open-space plots, with the only difference being that these plots were not allocated to the users by the state; the plots are used illegally. So, the producers are faced with high insecurity of land tenure, all the more so because of the country's increasing population density. In contrast, most peri-urban land was owned by the cultivators, at least according to Yachkaschi's (1997) respondents. Opinions differ in this respect, as can be deduced from the observation by Kyessi (2001) that land tenure is uncertain in informal and peri-urban areas. According to him, the problem of land tenure is the major challenge for urban agriculture as a viable long-term source of food and income.

The synthesis of the different studies on urban agriculture in Tanzania serves as a basis for understanding the general characteristics of the country's urban agriculture. What the studies and their data reveal is a heterogeneous picture with a variety of characteristics that still lacks depth. Neither the overall characteristics

that shape the production process nor the mechanisms that support these activities and actually encourage their expansion are totally clear. Therefore, from here we have to further explore the background, characteristics and mechanisms that shape urban agricultural activities in Tanzanian towns. For this reason, the rest of the book deals with a description and analysis of urban agricultural activities in two medium-sized towns – Morogoro and Mbeya.

Photo 1 Crop cultivation between apartments blocks in a medium-density area in Morogoro

3

Description of the two towns and the study population

This chapter is essentially a description of the study area and its population, and aims to provide background information for the discussion to be presented in the following chapters. It concentrates on the physical, economic, demographic and administrative features of the towns, as well as on the household characteristics of the study populations of both towns. This description is not intended simply to demonstrate the diversity between the towns, it is also designed to show that urban farming households do, in fact, have certain distinct characteristics.

Morogoro Municipality

General characteristics

The Municipality of Morogoro (or 'Morogoro Urban') is one of the five administrative districts of Morogoro Region.[1] In 2002, the urban area was 360 km^2, which is 0.5% of the more than 73,000 km^2 of Morogoro Region as a whole. The town has a bimodal climate, with rain falling between November and May, including a relatively dry period in January and February. Generally, the annual total rainfall varies between 600 mm and 1800 mm, with the neighbouring Uluguru Mountains experiencing heavy rains (2,800 mm). However, the rains vary in their amount, duration and intensity. Temperatures range from 18^0C high up in the mountains to 30^0C in the river valleys (URT 2002a). Soils are predominantly fertile alluvial and red soils. Morogoro Urban is a well-watered munici-

[1] The other four are Morogoro Rural, Kilombero, Ulanga and Kilosa.

pality with two rivers – the Ngerengere and the Mkundi – flowing through it. These two rivers form the main source of piped water in the municipality. The town has 14 water schemes, of which five are powered by electricity, five are gravity fed, and four are hand-pumped. In 2001, 40% of the households had electricity (URT 2002a).

Morogoro town has been referred to as a coastal town, even though it is two hundred kilometres from the Indian Ocean. Apart from the ocean's influence, a distinct feature is the dominant ethnic group – the Walugulu – who had early contacts with Arabs and Europeans before the ethnic groups located further inland. To a large extent Morogoro is thus culturally coastal (URT 2002a). Despite this, ethnicity in the municipality is mixed, including groups such as the Wapogoro, Wandamba, Wabena, Wakaguru, Wakwere and others from all over Tanzania. All these people live in the 19 wards in which the town is divided and in the 275 *mitaa* or 'administrative streets', which is the lowest level of administration.

Table 3.1 presents some population trends for Morogoro Municipality. Between 1967 and 2002, i.e. over 35 years, the population increased ninefold. The increase was particularly noticeable during the 1970s. Apart from natural increase, migration is the second major factor to cause an increase in the municipality's population. Expansions of the urban boundary over the years contributed as well. The town has encroached into the surrounding rural areas and the rural population has become part of the urban population as the result of administrative decrees.

The number of households increased with the growth in population (Table 3.1), though less dramatically because households became bigger. During the 1990s, however, households started to decline in size. The sex ratio – defined as the number of males per 100 females – has decreased quite considerably since the 1960s and the last census, in 2002, shows that there was for the first time a surplus of females, indicating increasing levels of female in-migration to the town.

Table 3.1 Morogoro Municipality: population characteristics, 1967-2002

	1967	1978	1988	2002
Total population	25,097	74,114	117,757	228,863
Average annual growth since previous census	5.7%	17.8%	5.9%	6.7%
Number of households	7,305	18,287	26,702	54,207
Average household size	3.4	4.1	4.4	4.2
Sex ratio*	109.9	101.7	100.9	98.6

* Number of males per 100 females.
Sources: URT 1967; Bertil & Henin 1973; URT 1978; URT 1990; URT 2002a; URT 2003.

Morogoro town is the largest population centre in Morogoro Region, attracting people from all over the country. For instance, a socio-economic survey carried out in Morogoro Urban in 1992/93 found that 34% of the sampled households were made up of migrants (MLHUD 1997).[2] Reasons for migrating to Morogoro town were overwhelmingly of a socio-economic nature, in particular the presence of employment opportunities (66%) and to a lesser extent the availability of social services (25%).

Morogoro Municipality's economy rests on two pillars. Being the regional capital, the first concerns the administrative services offered by the municipality (government offices, institutions, schools, hospitals). The second is the industrial and trading sector. The larger industries include G & T Shoes Co. Ltd, Tanzania Tobacco Processors Co. Ltd, Morogoro Canvas Mill, Tanzania Packaging Manufacturing, and Purebod (UK). There are several small-scale industries in the municipality such as weaving, fibre-processing, metal works, pottery, oil-processing, milling, furniture manufacturing and vegetable canning. The trading sector comprises, amongst others, agro-based commerce and freight distribution, as well as related transportation services.

Other businesses within the municipality provide goods and services and include shop owners, hoteliers, small workshop owners, professionals, barbers, vegetable sellers, *dala dala* (mini-bus) operators, taxi drivers, private hospital owners, carpenters, masons, word-processing specialists, lawyers, accountants, and building and civil contractors. These businesses generate revenue for the central and local governments in terms of taxes, levies and business licensing fees. In the year 2001/2002, a total of 4,810 business licences were issued and Tsh 230 million (US$ 255,450) was collected in business licence fees (URT 2002a).

Morogoro Municipality benefits from the nation's major road and railway network. The southern highway to Zambia and Malawi passes through the town, as does the east-west highway from Dar es Salaam to Dodoma and western and north-western Tanzania and the neighbouring countries of Rwanda and Burundi. Morogoro town has 376 km of roads, of which 17 km are trunk roads (i.e. tarmac), 15 km are regional roads, 243 km are district roads, and 101 km are feeder roads (URT 2002a).

In the year 2000, Morogoro Municipality had 34 dispensaries, six health centres and three hospitals. Diseases like malaria, dysentery and anaemia are common. The municipality has 103 nursery schools (2001), 54 primary schools and 14 secondary schools (2003). Finally, Morogoro town has two universities: Sokoine University of Agriculture and Mzumbe University.

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[2] It is not clear, however, how the term 'migrant' in this source was defined. The figure of 34% would seem to be quite low.

Farming in Morogoro Municipality

In 1993, a socio-economic survey carried out by the Ministry of Lands, Housing & Urban Development revealed that 75% of the sampled households in the town had farms (MLHUD 1997). The large majority of these farms (88%) were smaller than three hectares. Although it was not clear how many farms were located within and how many outside the boundaries of the municipality, one third were less than five kilometres from the farmer's place of residence and another 13% between five and ten kilometres. Crops were grown for food and cash, and included maize (57%), rice (27%) and a range of other crops (17%) such as cassava, plantains, sweet potatoes, groundnuts, sorghum and beans. Vegetables were also cultivated, for example *Amaranthus spp*., Chinese cabbage, tomatoes, okra and cabbage. Reported problems included long distances to farms, the small size of farms, poor soils, unreliable rainfall, the theft of crops, wild animals destroying crops, poor storage, and poor harvests.

Livestock keeping is very common in Morogoro town. Animals include improved dairy cattle, chickens (layers and broilers), goats, sheep, pigs, ducks and other small animals like rabbits, pigeons, turkeys and pheasants. In 1999, more than 5,300 improved dairy cattle, almost 2,000 goats, some 260 sheep and almost 1,000 pigs were counted (URT 2002a). Diseases such as East Coast fever, trypanosomiasis and contagious bovine pleuropneumonia seriously affected cattle, while Newcastle disease was common among chickens. In 1999, livestock facilities in Morogoro town included one dip, one dip testing centre, an abattoir, and a livestock market (URT 2002a).

Livestock is not only kept by individual farmers in town, but also by various institutions such as schools, seminaries, religious houses and the prison. Many institutions are said to raise livestock in order to offset the feeding costs of students and in some cases animals are used for teaching purposes and/or to earn money for the institutions. This was for instance the case at the farms of Sokoine University of Agriculture and the farms belonging to religious institutions.

Mbeya Municipality

General characteristics

Mbeya Municipality is located in the western corner of the Southern Highlands of Tanzania, about 850 km from Dar es Salaam. It borders Mbeya Rural District in all directions. The town is at an altitude of 1,700 metres (5,577 ft) above sea level. Immediately north of the town, the Mbeya Range, with the Mbeya Peak at 2,835 metres (9,300 ft), represents a physical barrier to any further expansion of the municipality. A large part of the old town lies on the lower slopes of this range. Mbeya has a moderate climate with average daily temperatures ranging

between 11°C and 25°C. The month of July is the coldest, while November is the hottest. There is one rainy season that starts in November and ends in May, with a mean annual rainfall of 1,200 mm (MMC 1999). There are five rivers/streams flowing through the municipality. In agro-ecological terms, the town is part of the Mbeya Plains, i.e. the highland zone with localised areas of fertile volcanic soils.

The historical background of Mbeya headquarters can be traced back to the 1930s when it was already a large settlement during British rule. In 1952, the town started to expand rapidly following the colonial government's decision to shift the Southern Zone headquarters from Iringa to Mbeya. After independence in 1961, the town experienced further expansion, especially after the launching of the Second Five Year Development Plan in the 1970s when it was made a growth centre in order to counter migration to Dar es Salaam. Thereafter, the growth of the town has largely been due to boundary expansions. In 1996, Mbeya Municipality had an area of 185 km^2 (URT 1997). In 2000, the municipality had grown to 214 km^2. The largest distance between the centre of the town and the municipal boundary is 14 km (8.7 miles). In 1980, Mbeya town was officially accorded a municipality status being among the eight municipalities on the Tanzanian mainland.

Like most towns in Tanzania, the indigenous ethnic groups of Mbeya town are of Bantu origin and are believed to have moved into the region a long time ago. Mbeya Municipality has a heterogeneous ethnic composition: the original inhabitants were the Safwa, but the Nyakyusa are more numerous because of immigration from the surrounding districts of Tukuyu, Kyela, Rungwe and Mbozi. Other ethnic groups include the Ndali, Lambya, Sangu, Bungu, Nyiha, Malila, Kinga, Bena, Hehe, Wanji and some Asians. All these people live in the 36 wards into which the town is divided.

Some population trends for Mbeya Municipality are presented in Table 3.2. The trends are comparable with those in Morogoro (described above). However, the population increase during the 1970s was even more dramatic in Mbeya than in Morogoro. Population growth has now slowed down, but was still higher between the last two censuses than in Morogoro. Household size decreased as well and in 2002 reached the same average of 4.2 persons per household as in Morogoro. Finally, although the sex ratio shows the same trend as in Morogoro, there was a surplus of females by the beginning of the 1970s and this increased to a remarkable level in 2002.

Mbeya Municipality is the administrative centre of Mbeya Region and the Southern Highlands of Tanzania. Both the Tanzania-Zambia highway and the Tanzania-Zambia railway line linking Dar es Salaam and southern African coun-

Table 3.2 Mbeya Municipality: population characteristics, 1967-2002

	1967	1978	1988	2002
Total population	12,325	78,111	152,844	266,422
Average annual growth since previous census	6.0	48.5%	9.6%	7.4%
Number of households	3,057	17,762	32,661	64,197
Average household size	4.0	4.4	4.5	4.2
Sex ratio*	100.7	97.5	94.5	90.7

* Number of males per 100 females.
Sources: URT 1967; Bertil & Henin 1973; URT 1978; URT 1990; URT 2002A; URT 2003.

tries pass through the town, making the municipality a busy commercial centre. Apart from providing services, which are core functions of a regional administrative centre, the municipality is also a regional centre for services and caters for the four Southern Highlands Regions (Ruvuma, Iringa, Mbeya and Rukwa). Among the more important services are land title registration, agricultural research and training at Uyole, the Cooperative Rural Development Bank Limited, IFAD-Southern Highland Extension, and Rural Finance Services.

Mbeya residents' major economic activities include small-scale industries and trade (about 20%). About 40% of the residents are employed in government, industries, parastatals, private companies and service organizations, while another 40% are involved in agriculture and petty trading (MMC 1999). Apart from being the regional administrative headquarters, Mbeya Municipality also serves as a busy regional commercial centre, and a business gateway to the neighbouring land-locked countries of Zambia, Malawi and Zimbabwe, as well as the south-eastern part of the Democratic Republic of Congo.

In 1997, there were four hospitals in Mbeya Municipality, as well as five health centres and 34 dispensaries. In the town, 27% of the under-fives were malnourished, while 1% suffered from severe malnutrition. The infant mortality rate stood at 60 per 1,000 live births (MMC 1999). In 1997, the town had 49 primary schools and 14 secondary schools. Unlike Morogoro, Mbeya Municipality does not have a university. However, the town has six colleges and training institutions: Uyole Agricultural Training Institute and the Agriculture Research Centre (both run by the Ministry of Agriculture and Food Security, MAFS), Mbeya Technical College (Ministry of Higher Education), the Medical Training Centre (Ministry of Health) and the Vocational Training Centre (Ministry of Higher Education).

Farming in Mbeya Municipality

As in Morogoro, a lack of formal employment opportunities in the municipality means that most people in Mbeya are involved in farming – both crop cultivation

and livestock keeping. Farming in Mbeya town is undertaken on a small-scale basis. The importance of the town's agricultural sector can be seen in the creation of a special branch of the Department of Agriculture in the mid-1980s to improve the growing of crops and the raising of livestock.

Annually about 9,000 hectares are cultivated in the green-belt areas of Mbeya town.[3] The main food crops consist of maize, beans, cowpeas, wheat, round potatoes, sweet potatoes and vegetables. Cash crops include coffee and sunflowers. Most crops are grown on non-designated plots, open spaces, and in valleys or swamps and most are produced for food and money, with the exception of coffee, which is grown solely for profit. Coffee is grown by wealthy individuals and on a government-managed farm at Itende under the National Service (*Jeshi la Kujenga Taifa*). Due to low prices, however, it has declined in popularity.

Crop cultivation in Mbeya Municipality faces several problems. Like elsewhere, these activities accelerate soil erosion, especially when crops are cultivated on slopes and hill tops or along river banks. Opening up land for new plots causes deforestation. Crops exceeding one metre in height, such as maize and bananas, are blamed for creating breeding grounds for malaria-carrying mosquitoes and can harbour thieves. Also the making of ridges – a common practice in Mbeya – attracts mosquitoes (*Anopheles spp*.) which breed and multiply. The use of inorganic fertilisers, organic manure and pesticides is claimed by some urbanites to be polluting water and farms.

As with crops, most of the livestock in Mbeya town are raised by smallholder farmers and include improved dairy cattle, pigs, goats, sheep and poultry. The two systems of rearing livestock are zero-grazing and free range. Zero-grazing is common in the built-up areas around the town centre, and is used mainly for improved dairy cattle. The system involves keeping the animals indoors on a permanent basis and feeding them with forage that is cut outside town and then transported to the compound. The free-range system is practised in the municipal peripherals.

Figures regarding the actual livestock numbers are confusing and not well documented. According to data from the Mbeya Municipal Agriculture and Livestock Office, the total number of livestock (i.e. large and small animals) increased steadily from about 16,000 in the mid-1980s to about 22,650 in 1997. The increase in the number of improved dairy cattle can be attributed in part to the launching of the Small-Scale Dairy Development Programme and the Heifer Project International in the 1990s. These programmes provided F1 heifers (calves) and bulls to selected urban farmers in order to improve the quality of their stock, which subsequently produced increased milk yields. Other benefits included the supply of animal medications, feed supplements, cheap labour for

[3] Source: Mbeya Municipal Agriculture and Livestock Office, 2001.

cutting and carrying forage to zero-grazed animals, and nutritional campaigns to encourage the drinking of milk. According to the 1997 Mbeya Municipal Socio-economic Profile (URT 1997), the development programme for improved dairy cattle aimed to increase milk production by 23% by the year 2000. This objective was to be attained through improved extension services focusing on better livestock husbandry. The main emphasis was on the following aspects: to keep one to four improved cows under zero-grazing; to increase the milk yield per cow per day by feeding concentrates; and to ensure that cows eat 20 kg of dry quality forage per day.

Besides smallholder farming in Mbeya, various institutions in the municipality undertake farming as well. By 30 May 2003, primary and secondary schools were growing vegetables (tomatoes, spinach) and field crops; Uyole Research Farm had 100 dairy cattle; Uyole Agriculture Training Institute had 60 dairy cattle; convicts in Mbeya Remand Prison were growing a variety of vegetables in the prison gardens; Iwambi Dairy Farm had 200 dairy cattle; and JKT Itende Farm was growing coffee.

Profile of the research population

This section offers some characteristics of the research population in Morogoro and Mbeya. All findings are based on the survey carried out in 2000. Subsequently, the chapter deals with the demographic characteristics of the surveyed households and offers data on mobility and migration, the households' sources of income, and a number of characteristics of urban farmers.

Demography

The main demographic characteristics of the household heads in the 608 surveyed households are presented in Table 3.3.[4] Over 80% were married males who were living permanently in their urban residence. Over half of them had no more than primary-school education, though one sixth had more than secondary school. In general, the household heads in Morogoro and in Mbeya showed no major differences in terms of demographic characteristics. In both towns, almost one fifth of households were female-headed. The same applies to the marital status and the educational level of the heads. However, there are some differences in age between the heads in the two towns: on the whole, the surveyed heads in Morogoro were somewhat younger than those in Mbeya.[5]

[4] For a complete overview, see Annex 3, Table A3.1.

[5] This is confirmed by the 'mean scores' of the age classification, ranging from 1 (up to 20 years of age) to 8 (over 80). Means were 4.4 and 4.8 for Morogoro and Mbeya, respectively.

Table 3.3 Summary of demographic characteristics of household heads (%)

		Morogoro (N=300)	Mbeya (N=308)	Total (N=608)
Sex:	male	82.0	83.4	82.7
Age (years):	21-40	20.1	16.1	18.0
	41-60	64.2	54.1	59.1
	>60	15.7	29.8	29.8
Residency:	regularly absent	22.1	11.4	16.6
Marital status:	married	82.6	80.5	81.5
	divorced/separated/widowed	10.1	15.9	13.0
	single	7.4	3.6	5.4
Educational level:	no education	12.4	13.6	13.0
	primary (partly or fully completed)	45.0	43.5	44.2
	secondary (partly or fully completed)	25.2	26.6	25.9
	tertiary/higher education	17.4	16.2	16.8
Occupational status:	regularly employed	34.4	13.0	23.4
	self-employed	49.7	67.5	58.8
	unemployed	11.2	16.6	14.0

Source: Annex 3, Table A3.1.

Another difference between the two towns concerns the type of residency. In Morogoro, the percentage of household heads who were regularly absent was two times higher than in Mbeya. Moreover, compared with Mbeya, twice as many of the heads mentioned 'farming elsewhere' as a reason for being regularly absent (31% and 65%, respectively).[6] The second most-mentioned reason – 'working elsewhere' – showed the reverse picture, namely 46% and 22%, respectively. Another 20% of the Mbeya heads mentioned 'looking for work' as a reason for regularly being away, while in Morogoro this was mentioned by only one respondent. For the spouses, these differences were even more marked.[7] Of the 50 spouses in Morogoro who were regularly absent, the large majority (84%) were involved in farming activities elsewhere. In Mbeya, however, the majority (75%) of spouses often absent were either working or looking for work elsewhere.

In terms of the heads' occupational status, there was a difference as well between the two towns. One third of Morogoro heads were regularly employed, i.e. they had a steady, salaried job. This applied to only 13% of the Mbeya heads.

[6] This is related to the importance of *rural* farming by the urban households. Although the percentage of households in Morogoro practising rural farming was lower than in Mbeya (see later in this chapter), plots were much bigger among Morogoro farmers (see Chapter 6) and thus required more labour.

[7] Spouses are all females. Figures on spouses concern *first* spouses only. There were ten households with two and five households with three spouses in the survey.

Most of the latter were self-employed, while one out of six of them said they were unemployed at the time of the survey. The impression given was that finding salaried employment in Mbeya was more difficult than in Morogoro.

The 'average household'[8] in the two towns consisted of 5.8 persons. The five smallest households consisted of one person and the six biggest had 14 persons. On average, Mbeya households were somewhat larger than those in Morogoro, with 6.1 and 5.4 persons respectively. This is due to the higher percentage of small households (i.e. with one to three persons) in Morogoro (28%) compared with Mbeya (14%).

Mobility

The Tanzanian rural but also urban population is highly mobile by nature. The mobility of villagers to the urban areas has two dimensions. The first is a permanent type of mobility, when people leave their rural setting in order to settle elsewhere. The second is non-permanent and is when people circulate between rural and urban areas. The latter suggests constant links between both areas, yet links between the rural area of origin and the town where the migrants are currently residents may remain viable even for the first dimension of mobility.

Table 3.4 shows some migration characteristics of *household heads*.[9] Three-quarters of the heads were not born in the town where they were living at the time of the survey in 2000. This percentage is higher in Mbeya than in Morogoro. Just over half of these came to town between 1970 and 1990. Almost one third had been living in town for at least 30 years at the time of the interview. As for the *spouses* of the household heads, the percentage of those who came from elsewhere was the same as that of their husbands. This is to some extent due to the fact that many of the spouses came to town together with their husbands (see below), though certainly not all.

For *household heads*, 'pull' factors seemed to be more decisive than 'push' factors as a reason for coming to town (Table 3.4 and Table A3.2 in Annex 3). 'Lack of land and/or work in the area of origin' was mentioned by a small minority of the immigrants. 'To work' or 'to look for work' were the dominant reasons. Finally, almost 30% of the immigrants came to town for non-economic reasons such as 'had relatives there', 'followed spouse', 'came with parents' or 'to attend school'. This category consisted mainly of people who moved to town at a young age or as the wife of a (now deceased) husband. Indeed, over half (56%) of the *spouses* whose husbands were still alive at the time of the survey,

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[8] A household is defined as a group of people usually residing under the same roof and eating from the same pot.

[9] For a more detailed overview, see Table A3.2 in Annex 3.

Table 3.4 Summary of migration characteristics of household heads (%)

		Morogoro (N=300)	Mbeya (N=308)	Total (N=608)
Born outside Morogoro/Mbeya		65.9	83.4	74.7
		(N=197)	(N=252)	(N=449)
Arrived in Morogoro/Mbeya	before 1970	24.7	34.3	30.3
	1970-89	57.1	51.4	53.8
	1990-99	18.1	14.3	15.9
Reasons for coming to Morogoro/Mbeya	lack of land/work in area of origin	11.7	4.0	7.4
	to (look for) work	71.4	73.0	72.3
	non-economic reasons	29.6	30.6	32.4
Region of origin	Morogoro (rural)	29.4	1.5	12.7
	Mbeya (rural)	5.6	78.3	49.1
	Kilimanjaro	23.7	4.9	12.5

Source: Annex 3, Table A3.2

had followed their husbands to town. Another quarter came in order to work or to look for work.

From looking at the regions of origin (or 'recruitment area') of the *household heads* (Table 3.4 and Table A3.2 in Annex 3), it is clear that the immigrants came from all over the country. Only one of the 21 Tanzanian regions, Rukwa, was not mentioned by the respondents. What is also noteworthy is the difference between Morogoro and Mbeya as far as recruitment area is concerned. Initially one might assume that distance would affect migration rates, and the closer the area of origin to the target town, the higher its share of migrants would be. In the case of Mbeya, most of the immigrants originated from the rural part of Mbeya Region itself. This could be explained by the fact that Mbeya Region is an area with a relatively high population density. By comparison, in Morogoro, this applied to only 30% of the immigrants. Morogoro Region has a relatively low population density. An important recruitment area of Morogoro appeared to be Kilimanjaro, which is also a high density area (like Mbeya Region) and located fairly close to Morogoro. Again, the *spouses* showed about the same pattern in this respect as their husbands.

Sources of income

Since this study deals with urban farming, a distinction is made between farming and non-farming income-generating activities, albeit with a strong emphasis on the former. However, before embarking on the study population's farming-related sources of income, a few words should be said about *non-farming* income-generating activities. Table 3.5 offers information on these activities among the

population of the two towns. The figures show that finding regular paid employment is not easy, as just over a quarter of those having non-farming activities mentioned this as a source of income for the household concerned. Many households had to resort to some type of business to make a living, mostly in the informal economy. This included, for example, such activities as keeping a small shop, craft making, food vending and making local brews (see Table A3.3 in Annex 3).

Table 3.5 Households performing non-farming income-generating activities, by activity (%)

(N=)	Morogoro (243)	Mbeya (194)	Total (437)
Paid employment	35.7	26.9	31.3
Business	65.3	49.0	57.1
Other*	4.0	3.9	3.5

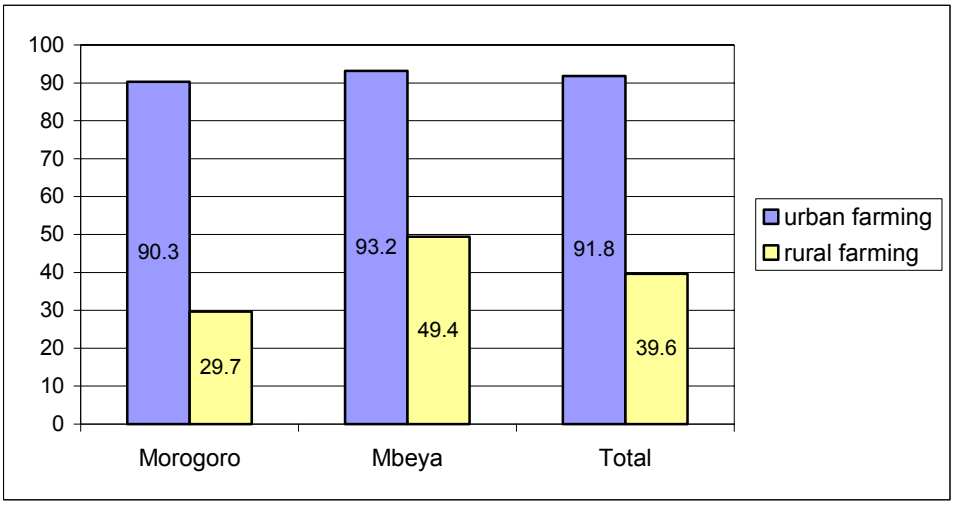
* Not clear whether paid employment or business.
Source: Annex 3, Table A3.3.

The Mbeya figures in Table 3.5 do not add up to 100% and in many households more than one non-farming income-generating activity was mentioned. This means that for some households in the two towns farming was the *only* source of income. Indeed, in no less than 27% of the households in the two towns no non-farming activity was mentioned. In Mbeya, this figure was even 34% (as against 20% in Morogoro). From other studies done in Tanzania it is known that livestock keeping in town is often a commercial business and can be financially rewarding. This seems to be confirmed by the findings of the present study. For one third of livestock keepers (or 19% of the total population) it was a full-time occupation. Particularly in Mbeya, livestock keeping seems to be an important income-generating activity as more than 40% of the livestock keepers (or 32% of the whole population) said livestock keeping was a full-time job for them.

As for *farming* activities, the respondents were first of all asked whether they did actually farm and, if so, where (in town or in the rural area) and what types of farming were undertaken. The results are presented in Figures 3.1 and 3.2.[10] Figure 3.1 shows that farming in town was very common in both Morogoro and Mbeya: more than 90% could be classified as 'urban farmers', i.e. cultivating crops on a plot of at least one square metre and/or keeping one or more types of

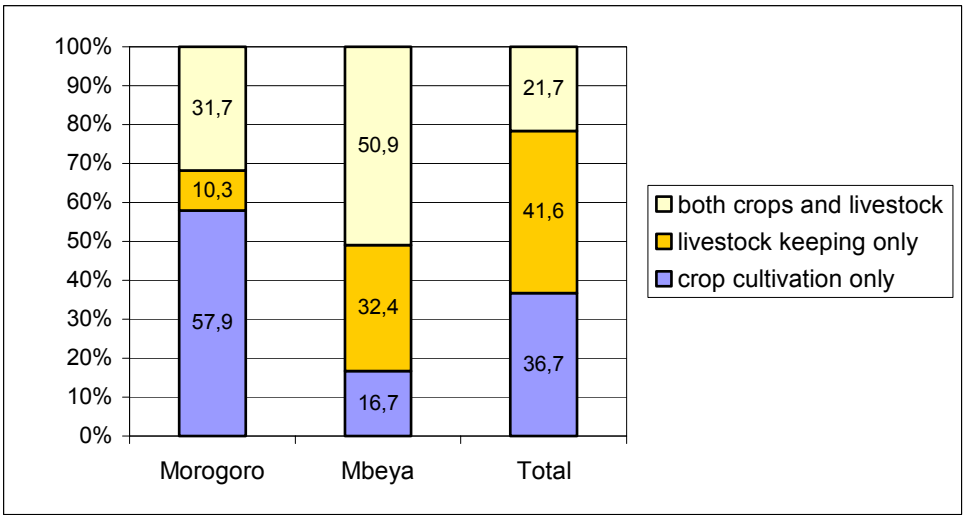
[10] Table A3.4 (Annex 3) presents the data on which both figures are based.

Figure 3.1 Number of households farming, by location of farming and by town (% of all households)



Source: Annex 3, Table A3.4.

Figure 3.2 Number of households farming in town, by type of farming and by town (% of urban-farming households)



Source: Annex 3, Table A3.4.

livestock during the 1998/99 agricultural season.[11] In addition, 40% of the urban households in Morogoro and Mbeya were farming in the *rural* areas, i.e. either at their rural home or on a purchased plot. This was more common among Mbeya households (50%) than among Morogoro households (30%).

From the type of farming, it appeared that 72% of all households in the two towns cultivated crops, while 58% kept livestock (Table A3.4). However, the two towns differed considerably in this respect, as is shown in Figure 3.2. In Morogoro, 90% of those households practising urban farming were crop cultivators, while 42% kept livestock.[12] In Mbeya, on the other hand, the situation was reversed with 83% keeping livestock and 68% cultivating crops. Moreover, in Morogoro, livestock keeping was usually combined with crop cultivation, while in Mbeya keeping livestock *only* was comparatively common (32% of households).

As far as *rural* farming was concerned, this was overwhelmingly crop cultivation (Table A3.4). Very few households – less than 1% in Morogoro and 5% in Mbeya – kept livestock in the rural areas.

Figure 3.3 presents data on the incomes of the study population. The respondents were asked to assess their household's gross income per month in Tanzanian shillings. Because answers on questions concerning a household's income situation tend to be rather unreliable and because the data concern gross incomes, the figures should only be taken as an indication. Nevertheless, it can cautiously be concluded that almost half of the study population had a gross monthly income of less than Tsh 50,000.[13] The figures also show that the income situation in Morogoro was somewhat better than in Mbeya.

Characteristics of the urban farmers

From other studies in eastern and southern Africa,[14] it is known that, to some extent, farming households may distinguish themselves from non-farming households in terms of housing density, household characteristics and characteristics of the household head. Table A3.5 (Annex 3) gives an overview of these variables for farming as well as non-farming households. Moreover, data are presented for

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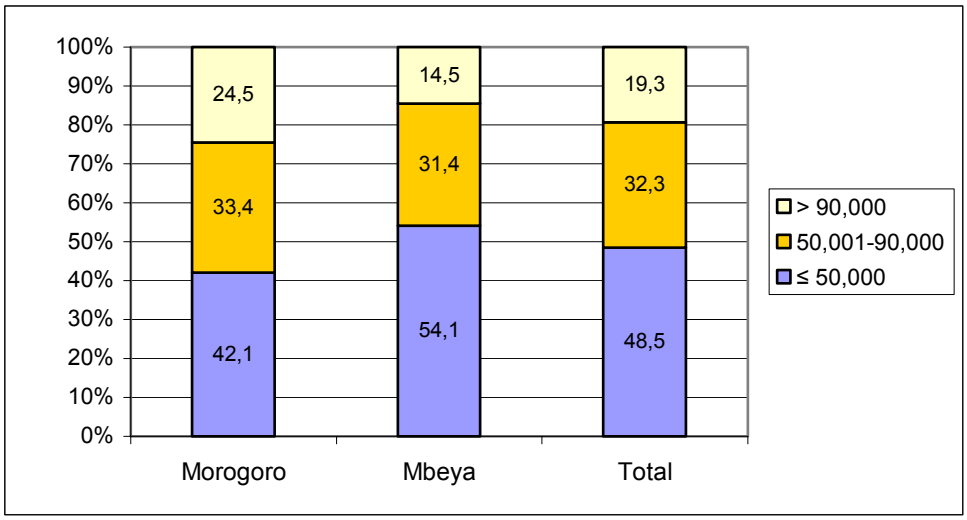
[11] One square metre as a bottom-line may seem very small but studies have shown that there are examples of surprising production levels from such a tiny plot (see, for example, Smit *et al.* 1996). The overwhelming majority of the urban crop cultivators in the present study had plots that were much larger, however. The benchmark for livestock used in this study was one head of cattle or five goats/sheep or ten small animals.

[12] These two figures add up to more than 100% because one third of the urban farmers practised mixed farming, i.e. cultivated crops and kept livestock.

[13] This was roughly equal to US$ 70 per household per month or US$ 2.3 per household per day or, with an average household size of 5.8 persons, less than US$ 0.50 per person per day.

[14] See, for instance, the studies mentioned on page 1, footnote 2.

Figure 3.3 Household gross income per month (in Tsh), by town (%)*



* The answers 'don't know' (18 cases in Morogoro and 4 in Mbeya) have been omitted from this figure.
Source: Survey data 2000.

urban crop cultivators and non-cultivators and for urban livestock keepers and non-keepers.[15]

On the whole, urban farmers and non-farmers were very much alike (columns 3 and 4 in Table A3.5). And comparing the crop cultivators with the non-cultivators (columns 5 and 6) and the livestock keepers with the non-keepers (columns 7 and 8) shows the same picture. The only noteworthy point is that most non-farmers (column 4) were living in high density areas. This appears to be more related to livestock keeping than to crop cultivation, which is surprising because crop cultivation usually requires more space than livestock keeping (unless the households living in high-density areas cultivate their crops on plots at some distance from the house).

Table A3.6 (Annex 3) makes a further distinction between the two towns, be it only for crop cultivators and non-cultivators and for livestock keepers and non-keepers.[16] As far as *crop cultivation* is concerned, cultivators and non-cultivators were very much the same in both towns (columns 3 and 4, columns 5 and 6).

[15] The group of 'urban farmers' was constructed by putting together those who cultivated crops in 1998/99 and those who kept livestock in that year. It should be borne in mind that there is some overlap between the group of urban crop cultivators and the group of urban livestock keepers. For that reason, the figures in, for instance, column 3 in Table A3.5 do not necessarily fall in-between the figures in columns 5 and 7. The same applies to column 4, on the one hand, and columns 6 and 8, on the other.

[16] A further distinction for the groups of urban farmers and non-farmers is not possible because the groups of non-farmers in the two towns are too small (29 in Morogoro and 21 in Mbeya) to allow for comparisons in terms of percentages.

Moreover, the group of cultivators in Morogoro showed hardly any difference with their colleagues in Mbeya (columns 3 and 5). The picture is different for *livestock keeping*. Livestock keepers and non-keepers in Morogoro *did* differ in various respects (columns 7 and 8). Compared with the non-keepers, the livestock keepers largely lived in the low- and medium-density areas, the households involved were relatively larger and more affluent, the household heads were nearly all men[17] and had a relatively high educational level. In short, livestock keeping in Morogoro town seemed to be more a business for the better off than for the poor and very poor. The same cannot be said of Mbeya where the livestock keepers and non-keepers showed no differences at all (columns 9 and 10). This difference between the two towns may be related to the earlier observation that livestock keeping in Mbeya is much more common than in Morogoro and thus not only restricted to the relatively well-off. Again, this can be an indication of the problems the Mbeya households face with finding other (non-farming) income-generating activities.

* * *

In summary, this chapter has paved the way for the study of the production systems of crops and livestock in Morogoro and Mbeya. The local scene has been described and the major characteristics of the surveyed urban households were shown, including the demographic characteristics, the distribution of non-farming income sources, and the differences between farming and non-farming populations in the towns. The discussion and analysis in the following two chapters will concentrate on the various characteristics of these production systems and the factors influencing them.

[17] Of the 54 female-headed households in Morogoro, only 17% practised urban livestock keeping. For male-headed households, the figure was 43%.

4 Crop cultivation

As seen in the previous chapter, 81% of the Morogoro households and 63% of the Mbeya households cultivated crops in their respective towns in the year under review. This chapter presents a description and analysis of the ways these people carry out their crop-cultivating activities. Based on the 2000 survey, the purpose of the current chapter is to describe the major features of the production system: access to land, the type and size of the plots cultivated, the characteristics and distribution of the crops cultivated, and the inputs used. Output and the types of inputs used are discussed in relation to household characteristics. Finally, the chapter discusses the perceived advantages and obstacles that urban farmers experienced in relation to their crop-cultivating practices and at the local markets.

Characteristics of urban plots

Number and size of plots

Access to land is of paramount importance to urban agriculture and to those engaged in it. By access we mean the ability to use a plot of land and to cultivate it for a significant period of time in order to produce crops and derive food and income from it. About 72% of households had access to land: 81% in Morogoro (243 households) and 63% in Mbeya (194 households). This pattern is closely related to the fact that, in relative terms, crop cultivation is more common in Morogoro, while livestock keeping is the dominant form of urban agriculture in Mbeya (see Chapter 3, Figure 3.2). As can be seen in Table 4.1, a quarter of the households cultivated more than one plot; five households even cultivated four different plots.

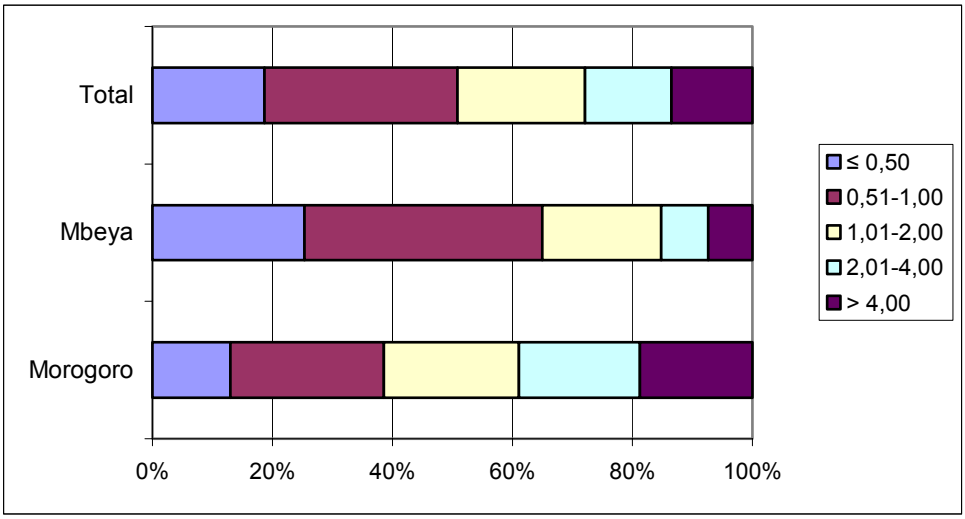
Table 4.1 Number of urban plots, by town

		Morogoro (N=243)	Mbeya (N=194)	Total (N=437)
Number of urban plots (%)	1	79.4	70.6	75.5
	2	15.6	23.2	19.0
	3	4.1	4.6	4.3
	4	0.8	1.5	1.1
	Total	100	100	100
Total number of urban plots		307	266	573
Average no. of plots per farming household		1.3	1.4	1.3

Source: Survey data 2000.

The size of the plot provides some indication of potential crop production and therefore of the urban farmer's potential to produce commercial quantities of agricultural output. An underlying assumption is that (with a given degree of intensification) the greater the amount of land under cultivation, the higher the chance that the farmer will commercialise part of his/her production. In the two towns, half of the crop cultivators had less than one acre at their disposal (Figure 4.1 and Table A4.1 in Annex 4). In fact, almost a fifth of the plots were less than half an acre in size. Plots in Morogoro were on average somewhat larger than in Mbeya. For instance, whereas in Morogoro almost 40% of the plots were smaller than one acre, this applied to 65% of the plots in Mbeya. Even so, almost a fifth

Figure 4.1 Distribution of plot sizes (in acres) by town (% of all plots)



Source: Annex 4, Table A4.1.

of the Morogoro plots were larger than four acres, compared to only 7% in Mbeya. All this indicates that land is scarcer in Mbeya than in Morogoro, which is in line with the finding that crop cultivation in general is more common in the latter town.

It is interesting to examine whether there is any relationship between household size and the amount of land cultivated by the household at the time of the survey. The initial hypothesis was that there could be a correlation between these two variables, namely as the size of the household increases, the need for more food and/or a larger income increases as well. The results of this analysis are shown in Table A4.2 (Annex 4). A linear regression was checked for two categories of land size: first, for all households cultivating land, and second, for all households cultivating land with a size of one acre or more. The results do not show any strong correlation. However, they do show that there is a relatively stronger correlation between family size and land size in Morogoro, meaning that here there is a tendency to cultivate a larger area as the number of persons per household increases. There is no correlation between these two variables in the case of Mbeya.

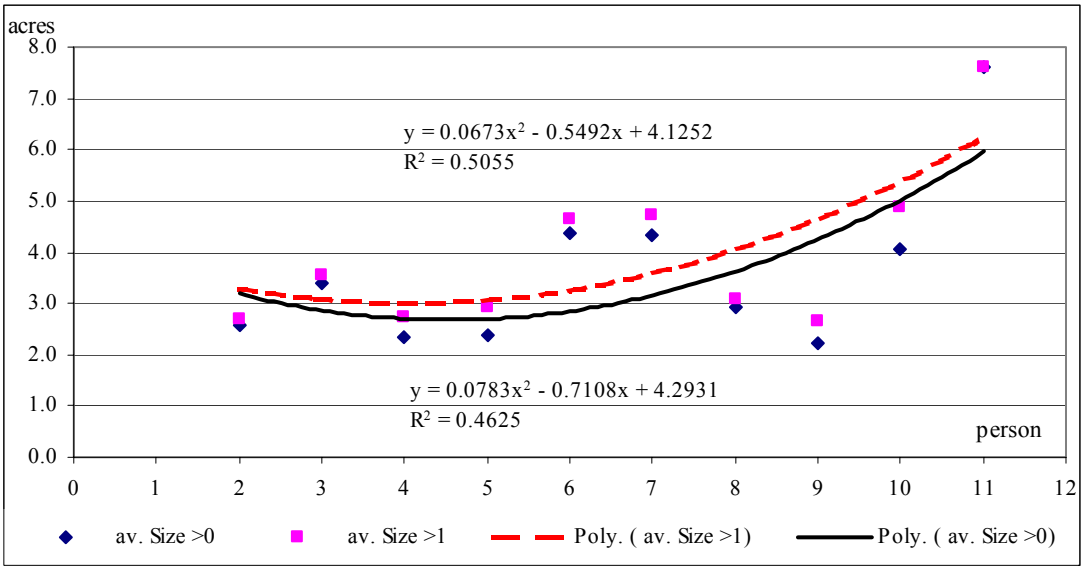
An attempt to run a polynomial regression to the power of 2 between the two variables produced some interesting results (Figure 4.2). These should be interpreted cautiously, however, due to the relatively low value of R^2, particularly for Mbeya. It seems that small households (1-3 persons) had a tendency to cultivate quite small plots of land. Medium-size households of 4 to 6 persons do not show a tendency to increase their land size. Their response to the households' increasing need for income is probably based on diverting labour resources towards non-agricultural sources of income. However, there is a tendency to increase the size of land under cultivation in larger families, i.e. of 7 or 8 persons and more. The explanation may be linked to a number of specific factors for each specific household. Nonetheless, we may hypothesise that when consumption needs increase and when labour resources are abundant, the will to cultivate more land is strong. And if this land is easily available, farmers will take the initiative and start to cultivate.

A similar hypothesis is offered for the relation between income and plot size: as income increases and the household's economic capacity is greater, there is a stronger tendency to cultivate a larger area of land. Table A4.3 (Annex 4) presents this relationship. There are two sets of correlations for each town. The first is based on all income categories, while the second excludes the two income categories between Tsh 130,000 and Tsh 170,000 per month due to the small number of entries in each. In spite of the fact that there is no significant correlation when all income categories are considered, there is a certain degree of correlation (R^2 = 0.50 and 0.68 for Morogoro and Mbeya, respectively) when the

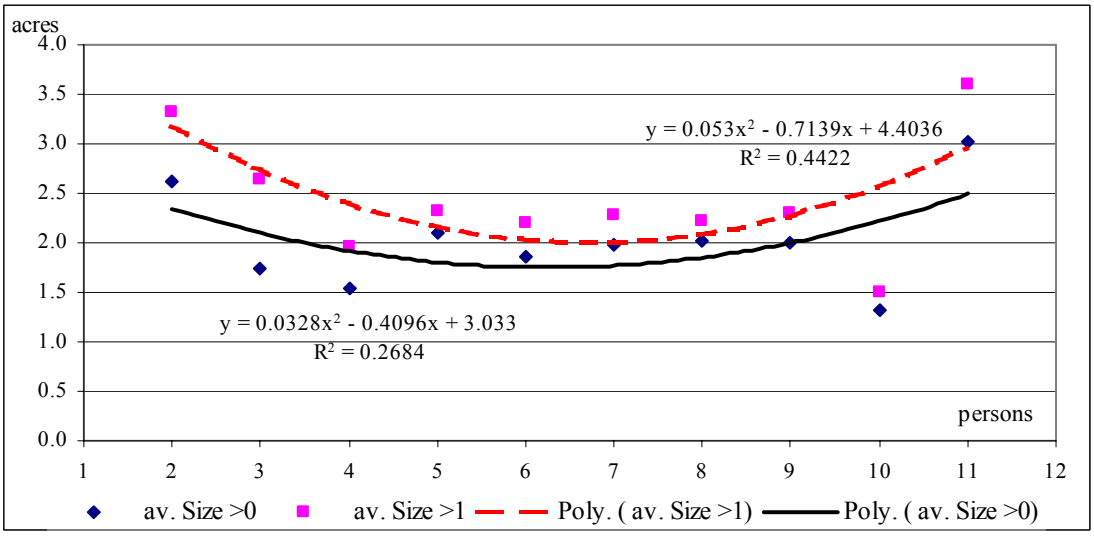
two above-mentioned categories are excluded. In other words, there may be some (factual) evidence to support this hypothesis.

Figure 4.2 Links between household size and average land size per household (polynomial regression to the power of 2), by town

Morogoro



Mbeya



It is also interesting to examine whether there are differences in access to land and in the amount of land cultivated in relation to the gender of the household head (Table A4.4 in Annex 4). In total there were 54 and 51 female-headed households in Morogoro and Mbeya, respectively, of which 76% and 65% had access to land and cultivated at least one plot. In Mbeya, about 16% of the female-headed households had access to a second plot. The figures do not reveal any major differences when male-headed households are compared with female-headed households. A similar statement can be made when the size of the plots is considered, confirmed by the mode and median. There is, however, some tendency for male-headed households to cultivate larger plots of land on average, particularly in Morogoro.

Land tenure

Another issue concerning land under cultivation is the type of land tenure. The permanence and duration of cultivation depends, among other factors, on the type of land tenure. In the case of ownership by a farmer, there are prospects for permanent cultivation of the plot. If the landowner is an external person or entity, there is always the fear that one or more plots of land may be reclaimed by the owner. In the two towns, the majority of the farmers (60%) cultivated their own plot(s) (Table 4.2). When the categories of family and relatives' land are added, access to land seems to be relatively certain for about three-quarters of the respondents. However, comparing the distribution of land tenure in both towns, it would appear that dependence on external sources for land – and especially on government land – was more common in Morogoro. As a result, relatively easy access to land explains why only about 8% of the households paid rent for the land they cultivated (Table A4.1).

Table 4.2 Summary of type of urban land tenure, by town (%)

	Morogoro (N=307)	Mbeya (N=266)	Total (N=573)
Own land	47.8	72.6	59.4
Government land	20.4	12.2	16.5
Family/relatives' land	21.1	9.5	15.6
Landlord	6.7	4.9	5.9

Source: Annex 4, Table A4.1.

Looking at gender differences, cultivating one's own land seemed to be slightly more common among male-headed households than among female-headed households in both towns (see Table A4.5 in Annex 4). However, the differences are too small to allow any significant conclusions to be drawn.

Location of and distance to plots under cultivation

By definition, urban agriculture is practised within a municipal area. Plots are thus located all over the two urban areas, wherever land is available and accessible. In some parts, however, farming plots are more frequently found than in others. Table 4.3 presents the most common locations of the plots used for urban crop cultivation in the two towns, while detailed figures are offered in Table A4.1 (Annex 4). Cultivation within one's own compound was more common in Mbeya than in Morogoro. However, the percentage of plots along the roadside was twice as high in Morogoro compared to Mbeya. Riverside locations, where available, were also fairly common in both towns. Roadside and riverside locations, as well as locations along railway tracks, under power lines and 'elsewhere within the residential area' often involve publicly owned lands. These types of locations were more common in Morogoro (Table A4.1), which may suggest higher demand and easier access to public land there than in Mbeya.

Table 4.3 Summary of urban plot location by town (%)

	Morogoro (N=307)	Mbeya (N=266)	Total (N=573)
In own compound	32.4	43.5	37.6
Roadside	40.8	19.2	30.8
Riverside	16.7	13.1	15.0
Peri-urban	2.0	15.4	8.2
Other	8.1	8.8	8.4

Source: Annex 4, Table A4.1.

The difference in plot locations was also analysed in relation to economic class and welfare level, using the housing density variable. Table A4.6 (Annex 4) shows the distribution of the location of plot number 1 (to which all crop cultivating households have access) by density groups. Although households located in low- and medium-density areas were under-represented in the survey, this analysis has a certain importance. Perhaps the most surprising (and difficult to explain) finding is that, compared with Mbeya, very few of those living in the low-density areas in Morogoro appeared to farm in their own compounds even

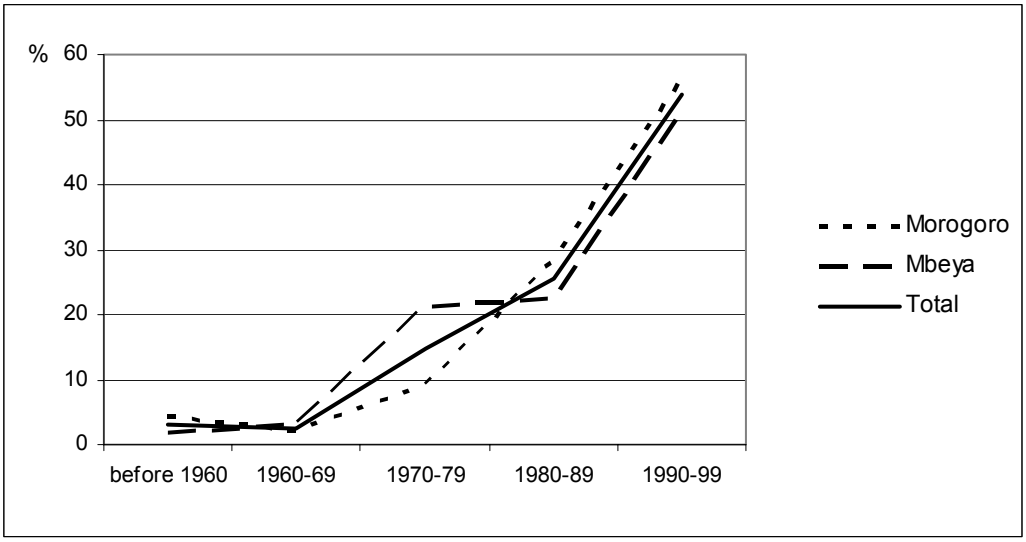
though space was unlikely to be a constraint. For households located in the high-density areas, roadside locations were much more important in Morogoro than in Mbeya. In the latter, a relatively large number of the crop-cultivating households in the high-density areas had access to a plot in the peri-urban zone.

As shown above (Table 4.3), less than 40% of all households operated from within their own compound. Consequently, they have to walk to get to their plots or use some means of transport. Table A4.1 (Annex 4) shows the percentage distribution of means of transport used by urban farmers to reach their plots. After walking, mini-buses (*dala dala*), which are a common means of public transport in Tanzania, together with other combinations appeared in more than 40% of the responses. This is followed by the bicycle. These frequently used means of transport can carry only a limited amount of produce, thus emphasising the difficulties of commodification and the commercialisation of urban agricultural production. However, these conditions may further emphasise that a larger part of the production is for subsistence purposes indicating that commercial production is limited and the current means of transport suit the producers, on the one hand, but serve as a constraint for commercial expansion, on the other.

Starting cultivation

Crop cultivation is not new to town dwellers but the trend towards urban gardening has been increasing, as shown by Figure 4.3. The figure presents the years when the surveyed households began cultivation. It is impossible to know how

Figure 4.3 Percentage share of starting cultivation, by town (%)
(N's: Morogoro = 259, Mbeya = 260)



Source: Annex 4, Table A4.1.

many other households started cultivation before or after 1960 and have since ceased cultivation. Therefore, the earlier periods are assumed not to be properly represented in the figure. Despite this, the figure clearly shows the major trends over time. About 3% of the surveyed households began cultivation before the 1960s, while more than 50% started gardening in the 1990s. It is in the last ten years that the tendency to become an urban farming household has accelerated, a phenomenon recognised in other parts of Africa as well. The trend is similar in both towns, with a few minor differences, mainly during the 1970s.

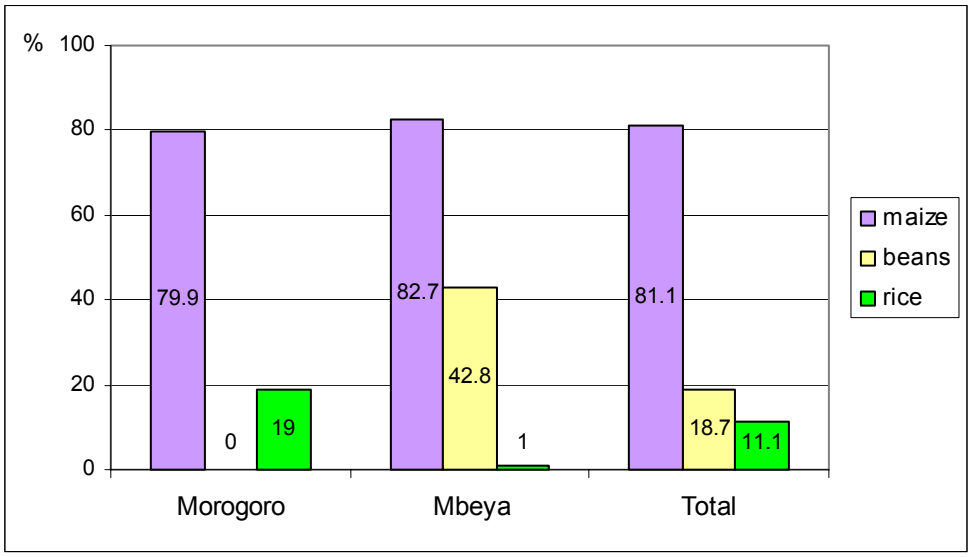
Crops: types and end-use of production

In Tanzanian urban areas a wide range of agricultural activities are generally carried out to directly satisfy household needs. They are not undertaken with an eye to the market. However, commercial production is derived partly from surpluses over and above production for subsistence, and partly from cash needs generated by the pattern of consumption. Both subsistence and cash production make up an integrated system for each of the urban households engaged in this type of agriculture. Taking this into consideration, we were interested in the crops grown, patterns of production and the end-use of production.

In both towns, households were surveyed to determine which crops were cultivated on their plots. The percentage frequency of households cultivating the most important crops is shown in Figure 4.4, while detailed figures are presented in Table A4.7 (Annex 4). A wide variety of crops was grown but only three were grown by more than 5% of the households: maize, beans and rice. Maize was the most common and was cultivated by almost two-thirds of *all* households in the two towns (Table A4.7) and by about 80% of the crop-cultivating households (Figure 4.4). This was followed by rice in Morogoro and beans in Mbeya. The variety of crops grown was larger among the Morogoro households compared with Mbeya (Table A4.7). Although there is a degree of similarity between the two towns, the point here is that the different physical environments influence crop patterns. As can be seen from the figures, Morogoro's climate is less attractive for growing beans, while in Mbeya conditions are less suitable for cultivating rice. Surprisingly, crops that have traditionally been easy to grow like cassava and *mchicha* (amaranth) are grown by a mere 3% of households. Similarly, the frequency of tree crops in urban gardens is low.

As mentioned earlier, the commercialisation of production is not new in urban Tanzania. Yet, the degree of commercial production differs widely among farming households as well as between the towns, although it seems that intra-town

Figure 4.4 Major crops grown, by town (% of crop-cultivating households)



Source: Annex 4, Table A4.7.

variation is higher than inter-town variation. In Table 4.4, the share of end-use of urban farmers' major crop production is averaged for each town and for three categories:

- subsistence, when production is consumed within the household;
- gifts, which includes all household production that is not for home consumption and not for sale; and
- cash, where production generates cash income by selling crops either at markets or directly to consumers in town.

It is worth noting that there are households that direct their production towards more than one end-use, while some use the same crop in each of the three categories. According to the figures, all farming households devote a share of their

Table 4.4 Distribution of end-use of production, by town

End-use	Morogoro			Mbeya			Total	
	N	%	Share of total	N	%	Share of total	N	%
Subsistence	242	100.0	84.0	184	100.0	73.6	426	100.0
Gifts	7	2.9	0.3	68	37.0	5.0	75	17.6
Cash	109	45.0	15.4	99	53.8	21.4	208	48.8
Total	242	100.0	99.7	184	100.0	100.0	426	100.0

Source: Survey data 2000.

production to subsistence. Almost half of them sold produce, and about one sixth gave away some of their production. The last two categories are more important in Mbeya, as in Morogoro only seven households gave away some of their production. This pattern is confirmed if the three categories are broken down by percentage of use (see Table A4.8 in Annex 4). It is obvious that different households show different patterns of end-use of production. Only a few divert a large proportion of their production to commercial purposes, thus acting as purely commercial producers: about 4% of the producers sold 80% or more of their crop production. By comparison, about 56% used 80% or more of their produce for subsistence, while about 44% devoted their entire production to subsistence and not to any other purpose. Somewhat surprisingly in a society where mutual exchange plays an important role, more than 82% of the households gave away none of their production. The conclusion is that subsistence production is far more important than cash production.

In Table 4.5, the percentage end-use of the urban farmers' major crop production has been averaged for each of the towns for the three categories: commercial purposes, gifts and self-consumption. Here, the commercially-oriented households are those that sold at least half of their production, while the subsistence-production-oriented households are defined as those that consumed at least half of their production, in most cases much more. It is worth noting that the data are based on farmers' assessments of the distribution of the whole year's production, so there is obviously room for error. However, errors cancel each other out, assuming that they are made by both sides.

Maize and rice dominate production in Morogoro in terms of quantities and frequencies (Table 4.5). Yet, the share of commercially-oriented households is about 10% for maize and less than 30% for rice. The level of commercialisation is not very different in Mbeya where maize forms a larger proportion of the

Table 4.5 Major crops, by end-use of production and by town

Crop	Average amount harvested (kg.)		Sold at least half (%)		Gave away at least half (%)		Consumed at least half (%)	
	Moro.	Mbeya	Moro.	Mbeya	Moro.	Mbeya	Moro.	Mbeya
Maize	997	1144	10.2	20.9	0.9	2.3	93.0	86.6
Beans	-	113	-	13.5	-	0.0	-	93.3
Rice	1430	-	28.6	-	2.0	-	79.6	-
Bananas	379	-	28.6	-	0.0	-	85.7	-
Cassava	482	-	26.3	-	0.0	-	84.2	-
Pumpkins	84	-	0.2	-	0.0	-	100.0	-

Source: Survey data 2000.

commercial production (21% of the households) and beans are the secondary cash crop (14% of the households). This table confirms the finding that a relatively large number of the households consumed a large part of their production. According to the data in Table 4.5, 80% or more of the households consumed at least half (in most cases much more than half) of their production of maize, rice, beans, bananas and cassava. Although many households did not show much commercialisation of their maize crops, it was nevertheless regarded as the main cash generator. In addition, a small number of households relied on specific crops as their major agricultural cash income. It is interesting to note that while a small number of the households gave maize away, the other major crops were seldom given away. It seems that different households treat the same crops differently.

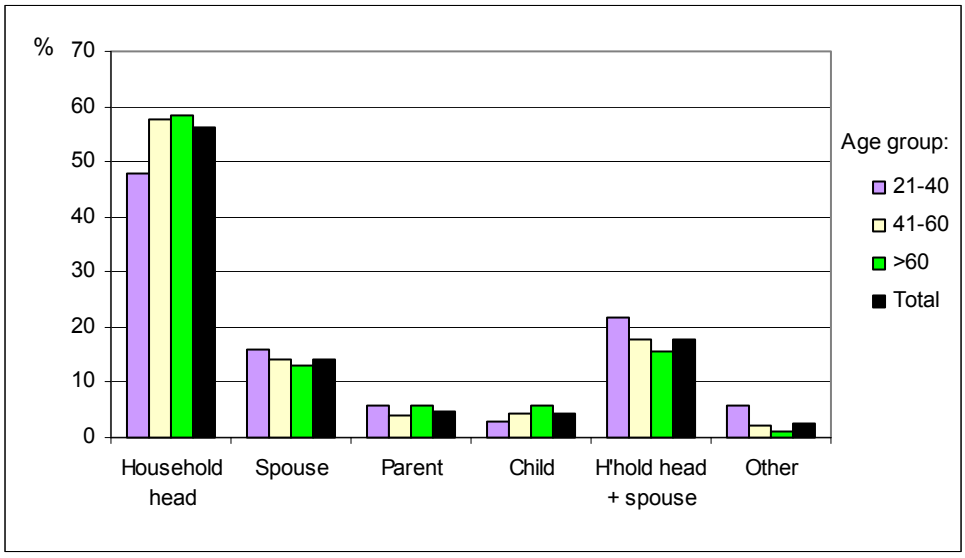
Characteristics of maize production

Maize is the most frequently cultivated crop and as such it could serve here as an indicator of some of the production characteristics. For instance, it is interesting to compare different households according to the division of production responsibility. It is assumed that the household members who devote more labour time to cultivation are those responsible for production. There is no clear record to suggest the proportional share of time put in by those persons. However, it seems that the tendency for an increase in the proportion of working hours in farming activities is directly linked to the end-use of production. The greater the commercial production, the longer the working hours devoted to farming.

Figure 4.5 shows the distribution of the person responsible for the production of the main crop (maize) by age of the household head, as well as for the total survey population. Altogether, 385 responses were recorded. It is clear from Figure 4.5 that there are no significant differences between the groups. For all three groups, the head of the household is the person most frequently responsible for growing and harvesting maize (56% on average as shown by the total), followed by the combined efforts of the household head and his spouse (18% on average). As the household head gets older there is a slight increase in his propensity to take responsibility for production (Annex 4, Table A4.9). In contrast, the spouse takes responsibility more often when the household head is younger. The small differences between the age groups may be related to the fact that younger household heads more often have a job elsewhere and the wife then has to do the farming. This also emerges in the answers in the in-depth survey. The role of the children is minimal but it is relatively more important for the older households. In sum, it seems that with the growing importance of maize in the household diet and income, the household head is taking more responsibility for

the crop. The same pattern arises for the other major crops, such as beans, rice, bananas, cassava and pumpkins (see Table A4.10 in Annex 4). For all these crops, the spouse is the second most important in terms of responsibility followed by other household members and relatives. However, responses from the in-depth study emphasise the role of women (spouses in many cases) in crop cultivation generally and maize cultivation in particular, which suggests that their responsibility as well as the labour time they spend on maize cultivation is greater than the above data show.

Figure 4.5 Percentage distribution of persons responsible for maize production, by age group of household head



Source: Annex 4, Table A4.9.

Tables 4.6 and 4.7 offer additional information on maize production and commercialisation for different types of households and income groups. The average amount produced by a household was just over 1,000 kg annually (Table 4.6). Surprisingly, households characterised by their head being regularly absent produced about 10% more maize than households where the head was living at home all the time. By contrast, the mode, although relatively low (about a quarter of the average), is 50% higher for households whose head was a permanent resident. Based on a similar comparison, the figures in Table A4.11 (Annex 4) indicate that about two-thirds of the households did not sell any maize. Yet, households where the head was regularly absent show a higher tendency to sell a larger amount of maize. In these households the spouse took relatively more responsibility for the production process.

Table 4.6 Amounts of maize harvested, by type of residency of household head

Type of residency of household head	Amount in kg					
	N	minimum	maximum	average	median	mode (N)
Full-time resident	301	36	18,000	1043	540	270 (32)
Regularly absent	70	54	12,600	1150	810	180 (8)
Total	371	36	18,000	1063	630	270 (36)

Source: Survey data 2000.

A variable that may affect the pattern of end-use of maize production is the household's income class. Here the housing density variable is taken as a surrogate for income class (see Table 4.7). People living in the high-density areas of Mbeya, characterised by relatively low incomes, had a higher tendency to sell maize (although the quantity sold is unknown). This might also be due to lack of storage space. However this was not the case in Morogoro. In both towns, the people in the high-density areas were somewhat more frequently inclined not to give away any of their production. As for self-consumption, there is no clear pattern, though in Mbeya, somewhat surprisingly, those having higher incomes and living in low-density areas show a higher tendency to consume all they produce.

Table 4.7 Percentage share of use of maize production, by density area and by town

	sold ≥ 50%	sold none	given none	consumed all	consumed 50% - 99%
Morogoro (N = 210)					
- low	7	87	27	27	60
- medium	10	78	77	62	30
- high	11	71	68	51	43
Total	10	75	68	53	40
Mbeya (N = 171)					
- low	8	63	56	48	46
- medium	0	83	33	33	67
- high	29	57	62	34	49
Total	21	60	58	38	49

Source: Survey data 2000.

Inputs for crop cultivation

Capital inputs

Generally, three categories of capital inputs can be identified in urban agriculture in Tanzania. The first category consists of cultivation inputs directly related to the growing process. Some are chemical, such as artificial fertilisers and pesticides, and some non-chemical (traditional), mainly organic (and more environmentally friendly) inputs like manure and crop residues. The second category consists of equipment including hand tools for farm work such as hoes and machetes, and a higher-level technology that includes motorised implements. The third category is money drawn from family resources or other formal or informal institutions.

The distribution of items related to the first category appears in descending order of user frequency in Table 4.8. Only the first three types of inputs – improved seeds/seedlings, chemical fertiliser and local seeds/seedlings – were used by about half of the farming households. Generally, more of Mbeya's crop-cultivating households used inputs related directly to cultivation compared with Morogoro's farmers. This is especially significant when chemical fertilisers, manure, insecticides, pesticides and local seeds are considered. It seems that in spite of the fact that crop cultivation in Morogoro is more widespread than in Mbeya, the use of inputs is less common in Morogoro in general but particularly regarding chemical inputs.[1]

Table 4.8 Use of cultivation inputs, by town (% users)

Type of input	Morogoro (N=269)	Mbeya (N=208)	Total (N=477)
Improved seeds/seedlings	61.2	53.4	57.7
Chemical fertiliser	24.0	74.1	46.2
Local seeds/seedlings	36.4	54.9	44.6
Manure as fertiliser	16.9	62.4	37.2
Crop residues as fertiliser	31.0	23.8	27.8
Chemical insecticides	14.9	41.5	26.7
Chemical pesticides	14.0	34.7	23.2
Irrigation	8.3	13.5	10.6
Urban waste as fertiliser	0.0	2.1	0.9

Source: Survey data 2000.

[1] Further analysis on the use of inputs is presented in Chapter 7, in the section 'Use of inputs'. See also Annex 7, Table A7.3.

Table 4.9 shows substantial disparities regarding the second category of inputs, namely the use of equipment. Animal-drawn traction was used only to a very limited extent, but somewhat more frequently in Mbeya. Simple hand tools were used in most households in Mbeya. In contrast, tractors were used by half of the farming households in Morogoro, ten times more frequently than in Mbeya, probably due to the higher welfare level in Morogoro, as well as to the larger plots there. Another likely constraint in Mbeya is the hilly landscape.

Table 4.9 Use of equipment inputs for crop cultivation, by town (% users)

Type of input	Morogoro (N=269)	Mbeya (N=208)	Total (N=477)
Oxen	1.2	5.7	3.2
Tractor	50.4	4.7	30.1
Hand hoe	32.2	83.9	55.2
Tractor/hand hoe	16.1	5.7	11.5

Source: Survey data 2000.

The third type of capital resource concerns money derived from a variety of sources. About 60% of the households used a certain quantity of money for inputs for cultivation (Annex 4, Table A4.12). Urban farmers' own money from agriculture or other income-generating activities was the main source of money invested in urban cultivation by 85% of the respondents. Money from relatives, including close family members, contributed about 10% of the total money put into urban crop cultivation.

An additional input category, which was not capital input by nature, was the technical advice provided by an extension officer or any other formal or informal source. In both towns, almost half of the crop cultivators had received some form of advice or assistance (Annex 4, Table A4.13). In other words, more than half had *not* received any technical assistance. Extension officers (for 60% of the households) and neighbours together provided three-quarters of these inputs. Conspicuously, only one household in Morogoro and two in Mbeya referred to the institution where advice had come from, namely Sokoine University of Agriculture in Morogoro and Uyole Agricultural Centre in Mbeya.

Labour inputs

Generally, three categories of labour sources can be distinguished in Tanzanian urban agriculture. The first category, and normally the major source of labour, is made up of the members of the household concerned, according to its internal

Table 4.10 Use of external labour, by town (% users)

	Morogoro (N=269)	Mbeya (N=208)	Total (N=477)
Relatives/friends/working groups	22.9	18.4	20.7
Hired labour	61.6	60.2	61.0

Source: Annex 4, Tables A4.14 and A4.15.

division of labour. This category was referred to above in the section that describes who assumes responsibility for maize cultivation. Additional information is presented in Table A4.14 (Annex 4) where the importance of the labour inputs of the spouse and the sons and daughters is underlined. Usually, crop cultivation is not a full-time job for the person involved and family members can allocate some of their time to cultivation. As mentioned above, the role of the women – in most cases the spouse – is greater than the figures suggest. Responses from the in-depth survey suggest that being housewives, and thus spending a lot of time at home, enables women to devote more time to crop cultivation, even if the labour is divided daily into a number of short time units.

Table 4.10 provides some information on the two other types of labour used in urban crop cultivation (for detailed information, see Tables A4.14 and A4.15 in Annex 4). Both labour sources are external, i.e. people from outside the household. First of all, in a fifth of the cases labour was provided by relatives, friends and/or in the form of working groups (Table 4.10), though the latter two categories were not very common (Table A4.14). This labour is usually free or operates on a mutual basis. The other external labour source is hired labour, which was used by about 60% of the crop-cultivating households in both towns. The use of this labour can be on a permanent, a seasonal or a casual ('on call') basis. Not surprisingly, the use of hired labour was more common on the plots of the higher income group. Moreover, hired labour came from a variety of sources (Table A4.15). The major sources are geographically divided between the rural and the urban space. Urban residents of both sexes and all ages were the main source, and were used by almost 50% of the crop-cultivating households. The single most important rural source was women, who are probably happy to find an additional source of income in urban gardens. The frequency distribution of the hired labour sources was quite similar for the two towns, albeit with minor exceptions (Table A4.15).

Means of transport

As shown at the beginning of this chapter, crop cultivation is also practised in fields located outside the household compound. Hence, produce has to be carried

to the market or to the house every evening. A variety of means of transport are on offer for the urban farmer, but not all are readily accessible due to availability or cost. Table A4.16 in Annex 4 presents the frequency of use of different means of transport by Morogoro and Mbeya urban cultivators. Commercial vehicles are most frequently used for larger quantities and longer distances, and the head and, to a lesser extent, the bicycle are used for small quantities and short distances. Carrying produce on the head appeared to be more common in Mbeya, while the bicycle was more frequently used in Morogoro. Again, this is likely to be related to differences in welfare level and topography.

Perceived advantages and obstacles

A basic assumption in this study was that urban dwellers are economically rational and that they practise crop cultivation as part of their livelihood strategy in response to a number of household needs. Information gathered in the in-depth study enables us to indicate some of the major advantages as well as the obstacles related to urban crop cultivation.[2]

First and foremost, urban dwellers perceived crop cultivation as an extremely important activity that provided employment, income and food. For some, it is the only source of food and income, for others it is an additional source, and for a few it is an entrepreneurial activity where most of the production is targeted at the market. Furthermore, under the current economic conditions most urban farmers have no intention of stopping cultivating, as they do not anticipate easily finding other income and food-provisioning alternatives. Several farmers, especially those who had in-migrated from rural areas, stated that they cultivated crops because they had traditionally done so. They continued with crop cultivation because of the economic advantages derived from it and a lack of alternatives within the urban environment.

There are people who prefer growing crops to breeding livestock because (i) the costs involved are lower than those of raising livestock; (ii) crops are perceived as requiring less labour and supervision; and (iii) they create less trouble for both the owner and the neighbours. It is worth noting that there are also inter- and intra-sectoral links whereby crop residues are used as livestock feed and also to fertilise crops.

In contrast, there are also several obstacles to crop cultivation. The five most frequently mentioned problems that were referred to by at least 10% of the respondents are presented in Figure 4.6.[3] Listed by frequency, these were: poor weather conditions, a lack of capital, pests, high input costs, and a lack of inputs.

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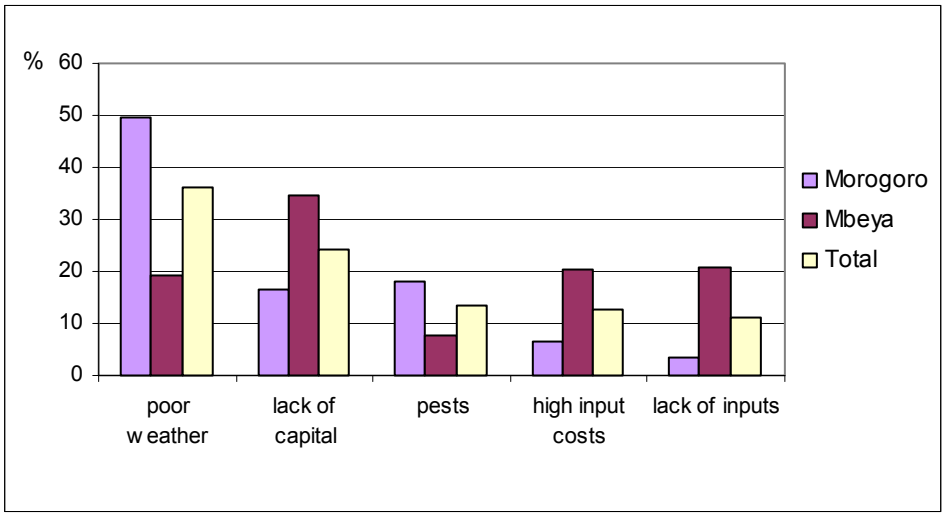
[2] A quantitative analysis of urban crop cultivation in terms of food security is presented in Chapter 6.

[3] See Table A4.17 in Annex 4 for details of the problems mentioned by crop cultivators.

However, the two towns differed considerably in terms of perceived constraints. For the Morogoro crop cultivators, the weather was the most frequently mentioned problem, indicating the drier climatic circumstances they experience in comparison with Mbeya. The Mbeya cultivators complained most often of a 'lack of capital' combined with a 'lack of inputs' and 'high input costs'. Capital inputs clearly form a major bottleneck in Mbeya. These three constraints constituted a major problem for almost 60% of the Mbeya crop cultivators as well (Table A4.17).

Figure 4.6 Most frequently mentioned problems with crop cultivation in town, by town (%)



Source: Annex 4, Table A4.17.

Other frequently mentioned obstacles related to crop cultivation were thieves who stole produce before it was harvested, high costs of transport for people and produce, and poor seed germination (Table A4.17). Some people also complained of unrestrained animals that destroyed crops in the fields. In addition, farmers resent interference from the municipal authorities and want to be allowed to cultivate in peace.

Only a few respondents complained about a shortage of labour (Table A4.17). Yet, as the in-depth interviews revealed, those who wanted to extend their activities mentioned other shortages and factors that limit production. Land is a scarce resource, while many plots are considered too small and do not enable the farmer to exploit economies of scale in the production process. Farmers are thus requesting land beyond the urban areas so that they can expand their crop-cultivating activities. In addition, there is a shortage of funding and inputs. For many, inputs are too expensive and there are no institutions offering low-cost financial

support. Using a tractor, for example, is relatively costly, and this alone makes farmers reluctant to use such labour-saving machinery.

* * *

The account above presents the similarities and differences in the crop-production process within and between the two urban environments. It was shown that, partly as a consequence of the towns' different locations and partly due to their economic and cultural conditions, urban residents may differ in terms of their tendency to grow crops, the quantities grown and the distribution of the end-use of the produce. It is clear that the production pattern, the use of inputs and the ways of managing the output are largely conditioned by the local situation (which does not mean that we can ignore the influence of forces operating at the national level). To have a better and broader understanding of urban agriculture in the two towns, we now turn to a discussion of the patterns and processes of livestock keeping.

Photo 2 Dairy cattle (and goats) in the compound of a medical doctor in the hospital quarters, Mbeya

5

Livestock keeping

Raising livestock in the research area is a major component of the urban-agriculture production pattern. Although this activity is somewhat less common than crop cultivation, many urban households keep some animals for subsistence as well as commercial purposes. As outlined earlier, 38% of the Morogoro population and no less than 78% of the Mbeya population could be considered as 'urban livestock keepers'. This chapter presents the ways urban livestock raising is carried out in the two towns and describes certain features of the production system to demonstrate its major components and lay down the essential background material for the arguments and discussion presented in the following chapters. Thus the chapter is largely concerned with the types of animals kept in town, common animal products, the inputs used in the production process, and the related advantages and obstacles perceived by the urban farmers.

Animals: types, end-use of production and rearing systems

Animals: types and numbers

A variety of livestock is raised in Morogoro and Mbeya. To obtain some idea of the importance of these various animals to the urban households concerned, it is necessary to consider their distribution. The top half of Table 5.1 presents the percentages of households keeping the most frequently found livestock, in descending order of frequency (the last column).[1] The figures do not add up to

[1] For less common types of livestock, see Annex 5, Table A5.1.

100% because not all urban households raised animals, while some kept more than one type of animal. A few points should be emphasised. First, larger animals like cattle, goats and pigs were more common than smaller livestock such as chickens and ducks. Second, it is clear from the data that cattle (both improved and local) and pigs are much more common in Mbeya than in Morogoro, which would apparently explain the difference between the two towns regarding livestock keeping in general. Third, rearing cattle was the most common livestock-keeping activity found in more than one third of the urban households. Keeping improved cattle (mainly dairy cattle) was twice as popular in Mbeya than in Morogoro, while local cattle were found in only two households in Morogoro, compared with more than one sixth of the Mbeya households. Scarcity of land might have been an incentive for raising smaller livestock, but this seems not to have been the case. The market price of livestock products is a more likely reason. The relatively high price that milk fetches makes the raising of cattle quite attractive. Nevertheless, there may be some discrepancy between the figures for smaller animals, particularly chickens, and the real number of households that kept them, because households with a very small number of chickens or ducks may have gone unnoticed.

Table 5.1 Summary of types of animals kept, by town (%)

	Morogoro	Mbeya	Total
As % of all households	*(N=300)*	*(N=308)*	*(N=608)*
improved cattle	20.0	48.4	34.4
goats/sheep	11.3	13.0	12.2
local chickens	11.7	11.0	11.3
pigs	4.7	17.2	11.0
local cattle	0.7	17.2	9.0
As % of livestock-keeping households	*(N=114)*	*(N=239)*	*(N=353)*
improved cattle	52.6	62.3	59.2
goats/sheep	29.8	16.7	21.0
local chickens	30.7	14.2	19.5
pigs	12.3	22.2	19.0
local cattle	1.8	22.2	15.6

Source: Annex 5, Table A5.1.

When looking at only those households that kept livestock, the picture changes somewhat, as is shown in the bottom half of Table 5.1. Improved and local cattle were still the most common types of livestock kept but the difference between the towns, in terms of improved cattle, was not as large as for the population as a whole. The difference is emphasised by the relatively high frequencies

of goats, chickens (either local or improved) and even ducks in Morogoro households (Table A5.1). In other words, although the number of households that kept these three types of livestock was similar in both towns, their relative share was more substantial in Morogoro. The figures also highlight the fact that every second household kept at least two types of animals.

Another interesting finding is that although, livestock keeping was generally more common in Mbeya, the average number of large animals (cattle, goats, sheep and pigs) per livestock-keeping household was higher in Morogoro than in Mbeya (Table 5.2).[2] The relatively small numbers of improved cattle per household in Mbeya may be due to a lack of space but also to an oversupply of milk that has resulted in a lower milk price in Mbeya (Tsh 250 compared with Tsh 400 in Morogoro). By comparison, the excess milk from Morogoro was delivered to other urban areas, including Dar es Salaam. Furthermore, the relatively lax enforcement of by-laws in Morogoro allowed households to keep more heads of cattle. The situation regarding improved chickens was different, although the Morogoro figure would have been higher had we not ignored one household that reported having 6,800 chickens, which was exceptionally high and not representative of the general pattern.

Table 5.2 Average number of major livestock types, by town (livestock-keeping households only)

Type of livestock	Morogoro	Mbeya	Total
Improved cattle	4.5	2.9	3.4
Local cattle	5.5	2.6	2.7
Goats/sheep	9.5	5.1	7.1
Pigs	10.5	4.6	5.9
Improved chickens	156.3	188.5	175.8
Local chickens	14.9	13.8	14.3

Source: Survey data 2000.

End-use of production

In urban areas in Tanzania there is generally a wide range of livestock production to satisfy household needs. Commercial production comes partly from surpluses for own consumption and partly from cash needs generated by patterns of consumption. Together, subsistence production and commercial production comprise an integrated system for each of the urban households engaged in livestock raising. Table 5.3 presents the respective percentages of each end-use of urban

[2] Counted as the number of animals owned by the household at the end of the year preceding the survey.

farmers' major livestock production, averaged over the total survey population. The five categories reflect the degree of self-consumption ranging from total subsistence (for own consumption only) to full commercial production where the entire production is sold. The category of 'other' includes animals kept for 'tradition' or for leisure purposes.

Table 5.3 Distribution of end-use of production, by major types of livestock (%)

End-use of production (by % share)	Improved cattle (N=205)	Goats & sheep (N=74)	Pigs (N=67)	Local chickens (N=69)
Own consumption only (100-0)	8.8	9.5	1.5	40.3
Mostly own consumption (80-20)	7.3	21.6	13.4	26.9
Both consumption and to sell (50-50)	77.1	52.7	31.3	28.4
Mostly to sell (20-80)	3.9	9.5	13.4	1.5
To sell only (0-100)	1.0	6.8	40.3	3.0
Other	2.0	0.0	0.0	0.0
Total	100	100	100	100

Source: Survey data 2000.

The data in Table 5.3 show a variety of end-use patterns. The dominant pattern for larger animals (excluding pigs) is a more or less even division between consumption and commercial purposes, as shown for the improved cattle and for goats and sheep. Roughly a half of their meat products were consumed at home while the other half were sold through different outlets. The data also suggest that of the total production, own consumption was more common than selling products and only a small number of households were full commercial producers. Yet, looking at the figures from another angle, over 90% of the households sold at least 20% of their production from each type of livestock presented in Table 5.3, with the exception of poultry, for which the figure is about 60%. This finding emphasises the importance of animals as a source of income. Poultry were kept primarily for own consumption purposes: about 40% of the households engaged in urban poultry keeping consumed all the chickens they kept. In contrast, raising pigs seems to have been more of a commercial enterprise, as 40% of the households sold their total production.

Rearing systems and responsible persons

Improved (dairy) cattle were the most common type of livestock in the two towns. As such, they receive more attention than small animals and can serve as an indicator for various livestock production characteristics. Data on the rearing system of improved cattle and comparative figures for goats and sheep are

presented in Table A5.2 (Annex 5). Zero-grazing, which generally means keeping livestock within one's own compound, was the dominant form of rearing, with no less than 90% of the cattle owners in both towns adopting it. This practice relies on the supply of (i) feed grown on the plot; (ii) food supplements supplied by commercial sources; (iii) crop residues and urban waste; and particularly on (iv) cut grass brought in from undeveloped areas outside the built-up area or from the rural area. As for goats and sheep, about half of the households kept them solely in zero-grazing, while the other half kept them partly in zero-grazing and partly in free range. There are a number of reasons for the high percentage of zero-grazing. First, by-laws do not permit the practice of free range within urban boundaries. Second, households with a small number of animals and enough land try to grow at least part of the necessary feed on their own plot. Third, the quantity of milk increases with zero-grazing. Nonetheless, there are costs involved, particularly related to providing feed for the animals. These costs are reduced by allowing animals to roam freely and households in areas with sufficient space for free grazing therefore tend to let their animals loose in the neighbourhood.

Table 5.4 presents data on the relative share of responsibility for livestock keeping between the household head and the spouse. Other members of the household, such as parents, relatives and cattle attendants, provided a much smaller contribution. The role of the head of the household was most important in the case of large livestock, while the spouse took greater responsibility for poultry. As with crop cultivation, one may assume that household members who devoted more labour time to livestock keeping were those responsible for production. There is no clear record to indicate the proportional share of time invested by those persons. However, it seems that the tendency towards a greater proportion of working hours in livestock activities is directly linked to the end-use pattern. Responses from the in-depth survey suggest that the time invested by the household head is dependent on other responsibilities. Those with other

Table 5.4 Person responsible for livestock, by type of livestock (%)

	N	Household head	Spouse	Head & spouse
- improved cattle	182	69.5	19.7	0.5
- goats/sheep	54	65.1	19.0	1.6
- pigs	56	72.6	14.5	3.2
- improved chickens	30	54.8	41.9	0.0
- local chickens	51	36.7	46.7	1.7

Source: Survey data 2000.

responsibilities spent fewer hours dealing with the animals, and the spouse compensated for this by spending more time on raising livestock. Livestock keeping appears to be either a full-time or a part-time occupation and, in the latter case, the person responsible has one or more other income-generating activities. Some indication of this is provided by the data in Table A5.3 (Annex 5). Livestock keeping was a full-time occupation for just over 30% of the urban livestock keepers in the two towns. However, this applied to no less than 40% of the Mbeya livestock keepers, indicating the importance of this activity for those households' food, income and employment situation. In Morogoro, this applied to 'only' 14% of the livestock-keeping households.

Inputs for livestock keeping

As with the system of crop production, three categories of capital inputs can be identified in urban agriculture in Tanzania. The first category consists of inputs directly related to the rearing process, either as part of the feeding requirements, or related to animal health. The second category consists of equipment and is mainly concerned with the housing conditions in which the animals are kept and the equipment used in the production process. The third category is money drawn from family resources or other formal or informal sources. However, not all this information is provided and here we discuss the first category only.

Tanzanian urban livestock keepers are increasingly adopting improved animal breeds within their production system. Data for both towns are presented in Table 5.5 and indicate that this practice is more common in Mbeya, which is a livestock rearing town where half of the livestock keepers raise improved breeds. In Morogoro, urban farmers are more usually crop cultivators than livestock keepers. Raising improved breeds requires the frequent use of advanced inputs

Table 5.5 Use of inputs for livestock, by town (% users)

Input	Morogoro (N=112)	Mbeya (N=235)	Total (N=347)
Improved breeds	34.8	50.2	45.2
Veterinary drugs	82.1	87.2	85.6
Feed supplements	71.4	88.1	82.7
Urban waste	27.5	60.0	49.7
Crop residues	44.6	56.2	52.4
Ethno-veterinary medicine	13.4	8.5	10.1
Cut forage	52.7	69.4	64.0

Source: Survey data 2000.

like veterinary drugs and feed supplements, which seem to be well entrenched in both towns, particularly in Mbeya. In contrast, ethno-veterinary medicine, which was far more common in the past, was used only by 10% of the livestock owners in the present survey. About a half of the households used the two types of inputs that make a significant contribution to the urban economy and ecology, namely crop residues and urban waste. These offer an economic link with crop cultivators and allow for the disposal of household waste.

An additional input category is the technical advice that can be provided by extension officers or another formal or informal source. Technical advice was received by similar percentages of households in both towns, and was widely accepted by 90% of the livestock-keeping households (Table 5.6). Extension officers (at 83%) were the most common source of innovations and technical advice. Urban livestock keepers welcome them and their advice is an important source of input, especially for households keeping cattle. Neighbours were the second most important source of technical advice, either as a result of their own experiences or through the spread of practices adopted from extension officers. In most cases, the use of technical advice was more common among Mbeya households. The exception was advice from Sokoine University of Agriculture (SUA), the second most important source of technical expertise in Morogoro. The SUA's presence in Morogoro allows university staff to pass on their knowledge and technical support to livestock keepers in the vicinity of the university.[3]

Table 5.6 Sources of technical advice, by town (%)

	Morogoro (N=113)	Mbeya (N=233)	Total (N=346)
Recipients of technical advice	88.5	90.1	89.6
Source of technical advice	(N=100)	(N=210)	(N=310)
- extension officer	70.0	89.6	83.3
- neighbour	8.0	21.3	17.0
- family member	7.0	7.1	7.1
- Sokoine University of Agriculture	14.0	0.0	4.5
- other	11.0	7.6	8.7

Source: Survey data 2000.

Labour inputs can be divided into those internal and those external to the household. The labour force was mainly comprised of household members who allocated their labour time according to their degree of responsibility, the time

[3] As seen in Chapter 4, this was not the case with crop cultivation.

they had available, their abilities, and their age. External sources include mainly hired labour and two-thirds of the livestock-keeping households used this source (Table 5.7). Most of this labour came from close relatives or more distant family members. Unlike crop cultivation, relatives are paid for the time they invest in a household's livestock business. Several households used hired labour from more than one source. For instance, cattle attendants were employed by almost one fifth of households. The pattern appears to be similar for both towns. The category 'other' includes friends, working groups and house boys.

Table 5.7 Sources of hired labour, by town (%)

	Morogoro (N=114)	Mbeya (N=239)	Total (N=353)
Using hired labour	63.2	68.2	66.6
Source of hired labour	(N=72)	(N=163)	(N=235)
- close relatives	60.6	64.6	63.9
- other relatives	16.9	20.5	19.6
- cattle attendants	16.9	18.6	18.3
- other	5.6	9.8	8.7

Source: Survey data 2000.

Income, education, gender and keeping livestock

Household characteristics are thought to influence the production system. For instance, one might expect livestock keepers with higher incomes to use more up-to-date inputs than livestock keepers with lower incomes for whom they are too expensive. This hypothesis, as shown in Table 5.8 for the case of improved cattle, appears to have some truth, albeit rather limited. It seems that there were no clear differences between households in different income groups when comparing their use of selected modern inputs. However, as household income increases, there is a tendency to use veterinary drugs, feed supplements and even technical advice more often. This was also the case for crop residues, which the households who keep livestock did not necessarily receive free of charge. The poorer households used urban waste more frequently, and it was usually provided free of charge. Among the lower-income households, zero-grazing was just as common as among the higher-income households. This may at first sight be somewhat surprising but can be understood by the fact that there is more open space in the neighbourhoods where the higher-income households are found. Moreover, the higher-income households employ more cattle attendants, who walk the cattle to grazing fields outside the compound.

Table 5.8 Relationships between income class (in Tsh per month) and selected characteristics of improved cattle keeping

Income class:	<50,000	50,000–90,000	>90,000
Average no. of improved cattle per household	3.9	3.5	4.1
% practising zero-grazing	92.6	91.2	89.6
% using veterinary drugs	85.2	94.4	97.9
% giving feed supplements	82.7	97.2	95.8
% using urban waste as feed	68.1	56.3	53.2
% using crop residues as feed	50.6	69.0	74.5
% receiving technical advice	90.1	95.8	95.8

Source: Survey data 2000.

As mentioned above, a surrogate for the variable of income class is the density of a household's residential area. High-income households live in low-density areas with large compounds around their houses. Poorer households reside in high-density areas that are either planned by the municipality or unplanned, where people settle on the land with no clear demarcation of residential plots. Table 5.9 presents data on the relationship between the number of heads of improved cattle and the area of residence. The major conclusion that can be drawn from the table is that people with a greater economic capacity keep more cattle in two ways. First, the share of households keeping cattle increases as density decreases. Second, there is a general tendency for the average number of cattle per household to increase as density decreases.[4]

Table 5.9 Characteristics of improved cattle-keeping, by density area

Density area:	Low	Medium	High planned	High unplanned
Total no. of households	81	132	171	224
Households keeping cattle	50	55	33	68
% of households keeping cattle	61.7	41.7	19.3	30.4
Total no. of cattle	184	241	97	179
Average no. per household	2.3	1.8	0.6	0.8
Average no. per keeping household	3.7	4.4	2.9	2.6
Mode	2	2	3	3

Source: Survey data 2000.

[4] Comparing the average numbers of improved cattle in Tables 5.8 and 5.9 also leads to the conclusion that income class and density area cannot entirely be treated as surrogate variables.

A similar analysis was done for the educational level of the household head (see Table A5.4 in Annex 5). The figures suggest first of all that the average number of heads of improved cattle increases when the household head has a higher educational level. Does this mean that university professors in Morogoro and hospital doctors in Mbeya owned more cattle than people who had not had any tertiary education? Possibly so because they might be better able to understand the market situation and the value of milk as a commodity, and they would also probably have more money to invest in cattle, to purchase inputs and to hire labour. Comparing inputs, the tendency is largely similar to that concerning income classes; all households belonging to the higher education category used veterinary drugs, while feed supplements were also most common in that category (98%). The same applies to crop residues (74%) and technical advice (98%). However, no clear tendency is evident regarding the use of urban waste and the practice of zero-grazing.

It is also interesting to examine whether there are differences in the tendency to keep livestock in relation to the gender of the household head (Table 5.10). In total there were 105 female-headed households of which 28 kept improved cattle. Hence, compared with male-headed households, the share of this group was smaller but the average number of animals was similar. Their smaller representation in the two other groups (goats/sheep and local chickens) indicates a general trend towards female-headed households but is insufficient to draw any definitive conclusions.

Table 5.10 Average numbers of livestock, by gender of household head and by type of livestock

Sex of household head: / Type of livestock	Male (N=503)	Female (N=105)
Improved cattle		
- households keeping improved cattle	178	28
- % of households keeping improved cattle	35.4	26.7
- average no. per keeping household	3.4	3.3
Goats/sheep		
- households keeping goats/sheep	71	3
- % of households keeping goats/sheep	14.1	2.9
- average no. per keeping household	7.5	4.3
Local chickens		
- households keeping local chicken	59	6
- % of households keeping local chickens	11.7	5.7
- average no. per keeping household	12.3	12.1 (43.5)*

* One household kept 200 chickens which increased the average to a value of 43.5.
Source: Survey data 2000.

A similar comparison was made for the use of inputs (Table 5.11). Compared with the male-headed households, a smaller share of the female-headed households who kept livestock used such inputs. This is true for all types of animals. The only exception is urban waste, usually provided free of charge, where their share is clearly higher, either for all livestock or for improved cattle alone. The main explanation is that most female-headed households belong to the lower-income class and cannot afford inputs as easily as households from the higher-income classes.

Table 5.11 Use of inputs for livestock, by gender of household head

	All livestock		Improved cattle	
	male	female	male	female
Households keeping animals (=N)	303	50	178	28
Type of input				
- zero-grazing (%)	53.5	50.0	89.3	89.3
- veterinary drugs (%)	85.5	76.0	93.3	82.1
- feed supplement (%)	82.5	74.0	92.1	82.1
- urban waste (%)	46.2	62.0	52.8	71.4
- crop residues (%)	52.1	50.0	61.2	60.7
- technical advice (%)	90.4	72.0	96.1	78.6

Source: Survey data 2000.

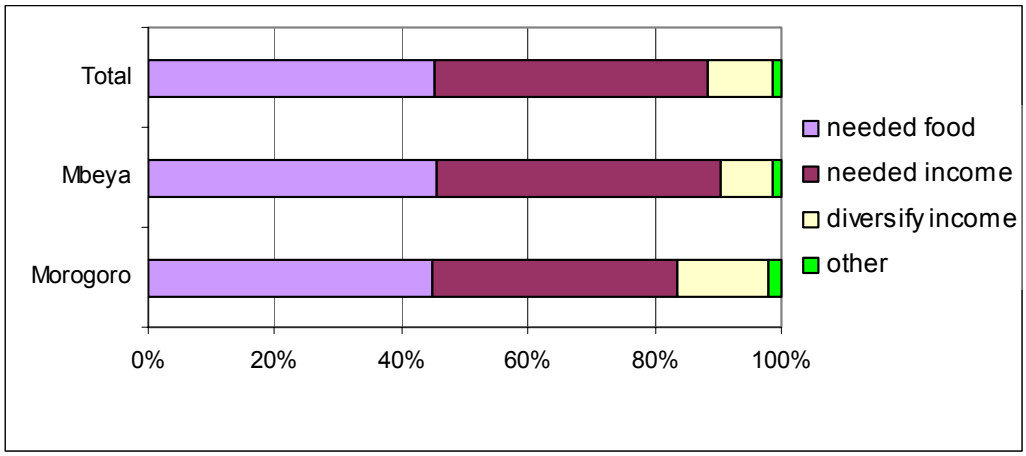
Perceived advantages and obstacles

Raising livestock in town has several well-defined advantages but farming households face severe problems in the production process and are damaging the environment.[5] Why do urban dwellers raise livestock? The provision of food and the generation of income were the two most frequent answers given by the households concerned and were mentioned by almost nine out of every ten respondents (Figure 5.1). In the current economic climate and with a lack of alternative ways to increase their incomes, raising livestock has enabled urban dwellers to provide for their basic needs. Besides providing food for the family, the money earned by selling animals and/or livestock products diversifies and increases their income, enabling the household to purchase food, pay school fees, build or renovate the house, invest in other economic activities and expand their farming activities. The difference between the towns (see Table A5.5, Annex 5) is the slightly higher importance given to income generation by Mbeya residents.

[5] The environmental aspects of urban livestock keeping are dealt with in Chapter 7.

However, this propensity was greater when the household was asked for one *major* reason for keeping livestock (Table A5.6). If we add up all the different (major) reasons in which income is mentioned, income needs were considered by over half of Mbeya households as the most important reason, while food needs appeared in 46% of the responses. Although the difference is insignificant, food needs were more often perceived by Morogoro residents as the major reason for keeping livestock (54%), closely followed by those stressing income needs (51%).

Figure 5.1 Reasons to keep livestock, by town and in total (%)



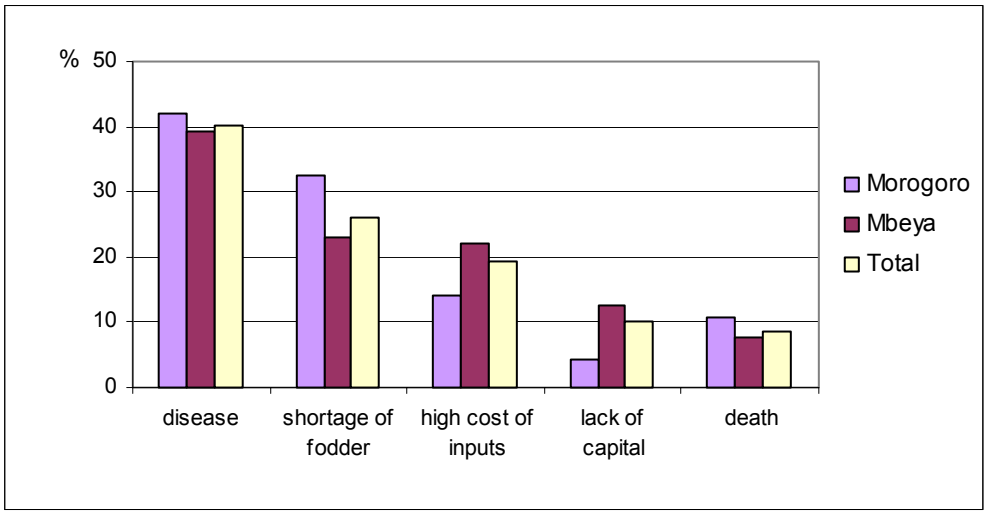
Source: Survey data 2000.

Besides food and income, urban livestock keeping provides employment for the owners of the livestock, for hired labour and for people in other economic sectors linked to the farming sector. Another advantage is the provision of manure for crop cultivation. It was reported in Chapter 4 (Table 4.8) that the latter practice was particularly common in Mbeya, where more than 60% of the crop cultivators used manure as fertiliser input. To sum up, livestock production is an employment-, income- and food-generating activity as well as an input supplier, that is well embedded in the urban economy.

Livestock keeping is not free of problems and obstacles to efficient production. Table A5.7 in Annex 5 provides details of the various constraints mentioned by urban livestock keepers. Figure 5.2 below shows the five most frequently cited problems. Obviously, several households faced more than one problem. Although about one sixth of the households reported that they had not encountered any problems, it is clear from the figures that animal-health problems were the greatest concern for farmers. Moreover, it was the most frequently mentioned *major* problem as well, reported by over a quarter of the respondents (Table

A5.7). Shortage of fodder (including a shortage of pasture and seasonal fodder problems) was the second most frequently stated constraint. The cost of inputs, such as animal feed and veterinary drugs, was also a problem referred to by one fifth of the livestock-keeping households in the main survey and repeatedly mentioned in the in-depth survey. Shortage of fodder was more of a problem in Morogoro than in Mbeya, which could well be due to Morogoro's drier climate. In Mbeya, on the other hand, costs of inputs and lack of capital were more serious constraints than in Morogoro. Some problems appeared to be more specific to large livestock, such as shortages of pasture and forage, while others, such as disease and the cost of inputs, were characteristic of all types of livestock. Finally, animal deaths were mentioned by almost 10% of those interviewed in the survey. This problem was voiced more frequently in Morogoro where various respondents said their animals had been poisoned.

Figure 5.2 Most frequently mentioned problems concerning livestock keeping in town, by town (%)



Source: Annex 5, Table A5.7.

An issue that was raised by farmers but that did not receive the expected emphasis in the survey responses (only 5.4%) was the price of milk or, more generally, 'poor market for animal products'. Overproduction of milk, which has little or no shelf life, led to a fall in the price of milk and restricted dairy production. The market for such products has yet to be developed so overproduction is a constant worry for dairy farmers. The in-depth interviews indicated that there were early signs of similar problems arising in the poultry sector. According to farmers, the price of animal products was low while the price of inputs was high.

* * *

This chapter and the previous one both show that urban crop cultivation and urban livestock keeping are major elements in the livelihood strategies of households in Tanzanian towns. The two main reasons for these activities in town are the provision of food and income, with the food element being more important in crop cultivation, while the income aspect is of comparatively greater significance for livestock keepers. The following chapter deals with these two points in more detail.

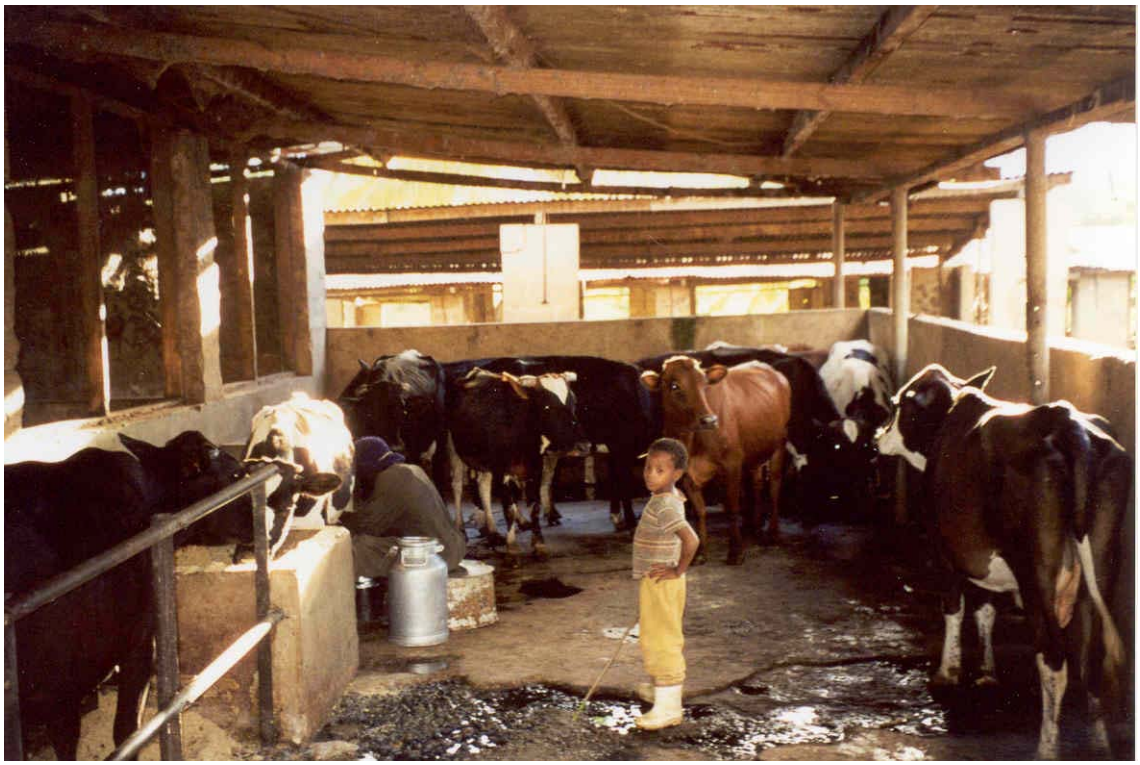


Photo 3 Commercial dairy cattle and pigs farm at the edge of a high-density area in Morogoro

6

Food and income

This chapter discusses the importance of urban farming to a number of aspects of household food security and income generation. The first section deals with the question of how urban farmers perceive the importance of their urban farming activities in terms of food and income. The second section looks at the importance of urban crop cultivation as a source of food and income and the third section does the same for urban livestock keeping. The fourth section considers *rural* sources of food and income for urban households, which in practice means having access to a rural plot and using it to generate food and/or income.[1] The last section provides insight into how the respondents perceived their own food-security situation.

Perceived importance of urban farming

Respondents were asked how they perceived the importance of their agricultural activities in town in terms of food and income. Detailed figures are presented in Table A6.1 (Annex 6), while Table 6.1 provides a summary. Urban crop cultivation is above all a source of food and this appeared to be the case for almost all the crop cultivators in both towns.[2] Almost 60% of the crop cultivators even considered their crop cultivation activities in town as their *major* food source. Yet quite a number of households sold some of the crops they produced, This was more common in Mbeya (41%) than in Morogoro (23%). For almost 10% of

[1] This has been a little-studied topic. The first findings from an ongoing study in Nakuru, Kenya, convincingly show the importance of access to rural land for the food security of urban households (see Owuor 2003).

[2] When the categories 'could not survive without it', 'food source' and 'food and income source' were added up.

the crop cultivators in both towns, crop cultivation was even seen as a *major* income source, indicating that the income generated from selling crops was considerable for these people. For another 10%, and again in both towns, crop cultivation was so important that they 'could not survive without it'. At the other end of the scale, six households (five of which were in Morogoro) admitted that they could manage without this economic activity.

Table 6.1 Importance of urban farming, by type of farming and by town (%)

		Morogoro	Mbeya	Total
Urban crop cultivation	*(N=)*	*(243)*	*(194)*	*(437)*
could not survive without it		9.9	8.2	9.2
food source		65.4	50.0	58.6
income source		3.3	0.5	2.1
food and income source		19.3	40.7	28.8
could do without it		2.1	0.5	1.4
Total		100	100	100
Urban livestock keeping	*(N=)*	*(114)*	*(239)*	*(353)*
could not survive without it		7.9	9.3	8.8
food source		23.7	21.1	21.9
income source		38.6	17.3	24.2
food and income source		28.1	52.3	44.4
could do without it		1.8	0.0	0.6
Total		100	100	100

Source: Annex 6, Table A6.1

The figures in Table 6.1 show that livestock keeping in town is both a food source and an income source, but its combined importance was more important in Mbeya than in Morogoro. Still, livestock keeping on a purely commercial basis was more common in Morogoro (39%) than in Mbeya (17%). However, the percentage of livestock keepers for whom selling livestock and livestock products was their *major* income source was somewhat higher in Mbeya (Table A6.1). As with crop cultivation, about 9% of the livestock keepers were completely dependent on this activity because they 'could not survive without it'. Only two households (in Morogoro) said they 'could do without it'.

'Importance of crop cultivation' and 'importance of livestock keeping' were further cross-tabulated with 'household income', 'household size' and 'sex of household head' to find out whether the food component was more important for low-income households, bigger households and female-headed households, respectively (see Table A6.2 in Annex 6). It turned out that there were almost no differences between the various categories. The percentage of households for whom urban crop cultivation and livestock keeping was a food source, an income

source or both was about the same in all categories. The only noteworthy finding was that the percentage of female-headed households that 'could not survive without urban crop cultivation' was twice as high as among the male-headed households. That was not the case for livestock keeping, indicating that crop cultivation in town is more important for female-headed households than livestock keeping. Crop cultivation and/or livestock keeping being a *major* or an *additional* source of food or income revealed only one weak relationship, namely between crop cultivation being a major food source, on the one hand, and household cash income, on the other. For 70% of the low-income group (<50,000 Tsh/month), crop cultivation was a major food source, compared with 44% in the high-income group (>90,000 Tsh/month).

Crop cultivation as a source of food and income

The importance of crops cultivated in town for subsistence purposes is obvious. Maize and rice were of particular relevance in Morogoro and maize and beans in Mbeya because 'they are staple foods in this town' as many respondents in the in-depth survey said. Also important were vegetables (amaranth or *mchicha* in particular) in both towns, cassava in Morogoro and Irish potatoes in Mbeya. However, most crop-cultivating households cannot consume their crops throughout the year, either because the produce is insufficient or because of a lack of storage facilities. Most households indicated that, especially during harvesting, their crop-cultivating activities were helpful in solving food problems, although several respondents in Morogoro said that they benefited from them at all times of the year.

An attempt has been made to estimate the contribution of the major staple foods produced by the urban crop cultivators to the households' energy requirements. The underlying idea is that a certain number of kilocalories are required on a daily basis to maintain the human body, and the question is how many of these are produced in urban gardens. For this purpose, a calculation was made of the aggregate energy yield produced by urban farming and the total energy needs of the urban population. It should be pointed out that the population's diet is not based only on the crops investigated in this study; thus the remaining kilocalories need to be derived from other crops and from livestock. Moreover, this calculation refers only to direct consumption needs and not to other human needs. At the outset, a number of assumptions were made:

1. Daily human needs are assumed to be 2,200 kcal, a figure that presents an average that cancels out differences in age, weight and consumption patterns.

2. The energy yield of every kg of production of a specific crop is similar regardless of the quality of the produce.
3. The total production represents an annual average yield. There is no annual variance.
4. There are, on average, 5.4 and 6.1 persons per household in Morogoro and Mbeya, respectively (see Chapter 3).

A number of variables must be incorporated in the assessment. First, there are those related to levels of production, or the output per crop. Second, food-generating activities may dominate urban agricultural production but there are additional forms of social production (giving away food) and commercial production. Differential estimates are therefore required according to different levels of self-consumption. Tables 6.2a (Morogoro) and 6.2b (Mbeya) present the calculation procedure incorporating the different steps taken to assess the energy yield based on the main crop production, for both towns. In the course of these steps there are a number of estimates of the proportion of the total energy needs of the population that the major crops can provide.

Although the results are based on rather crude figures and should be treated with caution, the findings are remarkable. If the maize-producing households consumed all the maize they produced, their own urban maize production would contribute over 80% of their households' energy requirements. This applies to both towns. Some of the self-produced maize was given away or sold but on average 82% and 74% was self-consumed in Morogoro and Mbeya, respectively. Taking this into consideration, self-produced maize still contributed over 60% to households' energy requirements. The same calculation was made for the second important staple crop in each town, namely rice in Morogoro and beans in Mbeya. The 48 rice-producing households in Morogoro produced more than their total energy requirements. If sales are included, the contribution of their own production to their energy requirements is still very high at over 80%. In Mbeya, beans contributed only 6% of the energy requirements of the bean-producing households.

It is also possible to roughly estimate the contribution of these staple crops to the energy requirements of the whole study population and, therefore, of the whole population in the two towns (see Tables 6.2a and 6.2b, row 12). Assuming that the produce being given away or sold remains in town, the *total* produce has to be used for this estimate at town level, and not only the part that has been consumed by the household that produced it. The tables show that urban-produced maize and rice in Morogoro constituted more than three-quarters of the energy requirements of the town's population, while in Mbeya, maize and beans contributed about 50%.

Table 6.2a Contribution of urban crop production to energy requirements: Morogoro (maize and rice)

		1 no. of h'holds	2 kg harvested (average)	3 aggregate kg (col. 1*col. 2)	4 kcal/kg (from Platt 1962)	5 aggregate kcal (col. 3*col. 4)	remarks
1	maize	215	997	214355	3630	778108650	
2	rice	48	1430	68640	3520	241612800	
3	total energy produced from maize and rice					1019721450	
4	daily energy per capita					2200	
5	annual energy requirements per capita (row 4*365)					803000	
6	annual energy requirements per h'hold (row 5*5.4)					4336200	5.4 = av. h'hold size (Ch.3)
7	annual energy requirements of 215 maize-cultivating h'holds (row 6*215)					932283000	
8	annual energy requirements of 48 rice-producing h'holds (row 6*48)					208137600	
9	annual energy requirements of 300 households (row6*300)					1300860000	
						%	
10	% contribution of urban maize production to energy req., 215 maize-producing h'holds (row 1/row 7*100%)					83.5	if 100% self-consumed
	% contribution of urban maize production to energy req., 215 maize-producing h'holds (0.82*row 1/row 7*100%)					68.4	82% self-consumed
11	% contribution of urban rice production to energy req., 48 rice-producing h'holds (row 2/row 8*100%)					116.1	if 100% self-consumed
	% contribution of urban rice production to energy req., 48 rice-producing h'holds (0.72*row 2/row 8*100%)					83.6	72% self-consumed
12	% contribution of urban maize & rice production to energy req., 300 h'holds (row 3/row 9*100%)					78.4	

Average percentages self-consumed were calculated as follows:

all of it: 100%	less than half of it: 30%
most of it: 75%	only a small part: 10%
about half of it: 50%	none: 0%

Source: Survey data 2000.

Table 6.2b Contribution of urban crop production to energy requirements: Mbeya (maize and beans)

		1 no. of h'holds	2 kg harvested (average)	3 aggregate kg (col. 1*col. 2)	4 kcal/kg (from Platt 1962)	5 aggregate kcal (col. 3*col. 4)	remarks
1	maize	172	1144	196768	3630	714267840	
2	beans	89	113	10057	3390	34093230	
3	total energy produced from maize and beans					748361070	
4	daily energy per capita					2200	
5	annual energy requirements per capita (row 4*365)					803000	
6	annual energy requirements per h'hold (row 5*6.1)					4898300	6.1 = av. h'hold size (Ch.3)
7	annual energy requirements of 172 maize-cultivating h'holds (row 6*172)					842507600	
8	annual energy requirements of 89 bean-producing h'holds (row 6*89)					435948700	
9	annual energy requirements of 308 households (row 6*308)					1508676400	
						%	
10	% contribution of urban maize production to energy req., 172 maize-producing h'holds (row1/row7*100%)					84.8	if 100% self-consumed
	% contribution of urban maize production to energy req., 172 maize-producing h'holds (0.74*row 1/row 7*100%)					62.7	74% self-consumed
11	% contribution of urban bean production to energy req., 89 bean-producing h'holds (row 2/row 8*100%)					7.8	if 100% self-consumed
	% contribution of urban bean production to energy req., 89 bean-producing h'holds (0.83*row 2/row 8*100%)					6.5	83% self-consumed
12	% contribution of urban maize & bean production to energy req., 308 h'holds (row3/row9*100%)					49.6	

Average percentages self-consumed were calculated as follows:

all of it: 100%	less than half of it: 30%
most of it: 75%	only a small part: 10%
about half of it: 50%	none: 0%

Source: Survey data 2000.

Regarding *income generation* it is clear that quite a number of the crop cultivators sold part (and some even all) of their produce, thus earning an income from it. As for the most important crop, maize, almost a third of the maize-growing households sold part of their crop, but usually not more than half of their total production. Other crops were sold as well but usually by a (small) minority of crop cultivators. Income generation from crops is naturally seasonal. During harvesting months, many cultivators are forced to sell part of their harvest, so prices tend to be low. The crops of those with storage facilities, however, can fetch a better price when demand is higher. As one respondent in Morogoro explained: "When crops are scarce, prices for crops go up and when the farmers sell their crops they get a lot of money."

The money earned from selling crops was used for household expenditures like food, clothing, health costs and children's education, as well as for preparing the farm for the next agricultural season. However, many more respondents in Mbeya than in Morogoro mentioned only the buying of food. From our data there appeared to be no relationship between the way the money was spent, on the one hand, and the person in the household who kept the money from the crop sales (the husband, the wife or both), on the other. Yet, it was conspicuous that in Mbeya it was mostly the wife who kept the money from crop sales, while in Morogoro it was either the husband or the husband and wife jointly. According to one respondent in Morogoro, however, this can make a difference: "Money obtained by selling crops is kept by either mother or father, but women keep the money properly without misusing it as compared to men."

Livestock keeping as a source of food and income

As shown in Chapter 5, animals are an important *food source*. Cattle (milk) and chickens (eggs, meat) are particularly important food sources for town dwellers. As one respondent in Morogoro explained: "Important are cattle, which provide milk (…), and chicken whose meat is used in preparation of chicken chips which are eaten by many people in this town." Many respondents stated that livestock was important as a food source throughout the whole year. Yet as with crop cultivation but to a lesser degree, there are seasonal fluctuations. According to a respondent in Mbeya, "during the cold season the chickens lay few eggs (…), during the rainy season there are many ticks causing diseases [while] during the dry season the availability of animal feeds is difficult." Many other respondents also mentioned feed problems in the dry periods and diseases in the rainy seasons.

An option when assessing the contribution of livestock production to the food needs of the urban population is to estimate milk production, since milk is an

important commodity in urban markets. The underlying idea is that a certain quantity of milk is consumed by households on a daily basis and the local production system is geared towards that purpose. To work out roughly how much milk is produced in the urban area, a calculation has to be made of the aggregate yield produced by urban dairy-cattle keepers. A number of simple assumptions have to be made at the outset:

1. One head of dairy cattle produces six litres of milk per day and has an eight-month lactation period (240 days).
2. Although there is a periodical change in the number of cattle during the year, the total at the end of the year is taken as the yardstick.
3. The percentage of self-consumption is based on the average reached in the sample survey.

Table 6.3 presents the method of calculation, including the different steps taken to assess the annual milk yield for both towns. In the course of this process, a number of estimates were made of the total periodic milk consumption of households that kept dairy cattle. Despite the fact that the Mbeya farmers produced 60% more milk than their Morogoro colleagues, and total milk consumption there is 75% higher, the annual and daily amounts of milk consumed per household and per member of households keeping improved breeds appeared to be higher in Morogoro (1.7 litres per household member per day) than in Mbeya (1.0 litre). This is not surprising if we remember that the number of dairy cattle per cattle-keeping household was higher in Morogoro. These figures are too high, however, because the calculation did *not* take into account that not *all* improved cattle were milk-producing cows. Nevertheless, the figures do indicate that milk consumption in the households with improved cattle was substantial.

A rough estimate of the annual milk consumption from urban milk production per year for the towns' total populations can also be made. Again, we refer to Table 6.3 that shows a total annual milk production of 384,480 litres in Morogoro and 624,960 litres in Mbeya. With populations of about 228,000 in Morogoro and 266,000 in Mbeya (2002 Census, see URT 2003), that would mean only 1.7 litres/capita/year in Morogoro and 2.3 litres/capita/year in Mbeya. This implies that although the total number of improved dairy cattle is substantial in the two towns (and in Mbeya in particular), total milk production is modest when compared to the milk needs of the population.

Regarding livestock keeping as an *income source*, cattle (milk, meat) and chickens (eggs, meat) were mostly mentioned by the respondents in the in-depth survey as animals that "generate income easily", as one of them stated in Morogoro. Other animals of importance as an income source were pigs and goats, the latter being "roasted in bars and restaurants", as another respondent in Morogoro

Table 6.3 Estimate of annual milk production from urban livestock keeping, by town

		Morogoro	Mbeya	Remarks
1	number of households keeping improved cattle	60	149	
2	total number of improved cattle at end of period	267	434	
3	litres of milk/cow/day	6	6	Mlozi & Hella 2001
4	litres of milk/day (row2*row3)	1602	2604	
5	lactation period (days/year)	240	240	Mlozi & Hella 2001
6	litres of milk/year (row 4*row 5)	384480	624960	
	Households with improved cattle:			
7	% self-consumed	52	56	see below
8	litres consumed per year (row 6*row 7/100)	199930	349978	
9	litres consumed per household per year (row 8/row 1)	3332	2349	
10	litres consumed per household per day (row 9/365)	9.1	6.4	
11	average household size (no. of members)	5.4	6.2	
12	litres consumed per hh member per day (row 10/row 11)	1.7	1.0	

Average percentages self-consumed were calculated as follows:

own consumption only: 100%
mostly own consumption: 80%
both consumption and sales: 50%
mostly sold: 20%
sales only: 0%

Source: Survey data 2000.

said. Many respondents thought that livestock were a source of income throughout the year "because livestock have no season". As far as selling animals for meat is concerned, this is indeed the case. However milk sales have a seasonal pattern, as several livestock keepers remarked, but opinions differed as to the best time of year for sales. For many, the rainy season is the best period because of its abundance of feed and the dry season is less favourable for income generation because of problems with finding sufficient food for animals. On the other hand, one respondent remarked that "during the rainy season there is little milk production due to disease". And another respondent said that the dry season is good "because there is enough feed because farmers have harvested their crops". Whatever the seasonal patterns (and these may differ for individual farmers), selling milk is known to be financially rewarding, as the study by Mlozi & Hella (2001) showed.

As with crop sales, the money from selling livestock and livestock products is usually kept by the wife in Mbeya households and more often by the husband in Morogoro households. The former is interesting because from a comment made by a Mbeya respondent, one gets the impression that the perception is different: "In many families, the household head is the one who keeps the money obtained from selling animal products, though there are a few families in which the money is kept by the mother in that family." One Morogoro respondent was even clearer about this, saying that "there are few people who can allow their wives to keep money". The reality is different, as the present study shows. Moreover, as with the use of the money earned from crop sales, it made no difference regarding how the money from livestock sales was spent. Most respondents mentioned the usual household expenses ("to solve the small problems at home", as one respondent in Mbeya said). Two points were very often mentioned. The first was children's education: "the income obtained from livestock in this town [Mbeya] is used for school fees and for buying school uniforms." It is well known that many households with livestock sell off an animal in order to be able to pay their children's annual school fees. The second frequently mentioned use of money raised from livestock sales concerned the maintenance and/or development of a household's animals.

Rural food and income sources

Rural links – i.e. places where urban residents originally came from and/or have relatives, or where they may have relatively easy access to arable land – enable and even encourage people to operate agricultural activities in the rural area. Thirty-nine per cent of the households in the two towns replied positively to the question of whether they owned or used an agricultural plot outside the munici-

pal boundary. This was more common among the households in Mbeya (48%) than in Morogoro (30%). The majority of these (74%) had one plot, another 21% had two plots, while a few had three or more plots. A number of characteristics of the rural plots are presented in Table A6.3 (Annex 6), with a summary in Table 6.4 below.[3]

The majority of the rural plots were to be found in the regions of Morogoro Rural and Mbeya Rural (Table 6.4), which implies that most were located quite close to town.[4] This is due to the fact that, for instance in Morogoro, many urban dwellers buy land for farming in rural areas that can be relatively easily reached. Land is generally plentiful in Tanzania and one just negotiates with the rural owner and can then buy it. Renting land in rural areas is not common for townspeople from Morogoro. This is somewhat different in Mbeya where many urban dwellers rent land for crop cultivation. This does not mean that rural plots are not sold to Mbeya townspeople, but to a lesser extent than in Morogoro.

Two-thirds of the households with a rural plot were the owners of the plot (Table 6.4). However compared with Mbeya, this percentage was lower in Morogoro. Almost 30% of the Morogoro plots were owned by the rural family or a

Table 6.4 Summary of characteristics of rural plots, by town (%)

		Morogoro	Mbeya	Total
	(N*=)	(110)	(212)	(322)
Location of plot	Morogoro Rural	89.0	0.5	31.2
	Mbeya Rural	0.0	74.1	48.4
Ownership of plot	own land	55.7	74.8	68.3
	family land	17.0	9.2	11.9
Size of plot	up to 2 acres	32.7	64.5	53.4
	2.1-10 acres	47.2	33.5	38.3
	>10 acres	20.0	2.0	8.4
User of plot	self	97.1	97.1	97.1
Person responsible	member of urban household	87.2	84.7	85.5
Type of usage	crop cultivation only	96.3	94.7	95.3
Food or income source	as food source only	40.2	66.2	57.3
	as both food and income	58.9	28.0	38.5

* N refers to plots. For each variable, some cases were missing and have been omitted from the analysis.
Source: Annex 6, Table A6.3.

[3] The data presented in these tables relate to *all* rural plots except those of the two households with five and six plots, respectively, because plot nos. 5 and 6 were not entered into the data base.

[4] For about three-quarters of the Mbeya rural plots, distances (in classes) were recorded. It turned out that 73% of these plots were located at a distance of less than 30 km from where the owner lived.

relative living there. The size of the plots varied considerably, the smallest being less than one acre and the biggest being 800 acres (but that was an exceptional case). On average, the plots of the Mbeya households were smaller than the Morogoro plots. For instance, almost two-thirds of the Mbeya plots were less than two acres, against one third of the Morogoro plots. This is due to the greater abundance of land in Morogoro Region.

Nearly all the plots were used by the urban household (Table 6.4), not only those plots owned by the urban household but also those owned by the family or a relative living there. A few exceptions concerned plots that were used by other family members (four plots) or by somebody else (three plots), while two plots had been rented out. As for the person responsible for the activities on the rural plot, this was in most cases one of the members of the urban household. In some cases, a relative living on the plot took care of the activities or somebody was paid to do so.

The type of usage of the plots was uniform as they were overwhelmingly used for crop cultivation only (Table 6.4). Maize was the most important crop for almost two-thirds of the Mbeya plots.[5] In most cases, it was the only crop grown, although on 9% of the plots the maize was mixed with beans and sometimes with some other crop as well. Rice and beans were the second most common crops, being cultivated on about 15% of the plots. Other crops on the Mbeya plots (though few in number) were bananas (4%), Irish potatoes (3%), coffee (3%), groundnuts (3%), sunflowers (2%) and green peas (1%).

For nearly all households, the rural plot was a source of food (Table 6.4). However, for 40%, the plot was a source of income as well. This was much more important in Morogoro (59%) than in Mbeya (28%). Only 4% of the plots were used solely for income-generating purposes, all but one being in Mbeya.

Further analysis was done by cross-tabulating three plot characteristics[6] – ownership, size, and food/income source – with a number of household characteristics, namely (i) household income and size, (ii) sex, age and the level of education of the household head, and (iii) urban crop cultivator (yes/no). First of all, ownership of the rural plots was not related to any of the variables. Secondly, the size of the plot showed some link with household income and the educational level of the household head, in the sense that the bigger plots were underrepresented among low-income households and household heads with no education.[7]

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5 The types of crops grown were recorded for 80% of the Mbeya plots.

6 This could only be done for the 238 plots that were entered in the data file as 'plot no. 1'.

7 Limiting the study to the percentages of households with a rural plot of more than four acres, the figures were as follows:
- low-income (<50,000 Tsh/month) 18% versus high-income (>90,000 Tsh/month) 39%;
- no education 8% versus >secondary 43%.

The third plot characteristic (whether the plot is a source of food or income, or both) is important for the food security of the urban household. Again, there appeared to be some relationship with household income and the educational level of the household head. Although the food aspect was about the same for all income and education categories, the income element was more important for high-income households and less important for households where the head had received no education at all.[8] Interestingly, this plot characteristic showed no relationship with *urban* crop cultivation. In other words, whether the rural plot was a food and/or income source made no difference for households that were engaged in urban crop cultivation and households that were not.

Perceived level of food security

Respondents were asked what they considered to be their most important food source(s) in 1998/99: own urban production, own rural production, purchased food or food donations. A detailed overview of the answers is given in Table A6.4 (Annex 6). Table 6.5 below shows how often each of the four possible sources was mentioned. For one fifth of the households in the two towns, their urban production was *the* most important food source during that year (Table A6.4), while for another 42%, their own urban production was *among* their important food sources. In other words, two-thirds of the households mentioned their own urban production as an important food source (Table 6.5). Although not specifically asked for, 'urban production' undoubtedly refers first of all to urban crop production. It is therefore clear that the figure for Morogoro is lower than the percentage of crop cultivators there (81%, see Chapter 3). Apparently, there is a category of households in Morogoro for whom crop cultivation in town

Table 6.5 Summary of most important food sources in 1998/99, by town (number of times mentioned; %)

	(N=)	Morogoro (293)	Mbeya (297)	Total (590)
Own urban production		66.6	63.3	64.9
Own rural production		23.5	40.7	32.2
Purchased		63.1	54.5	58.8
Donations/gifts		0.7	1.0	0.8

Source: Annex 6, Table A6.4.

[8] Percentages of households for whom the rural plot was an income source as well as a food source:
- high-income 65% versus 40% of the other income categories;
- no education 21% versus 42% of the three categories with more education.

is either only marginally contributing to the household food needs, or not at all. In Mbeya, however, the percentage of households for whom their own urban production was an important food source is very much the same as the percentage of urban crop cultivators.

Almost one third (31%) of respondents mentioned their own *rural production* as an important food source (Table 6.5) and for 29% of these it was *the* most important source (Table A6.4). The two towns differ in this respect, as rural production was more often mentioned in Mbeya than in Morogoro. This is in line with the percentages having access to a rural plot and shows that for all of those who have access to this type of food source, rural crop cultivation makes an important contribution to household food security.

Although *urban*, for 'only' 59% of the households was *purchased* food an important food source (Table 6.5). A much smaller percentage (15%) depended solely on purchased food (Table A6.4). The two towns differed considerably in this respect. Compared to Morogoro, twice as many households in Mbeya depended (partly or wholly) on purchased food. This may be due to, for instance, the smaller percentage of households cultivating crops in town and the smaller size of the plots in Mbeya, possibly in relation to the somewhat larger households in town. Moreover, average household income was somewhat lower in Mbeya (Chapter 3), so the cost of travelling to rural plots was more onerous for Mbeya households than for those in Morogoro. Finally, five households mentioned *donations/gifts* as an important source of food. For one of them, it was even *the* most important source.

Again, a cross-tabulation was carried out with a number of household characteristics (household income, household size; sex, age and education of the household head) thought to possibly influence food sources. None of the characteristics showed any relationship with the source of food. However, other household characteristics – namely whether urban and/or rural farming was undertaken – *did* influence the source of food (Table 6.6). For 85% of the *urban crop cultivators*, their cropping activities in town constituted an important food source. For non-cultivators, this was 13%. At first sight, the latter figure may look surprising but it is possible that these respondents were referring to livestock as a source of food (for example, milk). Not surprisingly, urban production was very important for *urban farmers* (i.e. the group of urban crop cultivators and the group of urban livestock keepers together). For 80% of the *rural crop cultivators*, their rural production was an important food source.

Three other observations can be made from Table 6.6. Firstly, as suggested earlier in this chapter, urban livestock keeping had little effect on the importance of the various food sources. Secondly, the (49) people who did *not* farm in town

Table 6.6 Most important food sources, by household farming characteristics (number of times mentioned; %)*

		(N)	Urban production	Rural production	Pur-chased
Urban crop cultivator?	yes	(426)	84.7	24.2	54.9
	no	(164)	13.4	53.0	68.9
Urban livestock keeper?	yes	(340)	63.2	29.7	59.4
	no	(250)	67.2	31.6	58.0
Urban farmer?	yes	(541)	70.8	27.9	59.0
	no	(49)	0.0	79.6	57.1
Rural crop cultivator?	yes	(239)	44.4	79.5	46.9
	no	(351)	78.9	0.0	67.0

* Missing cases have been omitted from the analysis.
Source: Survey data 2000.

relied relatively more heavily on rural food sources than people who did farm in town, and vice versa; a finding that suggests that there is some degree of substitution between urban and rural crop cultivation.[9] And thirdly, crop cultivators, whether urban or rural, had to purchase food somewhat less frequently than non-cultivators. Further analysis by town revealed that these patterns were the same for the two towns.

The respondents were also asked whether they had always had enough to eat in 1998/99. This variable can be considered as an indication of household food security in the year prior to the survey. Table A6.5 provides a full overview of the answers, while Table 6.7 below presents a summary. Taking the two towns together, 60% of the households always had enough to eat that year. In other words, 40% did not. The two towns differed considerably in this respect, i.e. the

Table 6.7 Summary of "Did you always have enough to eat in 1998/99?", by town (%)*

(N=)	Morogoro (296)	Mbeya (301)	Total (597)
Yes, always	45.3	74.1	59.8
About half of the time or less	35.2	14.9	25.0

Source: Annex 6, Table A6.5.

[9] However, as mentioned above, we also found that there was no relationship between whether urban crop cultivation was undertaken or not, on the one hand, and the rural plot being a source of food/income, on the other. We have no ready explanation for this seeming discrepancy.

percentage of households having experienced food shortages was much higher in Morogoro (55%) than in Mbeya (26%). Quite serious food shortages can be said to have occurred in those households stating that they had had enough to eat at most about half the time. This occurred in 35% of the Morogoro households and in 15% of Mbeya households.

Further analysis of this measure of the level of household food security was remarkable. At the level of the whole study population, i.e. the two towns taken together, hardly any relationship with the various household characteristics could be established. However, Table A6.6 (Annex 6) reveals that, at town level, this appeared only to be the case for households in Mbeya. In Morogoro, the food security level seemed (as with other variables) to be positively influenced by household income and the educational level of the household head. An interesting finding was the relatively high level of food security among the very large households (i.e. those with ten or more members) in Morogoro, all the more so as in Mbeya it seemed to be the other way around.

Does urban farming have a positive impact on the perceived level of food security? As Table 6.8 shows, the answer for Mbeya is 'no' (at least for this very crude measure), because the percentages of households answering 'yes, always' is the same for urban farmers and urban non-farmers. In Morogoro, however, there seemed to be a relationship with livestock keeping in town (and not with crop cultivation in town, as with the sources of food in Table 6.6). Compared

Table 6.8 "Did you always have enough to eat in 1998/99?", by household farming characteristics and by town (%)*

		Always enough to eat?					
		Morogoro			Mbeya		
		N (=100%)	yes, always	half the time or less	N (=100%)	yes, always	half the time or less
Urban crop cultivator?	yes	(241)	45.6	33.2	(192)	75.0	17.2
	no	(55)	43.6	43.6	(109)	72.5	11.0
Urban livestock keeper?	yes	(112)	65.2	19.6	(232)	74.6	15.1
	no	(184)	33.2	44.6	(69)	72.5	14.5
Urban farmer?	yes	(268)	47.0	33.2	(280)	73.9	15.7
	no	(28)	28,6	53,6	(21)	76.2	4.8
Rural crop cultivator?	yes	(88)	47.7	35.2	(150)	76.7	13.3
	no	(208)	44.2	35.1	(151)	71.5	16.6

* Missing cases have been omitted from the analysis.
Source: Survey data 2000.

with crop cultivation, livestock keeping is of a more commercial nature and food can be purchased with the money obtained from selling livestock and livestock products (see also below).[10] Finally, *rural* crop cultivation seemed to have no impact at all on food security levels, at least not during the year under review.

Those households that had faced a food shortage in 1998/99 were asked how they had coped. Various methods had been employed, as can be seen in Table A6.7 (Annex 6), while Table 6.9 below provides a summary. Most households (75%) had been able to purchase the food they needed, while another 9% practised this coping strategy in combination with other measures. A minority (12%) became involved in some small-scale business (Table 6.9). There was also a category, however, that received food from relatives in order to overcome their problems. Opportunities to increase crop cultivation in town were apparently very limited, as only three households were able to do so. Finally, there were two households who admitted that they had gone without food now and then, which shows that they had not been able to pursue any of the coping mechanisms described above. The ways the food-deficit households coped with food shortages differed substantially between the two towns (Table 6.9). The large majority in Morogoro were able to buy the food they lacked. In Mbeya, however, many did not have the ready cash and were forced to engage in some small business activity so as to be able to buy the food they required. Almost one fifth of the Mbeya households were (wholly or partly) dependent on donations from family members.

Finally, the respondents were asked how they thought their food situation could be improved.[11] A detailed list of all answers is presented in Table A6.8

Table 6.9 Summary of "How did you cope with food shortages?", by town (number of times mentioned; %)*

(N=)	Morogoro (152)	Mbeya (65)	Total (217)
Purchased food	94.7	59.9	84.3
Undertook small-scale business	2.6	32.3	11.5
Received donations from children/relatives	2.6	18.4	7.3

* Missing cases have been omitted from the analysis.
Source: Annex 6, Table A6.7.

[10] Keeping livestock is usually described as *mradi wa ng'ombe* in Swahili, meaning 'a cattle project'.

[11] Strictly speaking, this question was to be answered only by the 217 households who had "not always had enough to eat in 1998/99". However, for 42 of these, no answer was recorded. On the other hand, 162 of the households that had "always had enough to eat in 1998/99" nevertheless thought that their food situation could be improved, so they answered the question. In total, therefore, 337 households gave a reply to this question. Although we cannot say whether this group is representative of the whole study population, the findings are interesting enough to be presented.

(Annex 6). The answers have also been grouped in broader categories and are shown in Table 6.10. The most noticeable observation from both tables is that, with only a few exceptions, all respondents were referring to their own farming activities in town and not to any general measures that could be taken by the (local) authorities. A second general observation is that people either referred to farming in general or to crop cultivation. Livestock keeping is mentioned only by a few, although "borrow money/find capital" could be interpreted as obtaining money to invest in livestock. Despite this latter point, it again appears that livestock are seen more as an investment than as an important source of food.

Table 6.10 Summary of "How to improve your food situation?", by town (number of times mentioned; %)*

(N=)	Morogoro (184)	Mbeya (153)	Total (337)
Farming (in general)	47.3	60.1	53.2
Crops: inputs/techniques	39.7	48.0	43.7
Money/capital	20.1	45.0	31.3
Farm management	26.6	9.2	18.7
Advice/assistance	14.0	10.5	12.5
Storage	9.8	2.0	6.2
Livestock	1.6	6.5	3.9
Other	2.1	0.7	1.5

* Missing cases have been omitted from the analysis.
Source: Annex 6, Table A6.8.

The most frequently mentioned individual answer was "cultivate more land" either in town or in the rural areas (40% of respondents; see Table A6.8). When asked how much land they would need, replies varied considerably, from one to no less than 100 acres. In general, Mbeya households were somewhat more modest in this respect: one third would be happy with one or two acres; in Morogoro this applied to one sixth of the households. This difference is likely to be related to the higher population density in Mbeya as compared to Morogoro, in town as well in the surrounding rural areas, but could also be connected with the relatively easier access to land in Morogoro.

The second most mentioned answer had to do with lack of money (Table A6.8). For more than a quarter of the respondents, this was an obstacle to improving their food situation, though much more so in Mbeya (36%) than in Morogoro (19%). For many respondents (44%), one of the ways to enhance the household's food situation was to increase crop cultivation, either by using (all

kinds of) chemical inputs or by improving farming techniques. Management practices could apparently also be improved, especially in Morogoro (25%). Finally, relatively few respondents saw a clear role for agricultural and livestock extension officers.

* * *

Although this is an urban study, quite a number of the households in the two towns appeared to be living off farming alone. In Mbeya, this applied to one third of the population, with livestock keeping being the dominant activity. For over half of the households in the two towns, urban crop cultivation was a *major* source of food. Looking at it from another angle, Morogoro appeared to be roughly 75% self-sufficient regarding the supply of the two basic staple crops (maize and rice), while the concomitant figure for Mbeya was 50% (maize and beans). Nevertheless, in qualitative terms, the perceived level of food security appeared to be higher in Mbeya than in Morogoro.

Photo 4 Crop cultivation at the edge of a high-density area in Morogoro

7

Environmental issues

Urban farming is often considered to negatively affect the urban environment. Livestock keeping in particular is seen by many as a menace because it generates waste, smells, noise and health risks, and spreads disease. Crop cultivation is usually felt to be less damaging to the urban environment, although many regard the use of chemical inputs as harmful to the air, soil and groundwater. Other often-mentioned environmental issues related to urban crop cultivation are erosion (especially on slopes), the use of untreated sewage water for irrigation, crop pollution due to exhaust fumes (especially in crops cultivated along the sides of roads) and the spread of malaria (from mosquitoes breeding in maize stalks). A further important environmental issue concerns the recycling of organic matter in the urban agricultural sector. For instance, are urban waste and crop residues being used as inputs for crop cultivation as well as livestock keeping? Is the waste from animals kept in town being used for crop cultivation? In considering these points, we first discuss crop cultivation and then livestock keeping.

Crop cultivation

Awareness of environmental damage

Around a third of the surveyed crop cultivators in Morogoro and Mbeya were aware that their activities might be harming the urban environment (see Table 7.1). In other words, the majority of crop cultivators were *not* aware of the potentially damaging implications of their activities. The ones who were aware were asked what type of damage their activities might be causing. A wide range of answers was given (see Annex 7, Table A7.1). Table 7.1 shows the most frequently mentioned answers. ‘Erosion’ was mentioned by over half of the

respondents but the two towns differed considerably in their replies. Morogoro is a largely flat area, except on the southern side where the town stretches out up the lower slopes of the Uluguru Mountains. Mbeya, on the other hand, is located in a hilly area where erosion is far more of a concern than it is in Morogoro. 'Deforestation' was mentioned by a quarter of the respondents, with little difference between the two towns. Other types of damage were mentioned by less than 10% of the respondents.

Table 7.1 Urban crop cultivators: awareness of damage to the urban environment (% yes)

		Morogoro	Mbeya	Total
		(N=240)	(N=189)	(N=429)
Aware of damaging the urban environment		33.3	39.2	35.9
		(N=78)	(N=70)	(N=148)
Types of damage	erosion	28.2	81.4	53.4
	deforestation	30.8	20.0	25.7
	overcropping/loss of fertility	16.7	0.0	8.8
	environmental degradation	10.3	2.9	6.8
	environmental pollution	6.4	5.7	6.1
	mosquitoes in crops	5.1	7.1	6.1
	crop residues piling up/causing fires	11.6	0.0	6.1

Source: Annex 7, Table A7.1.

When asked which crops cause degradation of the urban environment, most respondents in the in-depth survey mentioned tall crops such as maize, bananas and sugar cane because "such crops form bushes in which thieves can hide". Several respondents specifically blamed maize "because it is where mosquitoes lay their eggs". A few people mentioned fruit trees and perishable crops such as vegetables because of the bad smell these plants give off when rotting. There was a marked difference between the respondents in Mbeya and those in Morogoro as far as environmental problems due to crop cultivation were concerned: almost 40% of the respondents in Mbeya felt that "no crops bring environmental degradation in the town", while in Morogoro only one person (4%) said so. This may (again) be related to the fact that crop cultivation is much more common in Morogoro than in Mbeya.

The complaint that is often heard by policy makers about chemicals used by urban crop cultivators was mentioned by only a few respondents in the main survey (Table A7.1 in Annex 7). It is not clear, however, whether those mentioning 'environmental destruction', 'environmental pollution', 'destruction of water sources' and 'health hazards' had chemicals and their use in mind. Only four people linked soil pollution specifically to the use of chemical fertilisers.

Nine other respondents perceived the breeding of mosquitoes in crops as one of the hazards of urban crop cultivation. Finally, there were two types of damage that were mentioned by various crop cultivators in Morogoro but by no one in Mbeya: overcropping/loss of fertility and the piling up of crop residues. The latter leads to environmental problems because the residues are usually subsequently burnt and the smoke can be a menace to the neighbourhood.

A third of crop cultivators claimed that they took precautions to minimise any potential environmental damage their activities might cause (Table 7.2). Those who took measures were not necessarily the same people who said 'yes' to the question about awareness, although it is not surprising that the large majority of the latter *were* the ones taking measures to protect the environment. Interestingly, however, there was a group who were *aware* of the potential damage but who did nothing about it (around 15% of those who claimed to be 'aware' in both towns). On the other hand, there appeared also to be a group who said they were not 'aware', but who nevertheless – and perhaps without realising it – *did* take measures not to damage the environment (8% in Morogoro and 15% in Mbeya).

The various measures most frequently taken are presented in Table 7.2.[1] However, two stood out, namely measures against soil erosion, and tree planting (which can also be regarded as a measure against soil erosion). Measures against soil erosion include the building of terraces, the practice of contour farming, constructing ridges, and protecting slopes either by using them only as pasture or by not planting crops there. Not surprisingly, measures against soil erosion were more seriously adopted in hilly Mbeya.

Table 7.2 Urban crop cultivators: measures taken to protect the urban environment (% applying)

		Morogoro	Mbeya	Total
		(N=240)	(N=189)	(N=429)
Measures against damage by crop cultivation		33.3	42.1	37.2
		(N=78)	(N=80)	(N=158)
Types of measures	measures against soil erosion*	20.5	82.5	51.9
	tree planting	56.4	41.3	48.7
	mixed cropping/crop rotation	15.4	0.0	7.6
	proper farming systems	11.5	1.3	6.3
	use of organic/farmyard manure	3.8	8.8	6.3

* Construction of terraces, contour farming, the construction of ridges and the protection of slopes by using them only as pasture or avoiding planting there.
Source: Annex 7, Table A7.1.

[1] See Table A7.1 in Annex 7 for a complete overview.

A number of other measures were mentioned as well (Table A7.1). Three of these were only or mostly mentioned by cultivators in Morogoro, such as 'mixed cropping/crop rotation', 'proper farming systems' and 'control/avoid fire'. The first two concern measures aimed at maintaining the level of productivity without putting too much pressure on the environment. As regards the measures taken against fire, almost 10% of the Morogoro crop cultivators mentioned this as a measure aimed at limiting environmental damage. This is undoubtedly related to the above-mentioned problem of crop residues piling up and the eventual need to burn them.

An attempt was made to assess the factors determining the awareness of and measures being taken against damage due to crop cultivation in town. An overview is presented in Table A7.2 (Annex 7). First, two household characteristics are presented: housing density and monthly household income. *Housing density* can first of all be seen as a purely geographical variable: people living in close vicinity to each other may be more aware of environmental damage and more inclined to take measures against it than people with more space around them. This seems not to be the case, as in both Morogoro and Mbeya awareness was no greater in high-density areas than in medium- and low-density areas. On the contrary, in Morogoro, awareness seemed to be greater among households living in the *low*-density areas (although the number of cases is actually too small to draw a conclusion). The latter observation may also be related to another interpretation of the housing density variable, namely as an indicator of the household welfare level: households with a higher income may have a greater awareness and be more inclined to take measures to protect the environment. However, this is not confirmed by the *monthly household income* variable. Except for the higher awareness among the high-income households in Mbeya, there seems to be no relationship at all.

Three characteristics of household heads were investigated: sex, age and educational level. As for the household head's *sex*, men score on the whole somewhat higher on both awareness and measures taken, but the differences between them and female household heads are small. The household head's *age* also has no bearing on environmental awareness: about a third of the household heads young and old in Morogoro and slightly more in Mbeya were aware of potential damage to the environment and/or were taking measures to prevent it. Finally, the *educational level* of the household head shows an interesting pattern. In Morogoro, it made no difference how well the household head was educated, although, surprisingly, the best-educated heads scored somewhat lower than the others. In Mbeya on the other hand, the figures show more or less the picture one would expect: the higher the educational level, the higher the awareness and the inclination to act.

Finally, two variables at the farming level were looked at: the person responsible for crop cultivation[2] and whether or not technical assistance was received and if so, from whom. As for the *person responsible*, there seems to be little difference whether it is the household head or the spouse responsible. However, the two towns again show a different picture. In Morogoro, there is a somewhat higher level of awareness among the household heads compared to the spouses, but in Mbeya it is the other way around. Yet, any differences are too small to allow definite conclusions to be drawn. As for *technical assistance*, one might expect farmers who received assistance to be more aware of and to take more measures against environmental damage than those *not* receiving assistance. However, the figures show that it made no difference at all. We also looked at the source of assistance, i.e. professional (extension officer, programme, institution)[3] or non-professional (neighbour, relative, friend, family member). Once again, there were no differences between the categories.

Use of inputs

As mentioned in the introduction to this chapter, local authorities and policy makers often consider the use of chemicals and sewage water for crop cultivation as serious environmental problems. In Chapter 4, we saw that the use of chemical inputs – such as chemical fertilisers, pesticides and insecticides – in Morogoro is not very common but that in Mbeya their use is more widespread. The same can be said about such environmentally friendly inputs as manure and crop residues. The use of urban waste and of sewage water was so limited (four cases and one case, respectively, all in Mbeya) that these have not been included in the analysis. In this section, we try to trace the factors behind the use of certain inputs, using the same variables as in the previous section. Table A7.3 (Annex 7) offers a complete overview and reveals that the *sex of the household head* and the *person responsible* make no or negligible difference regarding the use of inputs. However, it seems that all the other variables do matter to some extent, either in one or both of the two towns. These variables are presented in Tables 7.3a (for Morogoro) and 7.3b (for Mbeya) and, for clarity's sake, all as dichotomies. We deal first with chemical inputs, followed by the organic alternatives of manure and crop residues.

As for the factor of housing density, the use of *chemical inputs* was less common in the high-density areas compared with the medium-density areas in Moro-

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[2] During the survey, the question "who was responsible for crop cultivation in 1998/99" was asked for each crop separately. Since the large majority of the crop cultivators grew maize (see Chapter 4), the "person responsible for maize cultivation" is used here as a substitute for the "person responsible for crop cultivation".

[3] Sokoine University of Agriculture in Morogoro and Uyole Agricultural Centre in Mbeya.

goro and the low-density areas in Mbeya.[4] This applies particularly to pesticides (in Mbeya) and insecticides (in Morogoro and Mbeya). Not surprisingly, the figures concerning monthly household income show more or less the same pattern as those for housing density. High-income households used more chemical pesticides and insecticides than low-income households, probably due to the costs involved. Concerning the age of the household head, particularly the older heads in Morogoro used relatively few chemical fertilisers. In Mbeya, the age of the household head seemed to play less of a role, although the use of insecticides was relatively limited among the elderly. The household head's educational level shows marked differences between the two extremes, i.e. between those who had no education at all and those who had followed post-secondary education. As far as chemical inputs are concerned, this applied particularly to the use of chemical fertilisers in Morogoro and pesticides and insecticides in Mbeya. Indirectly, this is likely to be related to household income too. Receiving technical assistance in Morogoro seems to lead to a higher percentage of crop cultivators using chemical inputs. This is most visible in the use of insecticides. The type of (professional) assistance also seems to matter in this respect. In Mbeya, there appears to be no clear relationship between assistance, on the one hand, and the use of chemical inputs, on the other. The only notable figure in Table 7.3b is the relatively high percentage using pesticides among those crop cultivators who received professional assistance.

The use of *manure* is only indirectly related to the various variables mentioned in Tables 7.3a and 7.3b, as it largely depends on whether the households concerned kept livestock.[5] However, this applies more to the crop cultivators in Morogoro than in Mbeya, except for one notable exception. Whereas 45% of those in Morogoro who received professional assistance kept livestock, only 18% of them used manure (Table 7.3a), suggesting that the professional advisers did *not* encourage the use of manure. This is an observation that is in line with the findings above regarding chemical inputs. In Mbeya, another conspicuous finding has to be mentioned. Although for all categories mentioned in Table 7.3b the percentage of urban livestock keepers is high (ranging from 69% to 83%), three relatively low percentages of households using manure can be observed, namely high housing density (55%), household head over 60 years of age (52%), and those with no education (40%) . It is very possible that these three categories are interrelated, concerning elderly household heads who had no education and who were living in high-density areas. Quite a number of these people apparently did not use the manure produced by their own animals for their own crop cultivation.

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[4] The number of cases in the low-density areas in Morogoro and the medium-density areas in Mbeya is too small to allow for comparisons.

[5] As seen in Chapter 4, the source of the manure was for 80% own production. The rest was obtained from neighbours.

Table 7.3a Morogoro: use of inputs for urban crop cultivation, by various characteristics (% users)

			Chemical inputs			Organic inputs	
		(N)	chem. fertil.	pesti-cides	insect-icides	man-ure	crop resid.
Housing density	medium	(78)	30.8	14.1	24.4	43.6	39.7
	high	(150)	20.0	15.3	10.7	4.7	28.7
H'hold monthly income (in Tsh)	<50,001	(105)	16.2	12.4	11.4	7.6	37.1
	>90,000	(53)	39.6	22.6	17.0	35.8	34.0
Age of h'hold head	21-40 years	(50)	24.0	18.0	24.0	10.0	24.0
	>60 years	(37)	13.5	8.1	5.4	2.7	54.1
Educational level of h'hold head	none	(31)	19.4	16.1	12.9	3.2	22.6
	>secondary school	(42)	45.2	16.7	21.4	52.4	38.1
Technical assistance?	yes	(112)	28.6	19.6	23.2	18.8	34.8
	no	(126)	19.8	9.5	7.9	14.3	27.0
Type of technical advice	professional	(78)	30.8	20.5	28.2	17.9	37.2
	non-professional	(34)	23.5	17.6	11.8	20.6	29.4

Source: Annex 7, Table A7.3.

Table 7.3b Mbeya: use of inputs for urban crop cultivation, by various characteristics (% users)

			Chemical inputs			Organic inputs	
		(N)	chem. fertil.	pesti-cides	insect-icides	man-ure	crop resid.
Housing density	low	(54)	70.4	53.7	63.0	79.6	22.2
	high	(126)	75.4	29.4	33.3	54.8	24.6
H'hold monthly income (in Tsh)	<50,001	(90)	71.1	22.2	24.4	62.2	23.3
	>90,000	(34)	70.6	55.9	58.8	70.6	20.6
Age of h'hold head	21-40 years	(29)	75.9	27.6	51.7	72.4	27.6
	>60 years	(56)	75.0	33.9	28.6	51.8	17.9
Educational level of h'hold head	none	(25)	64.0	12.0	24.0	40.0	16.0
	>secondary school	(37)	73.0	56.8	59.5	75.7	27.0
Technical assistance?	yes	(93)	79.6	38.7	41.9	59.1	26.9
	no	(100)	69.0	31.0	41.0	66.0	21.0
Type of technical advice	professional	(62)	80.6	46.8	40.3	53.2	27.4
	non-professional	(30)	76.7	23.3	46.7	70.0	23.3

Source: Annex 7, Table A7.3.

Finally, as far as the use of *crop residues* is concerned, we saw in Chapter 4 that the majority of the urban crop cultivators did not use this environmentally friendly input as a cheap fertiliser. We also saw (in Chapter 5) that this could likely be explained by the fact that many urban farmers used the residues to feed their livestock. This equally explains why there seems to be no relationship between the use of crop residues, on the one hand, and the various categories in Tables 7.3a and 7.3b, on the other. Only one figure is worth mentioning: the high percentage among the elderly household heads in Morogoro. This may be related to the finding that very few of these people used any other inputs. In other words, they relied (or had to rely) on the input most readily available, namely crop residues. Another explanation could be that crop residues were part of their traditional farming practices and that these heads were too old to give them up.

Livestock keeping

Awareness and perceptions

Table 7.4 shows the awareness level among livestock keepers in the two towns concerning the (potentially) damaging impact of their activities on the urban environment.[6] Over half of them did indeed realise the possible impact, the percentage in Morogoro being somewhat higher than in Mbeya. 'Erosion' was mentioned by almost half of the 'aware' livestock keepers and 'destruction of crops/trees', 'dirtiness' and 'bad smell' by about a quarter of them. The types of damage are related to the rearing system of the animals: 'erosion', 'destruction of crops/trees/gardens' and 'can cause accidents' are related to the system of free range, while 'dirtiness', 'bad smell' and 'noise' are likely to be connected with zero-grazing. One livestock keeper in Morogoro thought that his animals did not cause any damage but this household kept five cows that were partially kept in zero-grazing and partly free range.

Almost two-thirds of the urban livestock keepers said they took measures against possible damage. For the large majority of them (over 80%) this involved zero-grazing. Some (20%) mentioned 'proper disposal of animal waste' as well, which meant in most cases that the waste was dumped in a pit within the compound.[7] Fewer than 10% said they used the waste for crop production.[8] Other measures were mentioned by just a few respondents – examples being 'tethering', 'reducing the number of animals' and, in one case, 'following advice from extension officers'.

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6 For more details, see Table A7.4 in Annex 7.
7 On waste management, see below.
8 On recycling, see below.

Table 7.4 Urban livestock keepers: awareness of damage to the urban environment and measures taken, by town (% yes)

		Morogoro	Mbeya	Total
		(N=114)	(N=239)	(N=353)
Aware of damaging the urban environment		60.2	50.8	53.9
		(N=60)	(N=118)	(N=178)
Types of damage	erosion	50.0	44.1	46.1
	destruction of crops/trees	18.3	35.6	29.8
	dirtiness	15.0	30.5	25.3
	bad smell	26.7	20.3	22.5
	noise	25.0	5.9	12.4
		(N=112)	(N=235)	(N=347)
Measures against damage by livestock keeping		61.6	66.4	64.8
		(N=68)	(N=154)	(N=222)
Types of measures	zero-grazing	80.9	84.4	83.3
	proper disposal of animal waste	13.2	23.3	20.3

Source: Annex 7, Table A7.4.

Respondents in the in-depth survey were asked which animals caused environmental degradation in town. In general, the answers can be divided into three categories. First, the majority mentioned cattle, pigs, goats and, to a lesser extent, sheep (i.e. large livestock). Second, quite a number of respondents mentioned 'all livestock roaming around freely'. And third, some people felt that 'all livestock kept in town' were bad for the environment. One respondent in Morogoro explained his response as follows:

> Livestock that bring about environmental degradation of the town are pigs because they dig holes in the soil, goats because they eat flowers and fences, cattle because when they are in large groups they cause erosion and local chickens because they destroy flower gardens when they are looking for insects to eat.

The livestock keepers in the two towns were also asked about their awareness regarding a number of more specific threats: disease, discomfort, noise and smell. The percentages of livestock keepers agreeing with these statements are presented in Table 7.5.[9] In general, the majority of the respondents agreed with the statements, although the awareness among Morogoro livestock keepers appeared to be somewhat greater than among their counterparts in Mbeya. The most obvious difference between the two towns concerns the transmission of *disease*: about 70% of the respondents in Morogoro were aware of this, against only 50% in Mbeya. The types of disease mentioned also differed according to town (see Table A7.5). Apart from tuberculosis, which was mentioned by the majority of respondents in both towns, the Morogoro livestock keepers mostly

[9] For more details, see Table A7.5 in Annex 7.

Table 7.5 Urban livestock keepers: awareness of livestock transmitting disease and of causing discomfort, noise and smell, by town (% yes)*

	Morogoro	Mbeya	Total
Livestock transmit disease	69.4	49.6	55.9
Livestock cause discomfort	75.7	66.0	69.1
Livestock cause noise	80.2	68.8	72.5
Livestock cause smell	80.0	75.1	76.7

* For N's, see Annex 7, Table A7.5.

mentioned worms and tetanus, while those in Mbeya often mentioned anthrax. Interestingly, some respondents in Morogoro mentioned diseases that cannot be transmitted by livestock such as flu, typhoid, pneumonia and sleeping sickness.

As far as *discomfort* is concerned, two-thirds of the livestock keepers aware of it mentioned the well-known plagues of noise and smell (see Table A7.5). Not surprisingly, *noise* was related to larger animals, pigs and cattle in particular. Nevertheless, a number of respondents mentioned poultry as a source of noise. Dogs, though not livestock, were also considered too noisy by many (30%). The problem of *smell* was for most respondents caused by animal dung, although some mentioned urine as well. Concerning other types of inconvenience, a number of respondents in Mbeya said that livestock feed on crops and/or cause accidents. This is undoubtedly related to the observation that the free roaming of animals like local cattle, goats and sheep is quite common in this town. Two types of discomfort that were completely different from all the other types concerned 'religious discomfort' (five cases) and 'jealousy' (four cases).

An attempt was made to see whether the degree of awareness is determined by other factors, namely the factors that were discussed in the section on crop cultivation: housing density, household income, sex, age and the educational level of the household head, the person responsible for livestock,[10] and technical assistance (whether received and from whom). Detailed results are presented in Table A7.6 (Annex 7), which shows that no relationships can be established as far as Morogoro is concerned. However, the story is different for Mbeya. There seems to be quite a strong correlation between the five awareness variables, on the one hand, and the educational level of the household head, on the other, i.e. those with less education were much less aware of the various negative effects of urban livestock keeping than those with a higher educational level. This relationship can to a certain degree also be seen with *income category* and *housing density* because the latter variables are to some extent related to educational level.

[10] The person responsible for improved cattle was used as a substitute for this variable because improved cattle are by far the most common type of livestock kept in the two towns.

Another factor appears to be the *person responsible* for livestock (here, improved cattle). When this was the spouse, the level of awareness was higher than when this person was the household head. Finally, the *type of technical assistance* also seems to have a positive influence as far as awareness and employing measures are concerned.

Because keeping large livestock is usually considered as more harmful for the urban environment than small livestock, it is worthwhile investigating whether the levels of awareness and measures taken differ according to the category of livestock kept in town. Therefore, a distinction was made between (i) keeping large livestock only (improved cattle, local cattle, goats/sheep and pigs); (ii) keeping small livestock only (improved chickens, local chickens, ducks, turkeys, guinea fowl and rabbits); and (iii) keeping both large and small livestock. Since only ten households in Mbeya kept only small livestock, the figures cannot be presented by town. The results are shown in Table 7.6. Although on the whole, there seems not to be much difference between the three categories of livestock, a few things can nevertheless be observed. People keeping large livestock were more inclined to take measures against damage caused by their animals than those who kept small livestock only (which could be expected). On the other hand, the latter group seemed to be a bit more aware of animals possibly transmitting disease and causing inconvenience and noise. At first sight, this seems somewhat surprising because small livestock do not transmit disease any more easily than large livestock and do not cause any more noise. Perhaps, these people did not keep large livestock because of a perception that they were more troublesome.

Table 7.6 Urban livestock keepers: awareness of negative effects of livestock keeping and measures taken, by livestock category (% yes)

	(N=)	large[1] (238)	large[1] + small[2] (78)	small[2] (36)
Livestock cause damage		49.2	66.7	50.0
Measures against damage		66.8	64.1	41.7
Livestock transmit disease		51.3	60.3	66.7
Livestock cause discomfort		63.0	79.5	75.0
Livestock cause noise		66.8	79.5	80.6
Livestock cause smell		73.5	79.5	72.2

Notes: 1) Cattle, goats/sheep and pigs. 2) Chickens, ducks, turkeys, guinea fowl and rabbits.
Source: Survey data 2000.

Inputs for livestock keeping

As seen in Chapter 5, about half of the livestock keepers in the two towns used urban waste as well as crop residues as feed for their animals (mainly for large livestock). These are two important inputs in terms of the reuse of urban organic material. We have also seen that this practice is more common in Mbeya than in Morogoro. In this section, we explore whether there is any relationship between the use of these two types of inputs, on the one hand, and various other characteristics, on the other. A complete overview by town is presented in Table A7.7 (Annex 7). In Table 7.7 below, which shows only the characteristics that (seem to) show such a relationship, the figures from the two towns have been grouped together to avoid too many categories with too few cases. Variables *not* shown in Table 7.7 are household income, the person responsible for livestock, 'received technical advice' and 'urban crop cultivator'. The fact that the latter variable as to whether or not the household cultivated crops in town shows no link with the use of crop residues as feed for the animals is particularly surprising, as one might expect this practice to be more common among mixed farmers.

As for the *sex* and *age* of the household head, female heads and elderly heads tend to use urban waste more often than male heads and younger heads, respectively. This may be related to household income: the majority of female-headed households as well as households with a head of over 60 years of age belonged to the low-income category. Urban waste is a relatively cheap resource and is given

Table 7.7 Urban livestock keepers: use of urban waste and crop residues, by various characteristics (% users)

		(N)	Urban waste	Crop residues
Sex of h'hold head	male	(304)	46.1	52.0
	female	(49)	63.3	51.0
Age of h'hold head	21-40 years	(53)	39.6	45.3
	41-60 years	(215)	47.0	51.2
	>60 years	(83)	59.0	57.8
Educational level of household head	none	(34)	50.0	38.2
	(some) primary	(133)	48.9	47.4
	(some) secondary	(103)	51.5	52.4
	>secondary	(83)	43.4	63.9
Type of technical advice	professional	(288)	51.0	55.9
	non-professional	(22)	31.8	18.2
Type of livestock	large	(238)	50.4	52.1
	small	(36)	16.7	19.4

Source: Annex 7, Table A7.7.

to animals because other sources are too expensive.[11] And as far as the 'elderly households' are concerned, it may also be a traditional practice that has become less common among 'younger households'. The *educational level* of the household head seems to influence the decision about using crop residues positively.

As for the factors directly related to livestock keeping itself, the question as to whether the household had received technical advice had no bearing on whether or not it used urban waste or crop residues (Table A7.7). However, the *type of technical advice* did (Table 7.7): people who had received professional assistance were much more inclined to use these two types of inputs (and crop residues in particular) than those who had had non-professional assistance. Finally, and not unexpectedly, the *type of livestock* kept influenced the use of either urban waste or crop residues. Both types of inputs are more suitable for feeding large livestock than small livestock.

Waste management

Livestock keepers were asked how they disposed of animal waste. Three-quarters used some or all of it for their own crop cultivation (Table 7.8) and about 40% gave part or all of it to neighbours, which would obviously also be used for crop cultivation. As one respondent in Mbeya remarked, "the livestock keepers of this town use the manure in their farms and gardens, also the children steal my manure to take to school and the neighbours ask for it." Some households were able to make money out of waste, as about 9% of the livestock keepers indicated that they sold (some of) their animal waste. Almost 20% of the respondents said they dumped (some of) it. This is mostly done in people's own compounds but four livestock keepers (all in Mbeya) said they dumped it in the street. Finally,

Table 7.8 Disposal of animal waste, by town (%)*

(N=)	Morogoro (114)	Mbeya (235)	Total (349)
Use all or some of it for own crop cultivation	78.1	76.3	77.0
Give all or some of it to neighbours	32.5	44.6	40.8
Dump all or some of it in own compound	15.0	18.9	17.5
Sell all or some of it	3.5	11.2	8.7
Dump some of it in the street	0.0	1.7	1.2
Give some of it to a school	0.9	0.4	0.6

* Number of times mentioned, so figures add to more than 100%.
Source: Annex 7, Table A7.8.

[11] This seems to be confirmed by the Mbeya figures (see Table A7.7), though when the two towns are taken together, there is no relationship between household income and the use of urban waste.

two respondents gave some of their waste to a nearby school, apparently also for crop cultivation purposes. In total, considering that waste that was either given to neighbours or sold would also be used for crop cultivation, it can be concluded from the figures in Table A7.8 that about 95% of the waste produced by livestock in town was recycled for use in urban crop cultivation.

Further analysis by type of livestock revealed that giving (part of) a household's animal waste to neighbours involved giving mainly waste from *large* livestock. Waste from *small* livestock was mostly used by the waste-producing households themselves and these households were also more inclined to dump their animals' waste in their own compounds. In other words, dumping waste in one's own compound was somewhat less common among those keeping large livestock (16%) than those keeping small livestock (28%). On the other hand, the four households that dumped some of their waste in the street were all cattle keepers.

As in the previous sections of this chapter, we also looked at the extent to which waste disposal differed according to a number of variables. Hardly any differences could be identified but a few observations can be made. Dumping of waste was more common among the elderly (>60 years) household heads (22%) than among the younger (<60) ones (9%). The four households where waste was dumped in the street all had elderly heads. Moreover, these heads all had a low level of education and were living in a high-density area. Dumping was almost as common among those who had received technical advice (18%) as among those who had not (20%). Three of the four 'street dumpers' had been given technical advice by a professional, while the fourth had not received any technical support.

Whether a livestock-keeping household cultivates crops as well, particularly in town, seems to be a more important determinant of how animal waste is disposed of than the variables above. This is to some extent confirmed by the figures in Table 7.9. The majority of those who used part or all of the waste for their own crop cultivation were urban crop cultivators. Those who were not apparently used

Table 7.9 Disposal of animal waste, by 'crop cultivator' and location of crop cultivation (%)

		Urban crop cultivator		Rural crop cultivator	
	(N)	yes	no	yes	no
Use some or all for own crop cultivation	(267)	71.2	28.8	40.4	59.6
Give some or all to neighbours	(141)	59.6	40.4	39.7	60.3
Dump all or some of it	(65)	69.2	30.8	50.8	49.2
Sell all or some of it	(30)	53.3	46.7	33.3	66.7

Source: Survey data 2000.

some of it for their rural crops. Those who gave (some of) their waste to their neighbours, were mainly urban crop cultivators. This may appear surprising but can be explained by the fact that many mixed-farming households produced more waste than they could use. The high percentage of urban crop cultivators among those who dumped (some of) their waste may at first also seem unusual, but it is very possible that the waste would be used later on. The figures under *rural* crop cultivation are less clear-cut, which was to be expected. For many, the distance factor and the possibilities for ferrying manure may influence their decision as to how to dispose of their animals' waste.

* * *

The urban environment and its resources is the infrastructure for executing farming activities. Yet, among the crop cultivators in both towns, the awareness that their activities might have a detrimental impact on the urban environment appeared to be quite low. Livestock keepers, by comparison, showed a higher level of awareness. Although recycling was practiced on a relatively large scale, measures taken by farmers to reduce environmental nuisances and damages were insufficient. Moreover, from an environmental point of view, the role of extension officers seemed to be rather ambiguous, propagating the use of chemical inputs for crop cultivation, on the one hand, and the use of urban waste and crop residues for livestock, on the other.

Photo 5 Dairy cattle in zero-grazing (left) and vegetable cultivation in a compound in the high-density area of Isunga, close to the town center of Mbeya

Photo 6 Chickens kept in the house, Isunga, Mbeya (same household as Photo 5)

8

Employment, marketing and the legal setting

So far, three aspects of sustainable urban agriculture have been discussed: food supply, income generation and environmental issues. This chapter now turns to the three other aspects that were identified in the present study, namely employment creation, the marketing of produce, and the legal and policy setting. Since the focus of the study was more on the former three aspects, these three issues are discussed more briefly.

Employment creation

The role of urban agriculture in generating employment was emphasised in Chapter 6. Engagement in urban agriculture provides direct employment for two categories of people: members of the farming households and hired labourers. According to the sample, more than 90% of the households in the two towns practised at least one type of agricultural activity within the municipal boundary, which means that in these households there was at least one person employed in urban agriculture. Given that the sample is representative of the total populations, this means that some 48,000 persons in Morogoro and 58,000 in Mbeya could be considered as being self-employed in some way in the agricultural sector.[1] In reality, the figures are even higher as in many households more than one person was involved in farming and for some, farming was a full-time occupation. As was shown in Chapter 5, livestock keeping was a full-time occupation for 40% of

[1] These figures are 90% of the total number of households in 2002: 54,207 for Morogoro and 64,197 for Mbeya (URT 2003).

the Mbeya livestock keepers and 14% of those in Morogoro. So 31% of *all* households in Mbeya found full-time employment in urban livestock keeping. At town level, this accounts for almost 20,000 persons. In Morogoro, 5% of the population – or about 3,000 people – were employed full-time in urban livestock keeping.

There is some division of labour between household members. Data from the in-depth survey reveal that, in general, the wife of the household head spent more time on crop cultivation than her husband, often "in the morning" or even "all her time". Some respondents in Morogoro said that it (also) depended on the distance between the house and the farm or whether she was employed (the latter indicating that farming was not always considered as a form of employment by the respondents). Conspicuously, these points were hardly mentioned by respondents in Mbeya. Mbeya men seemed to be more involved in household crop-cultivating activities than men in Morogoro. Most of the latter spent very little time on their crops unless they "had no other job", and even then "it will depend on his time-table". Some, however, gave a helping hand in the evenings and/or at weekends. When asked whether children younger than 14 years of age were also engaged in crop-cultivating activities, the majority felt that this did not happen in 'their' town. Yet, more than a third of the Mbeya respondents and a quarter of the Morogoro respondents thought that it *did* occur. And according to a few of them, it was even quite common.

The division of labour in urban livestock keeping was basically the same as in urban crop cultivation. The women spent more time on it than men, while the men in Mbeya were more involved in it than those in Morogoro. In addition, the men in Mbeya spent more time on livestock keeping than on crop cultivation. This observation is in line with the above-mentioned 40% of the Mbeya livestock keepers for whom it was a full-time job. A very time-consuming activity is the collecting of fodder for cattle that are kept in zero-grazing. As one respondent remarked about the household head, "he spends more than six hours [per day] looking for feed for livestock". Opinions regarding child labour in livestock keeping were as diverse as those regarding crop cultivation, though the percentages of respondents stating that young children were employed in livestock keeping were higher (52% and 40% in Morogoro and Mbeya, respectively). A respondent in Mbeya who claimed that child labour was not used gave the following reason: "they cannot carry grass".

The second category of people who were employed in the urban agricultural sector were hired labourers. They can be permanently employed, seasonally employed or hired for just one or two days at a time ('on call'). Hiring labour depends not only on the types of work to be done, but also on whether the household head and/or his wife have time to do it themselves (in other words, whether

they are employed elsewhere) and if they can afford it. One husband explained that his wife "spends a lot of time on crop cultivation (…) because not all the urban dwellers can hire labour". Hired labour for crop cultivation is seasonal in nature and will usually be no more than an additional type of labour for the person concerned. With livestock keeping, this is different. Quite a number of households hired somebody on a permanent basis, for example to look after their animals (if they were 'freely grazing') or to collect fodder for the animals kept in zero-grazing.

Table 8.1 provides an assessment of the role of urban agriculture in creating employment for hired labourers. A number of underlying assumptions were made and the figures in the table should be considered with caution. First, it was assumed that there was only one labourer per labour-providing household. Second, a labourer engaged in crop cultivation was not the same person as a labourer involved in livestock keeping. Third, there was no more than one hired labourer per farming type per household.

Table 8.1 Estimated hired labour employment in urban farming, by type of farming and by town

Row		Morogoro	Mbeya
1	Total number of households in municipality*	54,207	64,197
2	Number of households in sample	300	308
CROP CULTIVATORS			
3	Total number in sample	243	194
4	Number of households using hired labour	149	115
5	Idem, as % of sample (row 4/row 2*100%)	50%	37%
6	Number of households using *urban* hired labour	64	62
7	Idem, as % of sample (row 6/row 2*100%)	21%	20%
8	Idem, whole town (row 1*row 7)	11,380	12,840
LIVESTOCK KEEPERS			
9	Total number in sample	114	239
10	Number of households using hired labour	72	163
11	Idem, as % of sample (row 10/row 2*100%)	24%	53%
12	Number of households using cattle attendants	12	30
13	Idem, as % of sample (row 12/row 2*100%)	4%	10%
14	Idem, whole town (row 1*row 13)	2,170	6,420
ALL URBAN FARMERS			
15	Total hired urban labour in (row 8+row 14)	13,550	19,260
16	Idem, as % of all households in town (row 15/row 1*100%)	25%	30%

* URT 2003.
Source: Survey data 2000.

As far as crop cultivation is concerned, the calculation in Table 8.1, which is based on the sample of households in the main survey, indicates first of all that 50% of all sampled households in Morogoro and 37% in Mbeya used hired labour (row 5 in Table 8.1). However, since we are primarily interested in the *urban* employment created by the urban farming sector, only hired labour recruited from the towns themselves should be taken into consideration. Row 7 in Table 8.1 shows that about a fifth of the sampled households hired labourers from town. At town level, this implies that over 11,000 people in Morogoro and almost 13,000 people in Mbeya were engaged in paid labour on the urban plots of other households (row 8).

As for livestock keeping, a quarter of all the sampled households in Morogoro and over half of those in Mbeya used additional labour (row 11 in Table 8.1). However, in many cases, this involved unpaid labour by relatives, friends, house boys, etc. There is one category, however, that can certainly be considered as paid employees, namely cattle attendants, who were employed by 4% and 10% of the sampled households in Morogoro and Mbeya respectively (row 13). Thus, at town level, over 2,000 persons in Morogoro and almost 6,500 persons in Mbeya were employed as cattle attendants (row 14).[2]

In total, an estimated 13,000 persons in Morogoro town and 19,000 people in Mbeya town were employed by households engaged in urban farming. All of these people found employment and an income in the urban agricultural sector, two-thirds of them on a part-time and/or seasonal basis (hired labourers in crop cultivation) and the others (cattle attendants) on a more permanent basis. Moreover, as seen above, for some 3,000 households in Morogoro and 20,000 in Mbeya, farming was a full-time activity. These figures show that urban farming is of enormous benefit to the urban labour market because the agricultural sector provides employment for a substantial number of people. In addition, it is worth emphasising that urban agriculture creates jobs in other urban sectors as well. It generates demand for inputs and supplies the urban economy with outputs, activities that create a demand for labour. The web of formal and informal links creates employment and income in other sectors like transportation, marketing, equipment supply, and the provision of technical advice.

Marketing of produce

Easy access to markets is essential in order to generate an income from selling crops and/or livestock products. As mentioned earlier, many urban crop cultivators sell part of their produce. The in-depth survey, with detailed questions on

[2] These figures may be somewhat lower because we do not know whether all these people lived in town.

farming and related activities, offers a brief but useful view of issues related to marketing procedures. Urban farmers were asked about the person who usually sold the household's crops, whether it was the household head, the spouse or both. In Morogoro, selling crops appeared to be quite equally divided between the household head and his spouse. In Mbeya, however, it was largely the woman in the house who sold the crops. This difference is in line with the question as to who kept the money from crop sales. In both towns, the number of spouses keeping the money was smaller than the number of spouses who actually sold the crops.

A wide variety of crops was sold, although a few crop types were mentioned much more often by respondents, namely maize and vegetables in both towns, rice in Morogoro and beans in Mbeya. Customers were people from the neighbourhood as well as those from further away (mostly referred to by the crop cultivators as "other people"). According to one respondent in Morogoro, "customers are neighbours who know that you have harvested a lot of crops that you can sell, such as people in the street". One urban grower sold crops to primary schools. Only one respondent in each town mentioned middlemen, which indicates that selling crops usually involves a direct transaction between producer and consumer without any interference from outside traders or middlemen.

As for the marketing of livestock products, there was a division of labour between the head and his spouse comparable with the marketing of crops. In Morogoro, the spouse or the household head and his spouse together mostly sold these products. In Mbeya, however, it was predominantly the spouse who did so. And again, not all the women who actually sold the products were allowed to keep the money they made. Some interviewees mentioned a further division of tasks between the man and the woman in the house, depending on the type of animals being kept. One respondent in Morogoro made this quite clear by stating that "eggs, milk, chickens, ducks, goats and sheep can be sold by women, but cattle are taken to the market by men". According to another respondent in Morogoro, "a woman cannot deal with cattle but men can, so obviously it is the routine of our father; but for small products the woman is doing so".[3] The fact that the marketing of livestock products in Mbeya was largely a woman's business demonstrates otherwise.

Milk, eggs and chickens (broilers) were mentioned by nearly all livestock keepers as the most important products. Other animal products – meat, goats, ducks, pigs and even fish (in Morogoro) – were mentioned by a few respondents only. Three urban farmers in Mbeya also mentioned manure as a livestock product that was sold. The customers were mainly people from the neighbour-

[3] This was the same respondent who stated that "there are few people who can allow their wives to keep money".

hood, although some came from further away. A respondent in Mbeya stated very clearly that "other people in town buy the livestock products from the farmers, such as milk, eggs and chickens and mostly they are neighbours".

Legal and policy aspects

National policies

Urban agriculture in Tanzania is practised in a generally favourable political and legal context. Faced with a poor economy in the 1970s and 1980s, the national government issued policies to encourage people to undertake urban agriculture. Urban dwellers were thus able to attain food self-sufficiency and, in addition, offset sky-rocketing inflation. Government and political leaders time and again told urban dwellers to raise livestock and produce food in their backyards and on other open spaces. Policies behind this included *Siasa in Kilimo* (Politics is Agriculture) in 1972 and *Kilimo cha Umwagiliaji* (Irrigated Agriculture) in 1974, *Kilimo cha Kufa na Kupona* (Agriculture for Life and Death) in 1974/75 and *Mvua za Kwanza ni Zakupandia* (First Rains are for Planting) in 1974/75. Others were the National Economic Survival Programme (NESP) of 1981/82, the National Food Strategy in 1982, the 1983 National Livestock Policy (NLP), the National Agricultural Policy (NAP) in 1983, and the National Economic Recovery Programme (ERP) of 1986-1990.

Recently, the favourable attitude of the national government towards urban agriculture was clearly expressed in the National Human Settlements Development Policy of 2000 put forward by the Ministry of Lands & Human Settlement Development (URT 2000):

> Urban agriculture exists in most urban areas both in the developed and developing countries. As an economic activity, it provided income and employment opportunities to the urban populations, and a reliable supplementary source of food supply to urban dwellers at affordable prices. As a land use, well-planned urban agriculture creates a pleasant greenly scene.

Yet, the Ministry also signalled the potential dangers of the practice:

> Although urban agriculture is considered an important component in sustainable development, improperly practised urban agriculture conflicts with other urban land uses and leads to land degradation, water pollution, and is a threat to health and safety.

Therefore, in the same document (URT 2000), the government set a number of policy goals:

i. to designate special areas within planning areas whereby people will be granted legal rights to engage in agricultural activities;
ii. to continue to regulate and research the conduct of urban agriculture and to ensure that it does not disrupt planned urban development;
iii. to review existing laws to facilitate planned urban agriculture; and

iv. to facilitate the construction of appropriate infrastructure to mitigate/prevent land degradation, water pollution, and health and safety hazards in areas where urban agriculture is permitted.

At the ministerial level, urban agriculture has been partly encouraged by agricultural extension officers who offer non-formal education to urban dwellers. In a bid to encourage urban dwellers to produce their own food, the government set up an urban agriculture extension service in the 1970s under the Ministry of Agriculture and Food Security (MAFS). Currently, MAFS uses its urban-based Agriculture/Livestock Extension Agents (ALEAs), who work in towns, to promote the raising of livestock and the growing of crops. ALEAs visit urban dwellers and impart modern skills and knowledge (non-formal education) about agriculture so that farmers' production levels increase.

Local by-laws

In the early 1980s government policies encouraging urban agriculture, especially livestock keeping, started to have a negative effect on the operations of many urban councils and the physical urban environment, and it became obvious that the existing municipal by-laws regarding farming in towns needed revising. The first urban by-laws regulating the growing of crops and the raising of livestock in urban centres were enacted by the British colonial authorities back in 1928.[4] These by-laws had three main objectives: (i) to prohibit people of African descent growing crops and raising livestock in urban areas; (ii) to prevent urban agricultural activities, especially the growing of crops taller than one metre, in urban areas because they were thought to increase the presence of malaria-carrying mosquitoes; and (iii) to maintain a cleaner urban environment and sustain urban aesthetics by preventing people of African descent from growing crops on most open spaces in town. After independence in 1961, most of these by-laws fell into disuse. Later, however, most towns and municipal councils found it necessary to revive the by-laws in an attempt to regulate urban agriculture for the smooth running of towns. Two examples of such revised by-laws are included in this report, namely the 1982 by-laws on crop cultivation in Mbeya (Annex 8) and the 1999 by-laws on livestock keeping in Morogoro (Annex 9). These by-laws in essence state that the growing of crops or the raising of animals is permitted but under certain conditions.

The Mbeya by-laws on crop cultivation (see Annex 8) make a distinction between areas where the growing of crops is completely prohibited (By-law no. 3) and where it *is* permitted (By-law no. 4). The area where the cultivation of crops

[4] Under Rule 16 CAP. 101: By-laws for Regulating the Cultivation of Crops and Keeping of Animals in Urban Areas.

is completely prohibited covers eleven wards and most of another one.[5] Growing crops is also not permitted within fourteen metres of road banks. By-law no. 4 lists the three wards as well as a river valley where the growing of crops is permitted.[6] As for the river valley itself, crop cultivation is not allowed within fifteen metres of the river bank. The cultivation of annual crops is not restricted in these areas but written permission from the Municipal Director is required for permanent crops. Other by-laws regulate the ways in which crops have to be cultivated, including for instance the use of machinery, planting time, the use of inputs, weeding, the use of certified seeds, planting on slopes, as well as what to do in the case of pests or disease. Other by-laws stipulate the penalties for not adhering to these regulations, including fines, imprisonment and the destruction of crops. However, although these by-laws exist and clearly stipulate the penalties for infringement, they are rarely implemented. For example, it is common to see crops of all varieties planted in all the municipal administrative wards, on road reserves and riverbanks, in open public spaces including children playgrounds, and on surveyed plots. The by-laws are ignored at will.

The farming households in the in-depth survey were asked which crops they thought were not allowed to be cultivated in town. The Mbeya respondents were unanimous that crops taller than one metre (or three feet) were prohibited. Everybody pointed at maize but bananas, sugar cane and sunflowers were also mentioned. Many Morogoro respondents mentioned tall crops as well because these "form bushes in which thieves hide", as some respondents said. Others explained that tall crops make the town look dirty. A few respondents mentioned tree crops, such as fruit trees and coconuts because of potential danger to electricity lines, roads and houses. Finally, there were several people who thought that there were no restrictions on the growing of crops in town.

In the Morogoro by-laws on livestock keeping (see Annex 9), "animals" are cattle, donkeys, goats, horses, mules, pigs and sheep. In other words, small livestock like improved chickens, local chickens, ducks, rabbits and turkeys, most of which are now raised in urban areas, are left out. In By-law no. 3, the Council stipulates that it "shall earmark certain areas to be known as 'specified areas' within the Urban area for the purpose of keeping animals [and] along which to move an animal or animals and permits shall be issued by the Council in respect of animals authorized in the Urban area". Yet, the by-laws do not specify the numbers and types of animals that urban dwellers are allowed to raise in different density areas. By-law no. 5 forbids keeping animals outside "a building, structure or enclosure"; so the keeping of animals in free range is prohibited. According to

[5] The eleven wards are Sisimba, Maendeleo, Nonde, Majengo, Mabatini, Mbalizi Road, Sinde, Ruanda, Ilomba, Nzovwe and Isanga. The ward where crop cultivation is partially permitted is Iyunga.

[6] The three wards are Ilemi, Itende and Uyole. The valley mentioned is the Ilolo Valley.

By-law no. 8, animals are not allowed to be kept "in a building or part of such building that is used for human habitation", but people do keep improved chickens in their houses, as we observed. On the other hand, chickens are not defined as animals in these by-laws. Animals can only be moved with special permission from the Council. Most urban dwellers keep animals without a permit. By-laws no. 5 and 6 that require urban dwellers to remove manure, liquid filth and other animal waste, are never enforced. The fact that there are many senior government and ruling party officials among the livestock keepers who break the by-laws with impunity is probably the best assurance for most other livestock keepers that they will not be punished if they break the law.

Opinions among respondents of the in-depth survey regarding the types of animals allowed to be kept in town differed, both within and between the two towns. Most of the 24 respondents in Mbeya who answered this question thought that the keeping of large livestock – cattle, goats, sheep and pigs – was simply prohibited. According to four, no livestock at all were allowed to be kept in town. Others, however, stated that livestock were allowed if there were not more than four animals and they were not kept free range. The 21 Morogoro respondents seemed to be more aware of the contents of the by-laws, as seven of them knew about the ban on keeping animals free range. Six others mentioned the limitation regarding the number of animals (four) that people were allowed to keep. Two (wrongly) thought that livestock keeping was not permitted at all, while another two admitted that they did not know. Finally, one respondent aptly put it this way: "no livestock is prohibited to be kept in town, but it depends on the owner the way you follow the by-laws".

Respondents were also asked whether they thought that livestock raising and growing crops in town could be stopped by applying municipal by-laws. The majority (17) of the 29 Mbeya respondents said "yes", but according to one of them "only in the centre of the town". The other 12 respondents in Mbeya thought that the practice could not be stopped using these legal measures because it is too important for the people engaged in it, and the ones who are supposed to implement the by-laws are doing it as well. Two particular citations are illustrative in this respect:

> They cannot stop the crop growing and livestock raising because these activities reduce the hardship of life and the by-laws are not applied equally to leaders and other people, so when the leaders break the laws, other people follow.

> Crop growing and livestock raising cannot be prevented […] because the by-laws are there for many years and livestock keepers who are fined still continue to keep them. The municipality is slashing crops but the following year the urban farmers cultivate them again.

These quotes suggest that the municipality of Mbeya does try, to some extent, to exert control over farming activities but to little avail.

In contrast with Mbeya, most (19) of the 30 respondents in Morogoro thought that applying the by-laws could *not* stop farming activities in town. Most of them stressed the importance for the households involved in terms of employment, food and income. One respondent stated that "using the by-laws (…) will make poverty increase among families" and another one said that "it is the only way of increasing their income [and] to sustain their living and their families". Two respondents stressed that "the number of thieves and criminals will increase". Among the nine respondents who thought that urban farming could be stopped by applying the by-laws, a few mentioned certain conditions. Most of these conditions were related to the contents of the by-laws themselves and to the willingness of the municipality to enforce them. Another respondent put it as follows:

> To raise animals and cultivate crops can only be prevented if there is a selected area for livestock keeping and crop growing, and serious action should be taken against those who keep animals and cultivate crops and who cause environmental degradation.

Finally, two respondents thought that livestock keeping could be stopped but crop cultivation could not. As one of them said,

> I think livestock keeping can be prevented by using the municipal by-laws because it is difficult to raise livestock in town since most of the animals scavenge in the streets and there is not enough space to keep animals. But crop cultivation cannot be prevented because it is the activity the people depend on.

Local policies[7]

According to the Acting Municipal Director of Morogoro, "officially, farming in town is illegal" (Kalunelo 1999). Yet, the policy is that the municipality allows farming "on the condition that environmental degradation is being prevented and city development is not being hindered". Morogoro participates in the UNDP Sustainable Cities Programme, which implies that urban agriculture has become an integral part of its town planning "because of its importance for the people and for the food provision of the town" (Mkupete 1999). The policy focuses on the development of two types of plots (ibid.):

1) *Garden plots* of 1.5 to 3 acres in the so-called Green Belt areas. "The concept of garden plots is now part and parcel of town planning." Green Belts have been created along the rivers and "other hazardous areas" such as mountain slopes. Somebody who is interested in a 'garden plot' has to pay Tsh 65,000 for the necessary survey work. After that, he signs a lease contract with the municipality (based on the Land Act of 1998) for a period of 1 year, 33 years, or 99 years. The 33-year contracts are the most common; the

[7] This section is based on information collected during visits to key informants in September 1999. *Morogoro*: Mr Mkupete (Head, Department of Town Planning), Mr Maeda (Municipal Agriculture and Livestock Development Officer) and Mr E. Kalunelo (Acting Municipal Director); *Mbeya*: Ms S. Siriwa (Acting Town Director), Mr L. Muliahela (District Agriculture and Livestock Development Officer), Mr M. Mhando (Municipal Agriculture and Livestock Development Officer), Mr J. Mwangoge (Municipal Town Planner) and Mr G. Asombwile (Acting Municipal Town Planner).

99-year contracts concern larger plots. The municipality discourages one family from obtaining more than one plot "but it cannot be avoided entirely". The leaser pays an annual 'land rent' or 'lease fee' of Tsh 20,000 to 25,000 depending on the size of the plot. The leaser is allowed to build a house on the plot "but the predominant activity must be farming". The garden plots "have a long-term objective".

2) Plots in the so-called *nguvukazi* areas. These are located on the former sisal estates, which were long since abandoned and have become part of the town after the expansion of the town boundaries. The municipality sub-divided these areas into 5-acre plots. Each of the 19 wards in Morogoro has a right to part of the plots. The allocation is taken care of by the ward leaders and started in 1974. The users pay a modest fee because use is of a temporary nature, as "the present *nguvukazi* land will surely be used for further urban development".

Since agriculture is not officially recognised as an urban land use type, the policy of allocating land within municipal boundaries formally falls under the so-called Human Resource Deployment Activities (i.e. informal-sector activities). It should be noted that the poorer segments of the population are likely to have very little chance of obtaining either a garden plot (too expensive) or a plot in the *nguvu-kazi* areas (where allocation tends to be by means of personal networks).

In addition, the Ministry of Agriculture (Morogoro) acquired 3,000 hectares of land about 50 kilometres outside the town for use by townspeople who would not otherwise have access to land (Maeda 1999). The plots are one acre in size and cost Tsh 1,000 per acre for demarcation. They are partly intended for former villagers who became urbanites after the town expanded and who subsequently lost their plots to urban development. This can be seen in the light of a policy launched by the Tanzanian Prime Minister at the end of the 1990s that allowed each urban household to have four acres at its disposal: three to feed itself and one for commercial purposes (Kalunelo 1999). According to this policy, the Municipal Council has to make a plan, allocate a budget and present it to the Ministry of Agriculture.

Keeping cattle in town – and especially in built-up areas – is generally regarded as an undesirable activity. According to the Acting Municipal Director (who himself was keeping two dairy cows at the time), "livestock keeping has an impact on the environment and on safety on the roads" and "there are many complaints from neighbours"; so "the official policy is that cattle keeping is restricted to four animals, zero-grazing" (Kalunelo 1999). The Ministry of Agriculture tries to discourage the keeping of too many cattle, for instance by raising the fees for livestock[8] but "the collection of the fees is problematic" (Maeda 1999). Moreover, penalties are imposed on animals found roaming around.[9] According to the Municipal Agriculture and Livestock Development Officer,

[8] For instance Tsh 1,000 per year per head of cattle or per pig, Tsh 800/yr per calf or donkey and Tsh 500/yr per goat or sheep.

[9] For instance, Tsh 10,000 per head of cattle and Tsh 5,000 per goat or sheep.

"these measures worked because you nowadays see many fewer animals roaming around" (ibid.).

At the time of the fieldwork, the Ministry of Agriculture in Morogoro was pursuing other policies as well. One of these concerned the propagation of organic farming by bringing livestock keepers and crop cultivators together (Maeda 1999). Apparently, this policy was successful up to a point because "crop cultivators now sell their crop residues to livestock keepers" (ibid.). The next step is the reverse flow: manure from livestock keepers to crop cultivators. More generally, the Ministry has started to educate farmers about environmental conservation (ibid.). For instance, cultivators are encouraged to grow trees along the edge of their plots. Zero-grazing is compulsory and animal waste should be disposed of properly, i.e. "solid waste should be used on the plots and urine should be collected up and not allowed to flow onto the neighbours' plot" (ibid.). Finally, because it is impossible for most urban farmers to obtain credit, the Ministry has started to organise farmers into small groups of 5 to 20 persons to form so-called Saving and Credit Schemes (ibid.). In 1999, several groups were being set up and now they are encouraged in all the wards. The monthly amount each participant contributes is decided by the members themselves.

In Mbeya, there appeared to be no consensus among municipal officials regarding farming in town. According to the Acting Town Director,

> there is no official support for urban agriculture in Mbeya. The Municipality tries to prevent it, but the people "do not respond". The people know that the Municipality forms a threat. The Municipality intends to take measures, i.e. destroy crops, take away livestock, but this is difficult to implement. (Siriwa 1999)

According to the Municipal Town Planner (MTP), however,

> there is support for urban agriculture in Mbeya Municipality, especially in the peripheral areas of the Municipality, i.e. the areas that look more rural. Some of the people there not only cultivate crops but also raise animals. (Mwangoge 1999)

The MTP further explained that "according to the current master plan (1985-2005), zones in the periphery were for agricultural development" (ibid.). However, a look at the map of the master plan showed that the dark-green zones concerned forest land or a large farm and the light-green zones were designated as "open space and hazard land". The MTP admitted that agriculture was not officially recognised as a type of urban land use. In addition, "in the new master plan, there will be no room for urban agriculture" (ibid.). The latter observation was in line with the Acting Town Director's view:

> A new master plan is going to be developed by the municipal authorities (the old master plan was developed by the regional authorities). The new master plan is in its initial stages. Environmental aspects are very important (management of solid waste, sewage water, etc.), but there is no room for urban agriculture. (Siriwa 1999)

The confusion may lie in the distinction between farming in built-up areas and farming in peri-urban areas (the zone between the built-up area and the municipal boundary). According to the Municipal Agriculture and Livestock Development Officer, only 15 of the 36 wards in Mbeya Municipality are 'urban' (built-up areas), while the other 21 are 'peri-urban' and therefore of a 'rural' character: "About three-quarters of the Municipality consists of arable land" (Mhando 1999). As far as the Ministry of Agriculture is concerned:

> the municipal policy is to allow unrestricted crop cultivation only in the peri-urban areas and as far as the built-up area is concerned only crops that are not taller than two feet. Animals are allowed only in zero-grazing (free grazing can incur a fine of Tsh 10,000 per animal), with a maximum of four head of cattle. There are no official restrictions regarding the number of goats, sheep and chickens that can be kept, although the keeping of goats is being discouraged.

All Mbeya's municipal officers recognised the environmental hazards caused by the sector, particularly those from large livestock kept in the built-up areas: "air pollution, especially from pigs (which is big business, for the Dar es Salaam market); water pollution, especially where farming is done near rivers; and soil erosion, especially from livestock freely roaming around, but also from crop cultivation" (Mhando 1999). Waste from livestock is considered particularly problematic, especially in high-density areas "where people have very little or no space to dump the waste" (ibid.). But the Ministry of Agriculture has "only an educational task (…); measures can be taken, but only through the Public Health Officer" (ibid.).

In short, the Mbeya policy can best be characterised as *laissez-faire*. Unlike Morogoro Municipality, there is no assistance for the agricultural sector in the town. Or, in the words of the Municipal Town Planner (Mwangoge 1999): "We just let it go. There is no active support of any kind."

* * *

In summary, the legal position regarding urban agriculture is somewhat confusing for urban farmers since the perceived favourable policy of the national government clashes with the restrictions imposed by local by-laws. The situation leaves many farmers unaware of what is permitted and what is not, so they go ahead with what seems to be logical and of benefit to their own household. What is illustrated is a sphere of self-perpetuating activities being undertaken between the legal restrictions, on the one hand, and a *laissez-faire* type of policy, on the other. These activities, besides providing food and income, create employment and have the wider multiplier effect of generating supporting activities and additional employment. All in all, urban agriculture should be considered as much an integral part of the urban economy as any other sector, with its product,

inputs, linkages and environmental issues. Within this context, its sustainability should be assessed. This is attempted in the next chapter.

Photo 7 Crop cultivation in the housing quarters of Uyole Agricultural Institute (medium-density, Mbeya), in the gardens and in the filled-in drainage ditches annexed to the gardens

9

Issues of sustainability

The two towns in this study, Morogoro and Mbeya, resemble each other in size as well as in socio-economic terms. The most important sources of formal employment for the local populations are the administrative and service sectors. Of the two towns, Morogoro is somewhat more industrial. From the data regarding the characteristics of the study population, one of the most important observations is that people in Mbeya appear to have more difficulty finding regular employment and thus in making ends meet than those in Morogoro. This is perhaps related to the fact that the town has fewer industries offering employment opportunities. As a result, farming is of the utmost importance to Mbeya households, but this does not mean that farming in Morogoro is less common or even less important. After all, as in Mbeya, 90% of Morogoro households could be classified as being involved in urban farming. Compared with data from other Tanzanian cities and towns, and even from other countries, these are very high percentages indeed, confirming what was said in Chapter 2 about the general importance of urban farming in Tanzania for the people involved.

These people's *motives* for performing urban agriculture can be summarised in two words: food and income. Behind these motives, however, lies a whole range of factors explaining why people farm. These are discussed in the first section of this chapter. The next section deals with the sustainability of urban agriculture in the two towns, i.e. the major results of the study are presented in terms of the six aspects of sustainable urban agriculture that were distinguished in this study. The last section discusses the future of urban agriculture in the two towns, as seen through the eyes of the urban dwellers themselves. Based on local people's opinions, some final conclusions are drawn and a number of policy recommendations are made.

Factors explaining why people perform urban agriculture

Overview of factors

In earlier work by Mlozi and based on studies in Morogoro (Mlozi 1999) and in Dar es Salaam, Morogoro and Mbeya (Mlozi & Hella 2001), four so-called contextual levels were distinguished at which factors operate explaining why urban dwellers undertake and continue to perform urban livestock keeping. These four levels were the national government, the Ministry of Agriculture, the City or Town Council, and the individual urban farmer. A revised version of Mlozi's model is shown in Table 9.1.[1] Instead of his contextual levels, a distinction is made between four contextual variables, namely the 'economic context' (A), the 'political context' (B), the 'infrastructural context' (C), and the 'cultural context' (D). Analytically, the first two contextual variables play a role at three of Mlozi's levels, notably the government, the Ministry and the city/town council, while the infrastructural context relates to his city/town level. The 'cultural context' (D) refers to what can be described as 'tradition'. The four contextual variables (A-D) can be regarded as *opportunities* encouraging people to undertake urban farming. The main difference between Mlozi's model and Table 9.1 concerns the addition of a fifth category, namely 'availability of resources' (E). Below, both opportunities and resources will be discussed using earlier work by Mlozi and the present study as examples.

In combination, opportunities and resources determine whether a household or individual will be involved in urban farming or not, to what extent, and in which way (subsistence, commercial production). Opportunities may be favourable, but people who do not avail themselves of one or more of these resources are excluded from urban farming.[2] Conversely, people who *do* have access to all the necessary resources may nevertheless decide *not* to farm, either because of a lack of opportunities or because they prefer to make a living in some other way. Moreover, both opportunities and resources change in time and space, and often in relation to each other. Hence, the number of people performing urban agriculture differs in time and space as well.

Opportunities

As far as the *economic context* is concerned, a large majority of Mlozi's and Mlozi & Hella's respondents said "yes" to the question as to whether the poor performance of the national economy was among the factors that encouraged

[1] Two remarks must be made here. First, the factors mentioned in Table 9.1 after each of the three contextual variables are not complete. Largely based on Mlozi's work, they are considered to be the most important variables at those levels. Second, in his earlier studies, Mlozi dealt only with urban livestock keeping. However, we think that the factors influencing the decision to undertake urban crop cultivation are to a large extent the same.

[2] On "social exclusion", see for example, ASC 2002.

them to go into urban livestock keeping. The same applied to the low wages in the public sector. Data on the importance of the lack of employment opportunities are not available, since this was not among the factors presented to the respondents. However, it seems obvious that this is of great importance. In the present study, besides the well-known motives of food and income, several people mentioned employment as a reason for farming in town. As one respondent in Morogoro stated, "urban dwellers have no other job to do, so they are involved in agriculture as employment". Others referred to the general economic situation, albeit in terms of "the hardness of life" or "to fight against the tough life in town".

As for the *political context*, the government's policy of encouraging urban dwellers to produce their own food in urban areas was found to be an important reason for keeping livestock in town (Mlozi & Hella 2001). Support for the practice by the Ministry of Agriculture was mentioned by quite a number of respondents in Mlozi's Morogoro study in 1999, although it was considered less important than the national government's generally favourable attitude towards urban agriculture (Mlozi 1999). The lack of enforcement of local by-laws regulating the practice was mentioned by less than half of the respondents in the studies of both 1999 and 2001. Finally, the fact that many national as well as local officials were performing urban agriculture themselves was an encouraging factor for many urban livestock keepers in the 2001 study.

Table 9.1 Factors explaining why people perform urban agriculture

A)	Economic context	- general economic situation - low wages/salaries - lack of employment opportunities
B)	Political context	- generally favourable government attitude - support from the Ministry of Agriculture - by-laws not enforced - officials engaged in urban agriculture
C)	Infrastructural context	- presence of open spaces - presence of markets (supply and sales) - presence of extension services - presence of good road networks
D)	Cultural context	- tradition - ethnic background
E)	Availability of resources	- natural resources - physical/productive resources - financial resources - human resources - social resources

The *infrastructural context* (at town level) includes the presence of open spaces, markets, extension services and a good road network. The presence of open space is essential for those who have no compound but it was mentioned by only a minority in Mlozi's 1999 study. This may be due to the fact that his study concerned livestock keeping only, a practice requiring less space than crop cultivation. Access to markets to sell agricultural produce appeared to be a very important factor among the respondents in both studies. Again, this is more essential for livestock keepers than for crop cultivators because of the more commercial character of urban livestock keeping. On the supply side, over half of the respondents in the 1999 study mentioned the availability of feed and medications as a reason to be engaged in urban livestock keeping. A good local road network is needed to provide easy access to a market where agricultural produce can be sold. This applies particularly in the peri-urban areas where the marketing of produce may be hampered by the bad state of the roads. Finally, it was not clear from Mlozi's two studies whether extension services were considered favourable for urban livestock keeping. From the present study we can see that extension services in Morogoro and Mbeya were commonly used among livestock keepers but much less so among crop cultivators.

Regarding the *cultural context*, many urban dwellers have a rural and, thus, farming background. That alone may be a reason for people to start farming in town. Ethnic background can be important in the sense that certain ethnic groups have traditionally specialised in certain types of agriculture, for example crop cultivation, livestock keeping or even fishing. After settling in town, people may be more inclined to take up or continue a specific type of agriculture. Moreover, one's choice of crops and/or vegetables for cultivation and the types of livestock a person decides to raise can be influenced by one's rural up-bringing.[3] For one third of the respondents in the study by Mlozi & Hella (2001), people's rural background did indeed play a role. The same applied, but even more so, to the factor of ethnic background, which was mentioned by almost half of the respondents. Among the respondents in the in-depth survey of the present study, about half thought that many urban dwellers farm because "it is their tradition". There were no big differences concerning this point between the two towns and between crop cultivators and livestock keepers. Interestingly, for several respondents, 'tradition' was not the same as 'born in the rural areas'. Many respondents

[3] For example, most of the urban dwellers in Tanzania who raise improved dairy cattle belong to the Chagga ethnic group from Kilimanjaro. The Lugulu from Morogoro form the majority of those cultivating commercial leafy vegetables – *Amaranthus* spp. or *mchicha* (in Kiswahili) – in Dar es Salaam, simply because these people have culturally acquired knowledge and skills in growing vegetables in Mgeta and Matombo (Morogoro Region), their rural areas of origin. The Sukuma are likely to grow cassava on their plots and the Bena and Hehe will plant maize, while the Haya, Nyakyusa and Chagga will cultivate plantains. Culture is obviously an influential factor in the choice of crops cultivated.

who mentioned either 'tradition' or 'rural background' added that the food and income aspects were more important. As one respondents clearly stated: "The majority of the people in town cultivate crops not because it is their tradition or because they were born in the village but due to the fact that they want to increase their income, tradition being the second reason."

In addition to variables that *encourage* urban farming (i.e. opportunities), there may also be conditions that can be regarded as *discouraging*. These do not concern urban farming in general but only particular types of urban farming, commercial livestock keeping in particular. For instance, imports of powdery and/or pasteurised milk or eggs, broilers and beef into an area can deter people from going into commercial livestock keeping. The same applies to agricultural products that are produced more cheaply in the rural areas and can be sold at low prices in town. Natural disasters, like recurring droughts or the regular flooding of plots beside rivers, may dissuade people from cultivating crops. The environmental consequences of urban farming can be decisive enough to put some people off farming in town. The simple fact that by-laws exist can also be a reason to, for instance, refrain from growing tall crops and/or keeping large animals. Finally, a study in Nakuru, Kenya has shown that in some cases people did not farm because their landlord disapproved of it (Foeken & Owuor 2000). Despite all this, we can undoubtedly say that in the Tanzanian context, the encouraging factors far outweigh the discouraging ones.

Availability of resources

The addition of 'availability of resources' in Table 9.1 is taken from the five 'capitals' or 'assets' or 'capabilities' that all people have in order to make a living, albeit to different degrees.[4] These resources form a necessary condition for a household or individual to be able to undertake urban farming. *Natural resources* refer to land (both quantity and quality), water and energy, etc. Access to land is an important prerequisite without which it is impossible to practise urban farming (although there are examples from the present study of people keeping chickens in a room in their house). *Physical* or *productive resources* relate to equipment, tools, machinery, but also to, for example, food stocks (for animals). *Financial resources* include money (either those at home or in the bank), a loan or credit but also income-generating activities. *Human resources* concern not only labour as such, but also the quality of it, i.e. such 'assets' as skills, experience, knowledge, creativity and inventiveness. Finally, *social resources* have to do with the quality of relations between people, for example support from relatives or mutual assistance among neighbours, and the nature of

[4] See for example, Blaikie *et al.* 1994; Chambers & Conway 1992; Chambers 1995; Carney 1999; Brook & Davila 2000; de Haan 2000.

networks established with suppliers of inputs and customers who purchase outputs (de Haan 2000).

Regardless of the many favourable opportunities in the Tanzanian context, farming in town is not possible without the necessary resources or assets. The fact that over 90% of households in Morogoro and Mbeya appeared to be involved in urban farming shows, however, that the large majority of the people in these two towns did have access to sufficient resources to cultivate crops, keep livestock or do both. It also shows that in financial terms, it is easy to start urban farming. Even the very poor can usually afford to buy some seeds and start growing some crops. The necessary condition is primarily access to a piece of land (natural resources). From the Nakuru study, we know that *no* access to land was by far the most important reason for people *not* to farm in town, being mentioned by about 80% of the non-farmers (Foeken & Owuor 2000). For the large majority, it also constituted the *major* reason. Lack of financial means (financial resources) was mentioned by almost 30%, but for the majority of these it was not the main reason. There were no big differences between crop cultivation and livestock keeping in these respects.

Starting a commercial livestock business requires more resources than only land, however. Particularly the poor can usually not afford the costs of buying animals, feed, medicines, materials to buy a zero-grazing unit, hired labour, etc. Loans and credit (financial resources) are usually only available to those who can provide some form of collateral. Sustainable crop cultivation – in the sense of realising a certain level of production without exhausting the land – also requires resources that may be beyond the reach of low-income households. In the present study, labour (human resources) seemed not to be an important bottleneck. Yet, Flynn (2001) found otherwise in Mwanza among low-income households. This had not only to do with household size but also with the age and health of the household's labour force.

A good example of having sufficient resources and making the most of opportunities was a mushroom grower we visited in Mbeya in September 1999. Living in a medium-density area, the person concerned had access to a piece of land (natural resources) and with a small amount of savings (financial resources) he was able to build a simple, windowless structure in which he built rough wooden racks. Input costs were low because the mushrooms grew in soil in old plastic bags with holes in them that hung on the racks. Showing creativity and inventiveness and having the skills and knowledge to grow mushrooms (human resources), he was able to harvest about 10 kg of mushrooms per week, which he sold for Tsh 700 per kg to local hotels. Thus, the political context with its generally favourable government attitude and the infrastructural context (the presence of a market) worked in his favour.

Sustainability of urban agriculture in Morogoro and Mbeya

In Chapter 1, six aspects of the sustainability of urban agriculture were distinguished: food provision, income generation, employment creation, marketing of produce, environmental balance, and an enabling legal and policy setting. In the present section, the main results of the present study will be discussed along these lines.

Food provision

The importance of urban agriculture for a household's food supply is undeniable. In both quantitative and qualitative terms, a household's own urban food production constitutes a substantial livelihood source. In about two-thirds of the sampled households in both towns, own urban production was an important food source, while for a fifth it was *the* most important food source. This applied in particular to crop cultivation: the self-produced crops in town constituted a food source for *all* crop-cultivating households and a *major* food source for about 60% of them. This appeared to apply particularly to low-income households. About 10% of the crop cultivators in both towns even indicated that "they could not survive without it". On the other hand, only six (out of 437, i.e. 1.4%) crop-cultivating households said they could manage without it.

The level of food security – measured in qualitative terms – appeared to be much higher in Mbeya than in Morogoro. However, *solving* food problems was more difficult for Mbeya households. For almost all the households in the two towns, improving their food situation was primarily a matter of extending and/or intensifying their (urban) crop-cultivation activities. In other words, improving one's food situation was overwhelmingly seen as something one had to be responsible for oneself.

In quantitative terms, an attempt was made to estimate the contribution of the two main crops in the two towns (maize and rice in Morogoro; maize and beans in Mbeya) to the energy requirements of the producing households as well as to the energy requirements of the total population. Although the figures represent at best a very crude indication of the situation, the results were nevertheless remarkable. Maize alone accounted for about 60% of the energy needs of the maize-producing households. The contribution of rice (in Morogoro) was substantial as well, but beans (in Mbeya) were not so important. At town level, the contribution of maize and rice in Morogoro was an estimated 75%, and maize and beans in Mbeya provided 50% of the population's energy requirements. The same kind of calculation was made in the Nakuru study by Foeken *et al.* (2002), where they found much lower figures, namely 30% at household level and 8% at town level. Other studies done in Tanzania lack any comparable data but from the studies on urban horticulture carried out by the Urban Vegetable Promotion

Project in Dar es Salaam, it is known that the production of leafy and non-leafy vegetables in Dar es Salaam was considerable (Stevenson *et al.* 1996), but how much urban crop production contributes to people's food consumption is not known.

Compared to crop cultivation, livestock keeping is more important as an income source. Yet, it constitutes an important food source as well for many livestock-keeping households. Animal production was a source of food for about half of the households in Morogoro and for about three-quarters in Mbeya. Almost a quarter of the households in both towns kept livestock for food purposes only. Dairy cattle (milk) and chickens (eggs, meat) were the most important animal sources of food produced in town. Estimates were made of milk consumption in households keeping dairy cattle. It appeared to be substantial – 1.7 litres/day in Morogoro and 1.0 litres/day in Mbeya. At town level, however, the contribution of urban-produced milk was quite modest. The latter finding is surprising because key informants in both towns talked about an oversupply of milk in recent years. However, this was not only due to urban overproduction but also to increasing amounts of milk being produced at lower cost outside town.[5]

Income generation

Urban agriculture is not only an important food source but provides a substantial income source as well, both directly and indirectly. Indirectly, many households in the two towns save money by consuming their own products ('fungible income'). Directly, some or all of the produce is sold, which provides a cash income. Crop cultivation in town constituted a direct source of income for 30% of those practising it. However, for the Mbeya crop cultivators, selling part of their harvest was much more common than among those in Morogoro. Because the Mbeya crop cultivators did not harvest substantially more than their counterparts in Morogoro, this indicates that there was a more urgent cash need among the Mbeya households. Selling some of their crops was one way of solving this problem.

Livestock keeping is generally considered more as an income source than crop cultivation is. This was confirmed by the present study: two-thirds of the livestock keepers in the two towns made an income out of it. For more than a quarter of them, it even constituted a *major* income source. Rather surprisingly, there appeared to be no differences between low-income and high-income households in this respect. Although livestock keeping was much more common in Mbeya, the keeping of animals *solely* for income was more common in Morogoro.

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[5] Milk is a highly perishable commodity and due to a lack of cooling facilities on site, urban milk producers have to sell their milk the day it is produced. There is, therefore, almost no way of controlling the supply (or oversupply) of milk on the market, which naturally affects the price it can be sold for.

Selling milk can be particularly rewarding if organised on a certain scale, as earlier studies in Tanzania by Mlozi (Mlozi 1996; Mlozi 1997b; Mlozi & Hella 2001) and Sawio (1993a) have shown.

Employment creation

The study shows that at household level as well as at town level, the urban agricultural sector is a major source of employment. More than 90% of the households in the two towns appeared to be engaged in some kind of urban farming. Extrapolated at town level, this means that in some 48,000 households in Morogoro and 58,000 in Mbeya, at least one person found (full- or part-time) employment in the household's own farming activities. Crop cultivation is usually a part-time activity, mostly for the women in the households. Livestock keeping, however, is more time-consuming and appeared to be a full-time job for no less than 40% of the livestock keepers in Mbeya. In Morogoro, this applied to 14% of households. In other words, some 20,000 persons in Mbeya and 3,000 in Morogoro were occupied full-time in their livestock business.

Quite a number of farming households in town hired additional labour, thus offering employment to others as well. Some 11,000 persons living in Morogoro town and 13,000 in Mbeya town found employment in the crop-cultivating sector. However, these people were employed on a casual basis, i.e. at peak periods only. In livestock keeping, labour of a more permanent nature is required (cattle attendants, fodder collectors). An estimated 2,100 labourers in Morogoro and 6,400 in Mbeya were employed in this way.

Urban agricultural activities produce a wider multiplier effect by generating employment in related and supportive activities. In the private sector, this includes suppliers of inputs including veterinary-medicine shops and equipment shops, transport activities, formal companies and informal carriers, and market traders. In the public sector, extension officers are an example of an occupation that has emerged because of the expansion of urban agriculture. Similarly, the municipal departments in charge of regulating urban agricultural activities, allocating land and controlling environmental nuisance have more jobs to offer because of the intensity of farming in towns.

Marketing of produce

For the large majority who sold crops and/or livestock products, the marketing of agricultural produce was a very simple affair, namely a direct transaction between producer and consumer. This occurred either at the plot (the 'pick your own' system), at the farm gate, in the street or at the market. Usually women were involved in these transactions on the producers' side and obviously only small quantities were traded this way. From a study carried out in Dar es Salaam,

it is known that both producers and traders faced serious problems including poor, unreliable and costly methods of transport, unpredictable demand, seasonal oversupply, price fluctuations, severe competition, and a high degree of perishability of produce (Yachkaschi 1997). Although the present study did not focus specifically on the marketing aspect, there is very little reason to assume that the situation in Morogoro and Mbeya was any better than that described for Dar es Salaam. Given the importance of urban agriculture in the two towns in terms of food supply, income generation and employment creation, a study devoted entirely to marketing aspects would be worthwhile.

Environmental aspects

Sustainability of urban agriculture is often equated with the environmental sustainability of the practice. Those who think of urban agriculture in negative terms always point to the environmental hazards caused by the sector: crop cultivators use chemical inputs and polluted irrigation water; tall crops offer hiding places for thieves; and livestock cause dirt, noise, smells and disease.

As for crop cultivation, the use of chemical inputs appeared to be much more widespread in Mbeya than in Morogoro. It is not clear why this should be so. The use of chemicals appeared to be positively related to household income and the educational level of the household head. In other words, many of those *not* using chemicals in urban crop cultivation did not refrain from doing so because of an awareness of the damage they might cause to the environment but because of a lack of money (financial resources). Moreover, those in Morogoro who had received professional technical assistance also used chemical inputs more often, indicating that extension officers were more inclined to promote the use of chemical inputs than the use of organic inputs like manure and crop residues. As far as the use of polluted water is concerned, this was not a serious problem in the two towns because very few crop cultivators irrigated their crops. And finally, since maize is by far the most frequently cultivated crop, tall crops that can act as hiding places are present all over the two towns when the plants are mature.

The main environmental problem of livestock keeping concerns the disposal of animal waste. According to livestock keepers, most of it is recycled, i.e. used for crop production, either by the same household or by neighbours. However, many crop cultivators, especially in Morogoro, claimed they did not use manure as fertiliser. There were also livestock keepers who dumped part or all of their waste mostly on their own compound. This was more common among the elderly. Surprisingly, dumping was not influenced by whether one had received technical assistance from an agricultural extension officer or not.

Using manure for crop cultivation in town is one way of recycling organic waste. Others include the use of crop residues and urban waste as animal feed and/or as fertiliser for crop cultivation. Feeding livestock with crop residues and urban waste was quite common in Mbeya, more so than in Morogoro. Using these inputs as fertilisers for crop production was much less practised (crop residues) or even negligible (urban waste). The situation could be greatly improved if composting plants in the two towns existed where solid waste from the urban area could be turned into fertiliser, and assuming that there was a good initial system of collection as well. Both towns currently lack this provision.

Although these types of recycling may be regarded as positive from the perspective of the urban environment, the reuse of manure for crop cultivation could be promoted more extensively, particularly in Morogoro. Extension officers should play a role in this. First, however, they will have to be trained to encourage environmentally friendly farming, given for instance our finding that, at the moment, they apparently tend to promote the use of chemical inputs instead of organic inputs. Even so, the use of urban waste and crop residues for livestock keeping should be further encouraged because the present study shows that professional assistance has a positive impact regarding the use of these inputs. This finding makes it worthwhile emphasising this aspect of the extension officers' work.

A starting point for environmental sustainability of urban agriculture is the creation of awareness among urban farmers and extension officers regarding the environmental impact of urban farming. Studies done in Dar es Salaam have shown low levels of awareness among vegetable growers (Mlozi 1998) as well as among extension officers (Yachkaschi 1997). In the present study, just over a third of the crop cultivators said they were aware of the potentially damaging effects of their activities. Moreover, very few of them mentioned pollution due to chemical inputs as one of these effects. In as far as measures were being taken by crop cultivators, these consisted mainly of activities to prevent erosion in Mbeya, with its hilly landscape. Awareness among livestock keepers was higher (at over 50%), which is in line with another study in Dar es Salaam (Mlozi 1996). Nevertheless, this figure implies at the same time that the other half of the livestock keepers were *not* aware of any damaging effects. This figure may be a reason for concern, given the fact that the majority of the households could be classified as urban livestock keepers. Moreover, the large majority of those who said they took measures against damage by livestock did so by means of zero-grazing, implying that measures against noise, smells and dirt were hardly ever taken.

Legal and policy setting

The legal context is somewhat confusing for urban farmers in Tanzania. The national government pursues a generally favourable policy towards urban farming and has even tried to encourage people during periods of severe economic recession. Even though farming in town is generally accepted, by-laws at the local level pose many restrictions on the practice. Farmers appeared not to know what was allowed and what was not but since enforcement of these by-laws is practically non-existent, there are few or no legal obstacles to urban farming in the two towns. The result is that many urban farmers violate the law, including many – if not most – municipal officials. Many of the respondents in the in-depth survey of the present study felt, however, that even if the by-laws were applied, urban farming would continue because of its importance for those involved.

Although Morogoro and Mbeya are bound by the same by-laws, their policies towards the farming sector appeared to differ. In Morogoro, attempts are being made to control the sector but at the same time to support it within the confines of the existing regulations. In Mbeya, a *laissez-faire* type of policy prevails offering little control but no active support either.

Secured access to land is usually considered essential for sustainable urban agriculture because "clear property rights ... determine producers' willingness to invest" (Yachkaschi 1997). In Morogoro and Mbeya, about three-quarters of the plots for crop cultivation were either owned by the cultivator or by his/her relatives, so access to land seemed to be ensured for the majority of the cultivators. Yet, the other 25% of the plots belonged to someone else, so the users of these plots were not particularly inclined to invest in them with an eye to future yields (even assuming the cultivator had the financial resources to do so).

The future of urban agriculture in Morogoro and Mbeya

Is there a future for urban agriculture in the two towns? The often-heard answer is "no", the major reason being that with the increase in the urban population, no space will be left for farming. Others say "no" claiming that farming is not a recognised type of land use and/or is a non-aesthetic activity in an urban setting that causes unacceptable levels of environmental damage, so it should not be there anyway. Another answer is "yes, unless", meaning that as long as the law and regulations are observed by those practicing it, farming in town is an acceptable activity and, therefore, does have a future. Finally, there is the category who answer the question with an outright "yes", though their reasons for saying so may differ. Some people consider the fact that the phenomenon of urban agriculture has expanded so much in Sub-Saharan Africa (as well as in other parts of the world) as a *fait accompli*: for many, farming in town has become a vital ele-

ment in their livelihood. Others claim that despite the growth of the urban population, there will always be urban spaces where people can farm, not only in their own compounds but also on open areas such as along roads, rivers and railway verges and under power lines. Also, with urban boundaries expanding, there will always be open spaces in new peri-urban zones. Finally, there are those 'who stress that urban farming can play a very *positive* role in improving the urban environment with recycling, for example, and 'green lungs'.

In the rest of this section, we let the people of Morogoro and Mbeya talk. After all, they are the ones most involved, and in a sense they are all experts. So, how do *they* see the future of urban farming in their towns? How can the sector be developed? And what should the role of the municipal council be? These questions were presented to the 60 respondents in the in-depth survey. As for the first question about the future of urban agriculture, two-thirds of the respondents said "yes" to the question "Do you think that the raising of livestock and growing of crops in town will continue?" A quarter said "no", while the remainder had a more balanced view in the sense that they felt that some farming activities did have a future and others did not.

Box 9.1 provides a selection of the respondents' answers. Interestingly, the reasons for saying "yes" or "no" show considerable variation, whereby many of the aspects of sustainability discussed in the previous section and throughout this book are mentioned. Those who replied in the affirmative referred mostly to the benefits for the people involved in terms of food, income and employment. One respondent 'blamed' the government for allowing urban farming to have a future because the local government does not prohibit it in any way. Those who thought that urban agriculture had *no* future had different opinions about the reasons. The increasing shortage of land was mentioned several times. Others, however, mentioned marketing problems, such as poor transport systems and low prices for animal products. High costs related to livestock keeping due to taxes, expensive drugs, etc. was another reason. One respondent mentioned the environmental problems caused by the practice. Finally, there were some who saw the existence of municipal by-laws as the reason for urban agriculture having no future, apparently thinking that these might be enforced in the (near) future.

Since the majority of the respondents did see a future for farming in their towns, the next question raised the point of what should be done to develop the sector. A selection of the answers to this question is given in Box 9.2. Although a wide variety of answers were given, it is possible to identify three general areas. First, many respondents in both towns thought that the by-laws should be respected. In Mbeya, this was specified by many as follows: (i) animals should

Box 9.1 "Do you think that the raising of livestock and the growing of crops in town will continue?"

● Yes, because it is the only employment for a big group of people, especially those who are not employed, and even if you are employed, crops and livestock increase your income. (Morogoro)

● Yes, because it is the only way of earning a living. Industries are no longer producing, business is difficult. The only solution is to cultivate crops and raise livestock. (Morogoro)

● No, because of a lack of permanent areas for crop cultivation and livestock keeping. (Morogoro)

● No, because of a lack of land caused by the population increase. (Morogoro)

● No, because of (i) the presence of livestock scavenging in town and destroying crops, and (ii) the theft of crops cultivated in town. (Morogoro)

● Yes, because it helps to get what the family needs at home. But for other people, it will not continue due to the problem of pastures in town and it is expensive to herd animals outside the town. Crop cultivation will not continue because the majority grow crops on plots which are for building houses, so they will run out of land. (Mbeya)

● Yes, because (i) the government has not put any effort into prohibiting crop growing and livestock keeping, and (ii) the government insists people grow enough food without stating where they should grow crops, so people grow crops anywhere they think it is right for crop growing. The same situation is happening with livestock. (Mbeya)

● No, because there is no market and the input and transport systems are not good. (Mbeya)

● Yes, because livestock and crop cultivation are simple ways of increasing income, especially for those without employment. (Mbeya)

● Yes, because (i) it increases urban dwellers' incomes; (ii) livestock raising provides employment for young people who cut grasses and feed animals, especially cattle; and (iii) livestock raising in town helps in providing nutrition, especially for children. (Mbeya)

● No, because (i) livestock taxes in town are high; (ii) the Municipality introduced a limit on the number of animals that can be raised in town; (iii) the price of animal products is low; and (iv) the price of livestock drugs is high. (Mbeya)

● No, because of the municipal by-laws which prohibit crop cultivation and livestock raising. (Mbeya)

● Yes, because those who cultivate in town have permanent land since they do not move from one place to another. Also urban dwellers raise a small number of animals which are easy to keep. (Mbeya)

● No, because the fine that people who grow crops and raise livestock have to pay is very high. (Mbeya)

● Yes, because of the country's poor economic situation. Urban dwellers will continue farming in order to increase their income and food. (Mbeya)

● No, because of the shortage of land in town. (Mbeya)

● Yes, because (i) plots in town are very small; (ii) it helps the ones who practise it to get food and some money to reduce the hardship of life; and (iii) it helps those who are not employed to run their lives. (Mbeya)

● No, because the cost of raising cattle is high nowadays and the milk market has gone down due to the fact that milk from national ranches dominates in town. Raising pigs and chickens will continue. Raising goats and sheep will not continue for the same reason as cattle. Crops grown in gardens will continue, but growing maize and other tall crops will stop because it causes environmental damage and it brings mosquitoes. (Mbeya)

Source: Survey data 2001.

Box 9.2 "What should be done to develop crop cultivation and livestock raising in this town?"

● Enforce the municipal by-laws that say that all animals are kept inside and crops which bring about the bushes are not allowed to be cultivated. (Morogoro)

● Abide by the by-laws that designate the areas in the peri-urban area for farming purposes. (Morogoro)

● We should go to the peri-urban areas and there should be things like transport to go there, inputs and markets. For livestock keeping, we should make sure that the environment is clean so that we do not get diseases. (Morogoro)

● We should go to peri-urban areas so that we can get more space for our animals. There should be fences and animals should be kept inside so that the animals that eat the crops cannot do so, such as goats and local chickens. We should cultivate vegetables only and not crops that grow tall. (Morogoro)

● By giving loans to livestock keepers and crops growers. Give them education on modern methods of crop cultivation and livestock keeping. (Morogoro)

● Farmers should be shown how to get inputs, especially seeds and those needed for cattle. They should be given areas outside the urban areas so that they can have space for their activities. They should be given capital to improve their activities. (Morogoro)

● There should be no interference from the municipal authority and animals should not be reared in free range. Farmers should be educated in modern methods of livestock keeping and crop cultivation. (Morogoro)

● People should practise zero-grazing and cultivate short garden crops. (Mbeya)

● We should educate people to keep few animals, and crops should be cultivated following the experts' advice. (Mbeya)

● Reduce the number of animals and make sure that the animals are not left free to scavenge in town. Cultivate short crops and use fertilisers. (Mbeya)

● Livestock education, especially on zero-grazing, should be encouraged. People should be encouraged to keep fewer animals, especially cattle. The Municipality should educate the livestock keepers and crop growers. The by-laws should be used effectively. (Mbeya)

● There should be a good policy on urban agriculture. The by-laws should be enforced without considering the position of the person concerned. Markets for animal products should be found and the processing of animal products improved, especially milk processing. People should be encouraged to grow short crops. The market for crop products should be encouraged by establishing small-scale processing plants, like tomatoes. (Mbeya)

● The important inputs for crops and animals should be available at low prices. (Mbeya)

● Find permanent markets for our crops and animal products. Reduce the prices of animal and crop inputs. (Mbeya)

● The government should leave us alone and not force us to pay taxes and fines. (Mbeya)

● Livestock keepers and crop cultivators should be in contact with the authorities so that we can pass on our ideas. We should set up farmers' associations so that we can establish the prices of our products and also get loans. (Mbeya)

● We farmers should cooperate and set up a cooperative union, and we should supervise and arrange the prices of our products. (Mbeya)

Source: Survey data 2001.

be kept only in zero-grazing and numbers should be reduced; and (ii) crops should be cultivated only in the form of gardening, i.e. no tall crops. There were also a few respondents who said the opposite, that by-laws should be amended. Second, another general way of developing the sector that was often mentioned – particularly in Morogoro – concerned educating farmers to use more up-to-date farming methods. And third, quite a number of the Morogoro respondents said that farming should move to the peri-urban areas where there is more space and farming can be undertaken on a more permanent basis.

Some respondents mentioned improvements in marketing, including for instance the establishment of small-scale processing plants for livestock products (for example, milk) and vegetables (for example, tomatoes). Others thought that if inputs were less costly and more easily available, the sector could further develop. Two respondents in Mbeya came up with the suggestion of establishing farmers' associations or cooperatives to influence the prices of farming products and to make it easier to get loans.

Finally, the respondents were asked about the role of the municipal council in developing the urban agricultural sector. A selection of their replies is presented in Box 9.3. The most frequently mentioned answer was that areas should be selected for farming purposes in the peri-urban areas. This was generally considered a good idea, especially in Morogoro where almost two-thirds of the respondents said so. One respondent in Mbeya felt that plots for building houses should be big enough to allow for farming as well. The second most important role for the municipality involved educating farmers in good husbandry and crop cultivation as well encouraging them to obey the by-laws. Improvement in the extension services, which was mentioned by some respondents in Mbeya, is related to this. According to quite a few respondents, the authorities could also be more active in controlling the markets for inputs (lower prices, regular availability) and end-products, as well as in the provision of loans. Finally, there were four respondents, all in Mbeya, who mentioned what the municipality should *not* do (anymore), such as levying high taxes, punishing farmers who break the law, and slashing crops.

One of the most surprising things about the opinions expressed about the future and/or the development of urban farming was that, in general, these opinions did not differ very much from those of local officials. First, most respondents thought that farming in town would continue. Most officials recognised the sector as a fact of life, too important for the livelihood of many urban dwellers to be restricted. Moreover, many of them farmed themselves. Second, most respondents believed that urban farmers should respect the by-laws and that the muni-

Box 9.3 "What should the municipal council do to develop crop cultivation and livestock raising in this town?"

● The Municipality should select areas for crop cultivation and livestock keeping. (Morogoro)

● The Municipal Council should give the land in the peri-urban areas to crop cultivators and livestock keepers and the farmers should be given permanent ownership of the land. (Morogoro)

● Farmers should be given permanent farms in the rural areas or in the peri-urban area. (Morogoro)

● The Municipality should encourage people to cultivate crops and raise livestock without environmental degradation and select areas outside the town for crop cultivation and livestock keeping. (Morogoro)

● What the Municipal Council could do is to give crop cultivators and livestock keepers loans and education on good livestock keeping and crop cultivation. (Morogoro)

● The Municipality should educate people about the by-laws that govern crop cultivation and livestock keeping in town. (Morogoro)

● The Municipality should use the street leaders so that they know the problems of urban crop cultivation and livestock keeping, so that they can give their opinion and suggestions on how to conduct urban agriculture. (Morogoro)

● The Municipality should offer advice on which crops to cultivate in town. Open plots that are no good for building houses, especially around the Kikundi River, should be given to farmers. They should control livestock keepers by selecting areas for livestock. (Morogoro)

● The Municipal Council should not restrict farmers and farming. The free rearing of animals should be allowed. (Morogoro)

● The Municipality should provide education on good animal husbandry and good crop cultivation. After that, it should collect taxes according to the service that is provided to the farmers. (Mbeya)

● The Municipal Council should listen to urban crop cultivators and urban livestock keepers. They should choose the areas for urban crop cultivators and urban livestock keepers to plant grass for their animals. They should supervise the provision of animal inputs and crop inputs. (Mbeya)

● The Municipality should reduce the tax charged on livestock raised in town. They should reduce the punishment and fines for those who break the law by raising livestock and cultivating crops. (Mbeya)

● The Municipality should reduce the tax on animals in town and stop the habit of slashing crops. (Mbeya)

● The Municipality should prepare by-laws which will direct people to keep a small number of animals, such as three head of cattle. They should allow people to cultivate crops that mature quickly and that are shorter. (Mbeya)

● The Municipal Council should improve the extension services to urban crop cultivators and livestock keepers. (Mbeya)

● The Municipality should provide extension services on good animal husbandry and crop cultivation in town. They should control the sales of animal inputs and crop inputs. (Mbeya)

● The Municipal Council should provide large plots for building houses, including space for crop cultivation and livestock keeping. They should state the maximum number of animals that can be kept. (Mbeya)

Source: Survey data 2001.

cipality should be more active in educating farmers in this respect. Third, according to the majority of the respondents, zones should be created in the peri-urban areas where farming, i.e. both crop cultivation and livestock keeping, could take place undisturbed. This is in line with the by-laws stating that the municipal council should select certain areas where farming is allowed. Actually, the Morogoro Municipal Council is already pursuing such a policy with the creation of "garden plots" in the Green Belt areas, the *nguvukazi* areas in the peri-urban zone, as well as the acquisition of 3,000 hectares beyond the town boundaries. In Mbeya, no such policy has yet been developed.

When answering the questions above, the environmental aspects of urban agriculture were directly mentioned by a few respondents only. Indirectly, however, the urban environment was frequently referred to, namely by all those stating that the by-laws should be respected, that livestock should be kept in zero-grazing only, that the numbers of livestock should be reduced, and that crop cultivation should be limited to gardening (vegetables and legumes) only. Yet, there were also quite a number of respondents who stressed the need for (education on) modern farming methods in order to raise their yields. By 'modern methods' these people undoubtedly meant 'modern inputs', including the use of chemicals in crop cultivation. As we have seen, there was no indication that the extension officers in the two towns were promoting organic farming, in fact quite the contrary. To create an 'environmental balance', however, the use of chemicals in urban farming – and in built-up areas in particular – should be restricted as much as possible, while organic farming, including various kinds of recycling, should be heavily promoted.

Finally, some respondents said that the municipal council should play an active role in the provision and pricing of inputs, the provision of loans, and the control of the sector in general. It is probably not very realistic to assume that the local authorities are able or should be the ideal institution to do this. A better solution was offered by the two respondents in Mbeya who said that urban farmers should organise themselves in farmers' associations or cooperatives, which would enable them, as an institution, to buy inputs at lower prices, obtain higher prices for their products, and get loans for the development of their farms, for instance through rotating credit schemes. The role of the municipality should be restricted to an encouraging and facilitating one. Close contacts between (representatives of) farmers' associations, on the one hand, and the local authorities, on the other, are essential, as a few respondents rightly remarked. It is only through this 'partnership' approach that farming in towns can be sustainable.

* * *

In summary, both urban crop cultivation and urban livestock keeping are major elements in the livelihood strategies of urban households in Tanzanian towns. It is in this context that the two main purposes of farming in town, i.e. the provision of food and income, should be considered. In addition, urban agriculture has to be seen as an integral sector of the urban economy like any other. It forms a major part of the employment market as well as the supplies and sales markets, generating demand for inputs and supplying the urban economy with outputs. It is linked directly and indirectly to other activities and supports the continued existence of a number of agricultural services. A positive element in the Tanzanian situation is that all this is recognised by the national government, witness for instance an excerpt from a fairly recent policy paper that states that "urban agriculture is considered an important component in sustainable development" (URT 2000). However, in order to be so, urban agriculture itself has to be practised in a sustainable way. This does not only imply the need for environmentally friendly farming, as the government stresses, but also involves the overall development of the sector, including secure access to land, higher productivity and improved marketing opportunities. Only then can urban agriculture be the vibrant and viable economic sector it deserves to be.

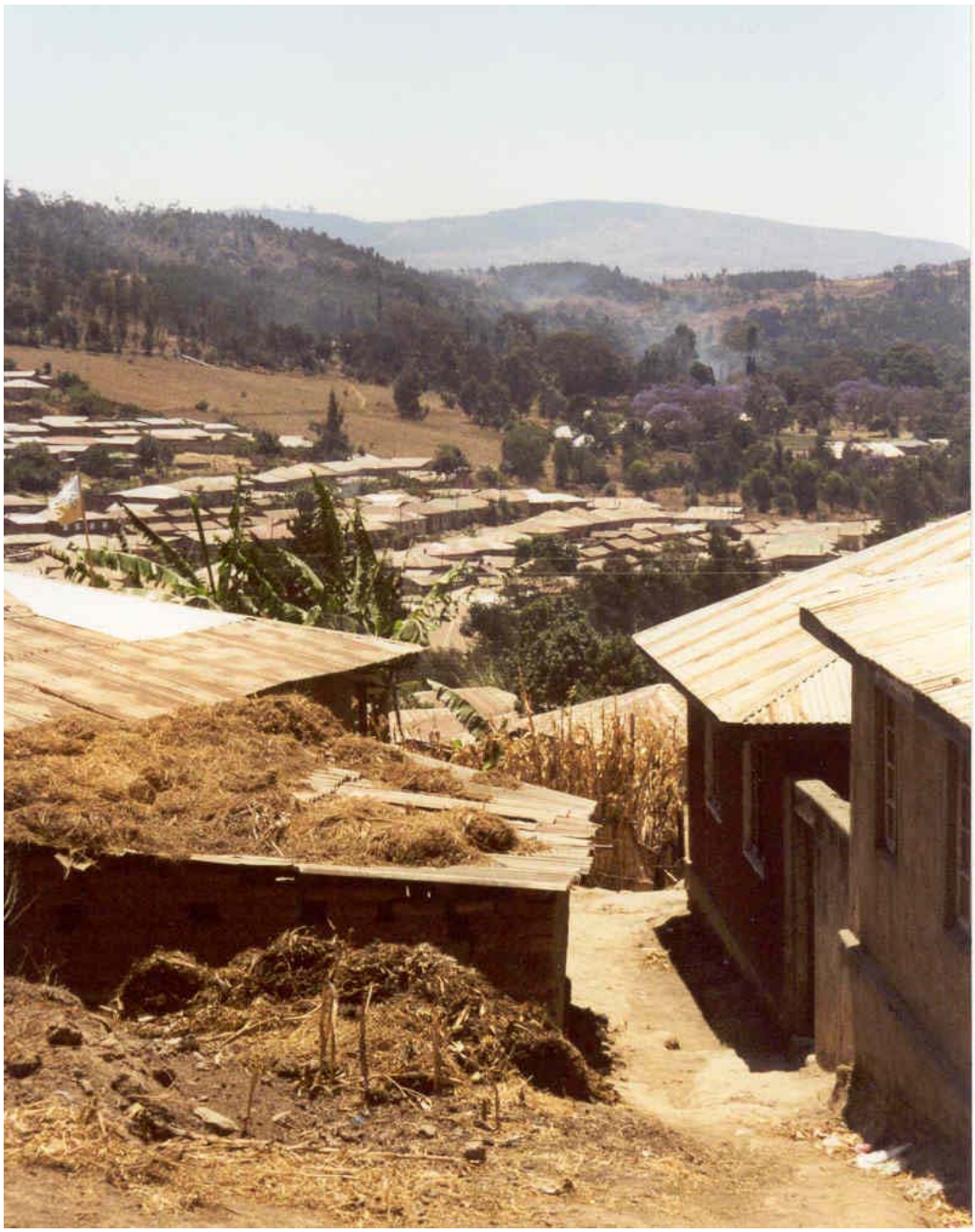

Photo 8 Signs of farming in the high-density area of Majengo, Mbeya

Annexes

Contents:

Annex 1: Tables with Chapter 1

Table A1.1 Research sample for the general survey

Town	Population density	Name of block	Number of respondents selected	Number of respondents covered
Morogoro	Low	Mlimani	20	20
		Bomani	20	20
	Medium	Kilakala	20	20
		Kihonda	20	20
		Mbuyuni (SUA)	20	20
		Mazimbu	20	20
	High	Mji Mpya	20	20
		Kichanani	20	20
		Sabasaba	20	20
		Uwanja wa Ndege	20	20
		Sultan area	20	20
		Mji Mkuu	20	20
		Mwembe Songo	20	20
		Mbuyuni	20	20
		Kingo	20	20
		SUB-TOTAL	300	300
Mbeya	Low	Uzunguni	20	20
		Jakaranda	20	20
		Block T	20	20
	Medium	Forest	20	20
		Soweto	20	20
		Block X (SAE)	20	21
	High	Mabatini	20	20
		Nonde	20	24
		Ghana	20	20
		Majengo	20	21
		Mwanjelwa	20	20
		Isanga	20	20
		Sinde	20	22
		Manga	20	20
		Mbalizi Road	20	20
		SUB-TOTAL	300	308
		GRAND TOTAL	600	608

Annex 2: Tables with Chapter 2

Table A2.1 Overview of studies on urban agriculture in Tanzania

	author(s)	year	C/L/UA	city/town
1	Amend & Mwaisango	1998	C	Dar es Salaam
2	Benedict	1999	UA	Morogoro
3	Bongole	1998	L	Dar es Salaam
4	Briggs	1989	C	Dar es Salaam
5	Briggs	1991	UA	Dar es Salaam
6	Bwana	1997	L	Morogoro
7	Dongus	2000	C	Dar es Salaam
8	Flynn	2001	UA	Mwanza
9	Hormann	1993	C	Tanzania
10	Howorth et al.	1995	C	Dar es Salaam
11	Howorth et al.	2001	UA	Tanzania
12	Jacobi	1997	C	Dar es Salaam
13	Jacobi	1998	C	Dar es Salaam
14	Jacobi et al.	2000	C	Dar es Salaam
15	Kiango & Likoko	1996	C	Dar es Salaam
16	Kishimba	1993	UA	Dar es Salaam
17	Kishimba	n.d.	C	Dar es Salaam
18	Kogi-Makau	1998	C	Dar es Salaam
19	Kyessi et al.	1993	UA	Dar es Salaam
20	Kyessi	1996	UA	Dar es Salaam
21	Kyessi	2001	UA	Dar es Salaam
22	Lupalla	1993	UA	Dar es Salaam
23	Lupanga et al.	1992	L	Tanzania
24	Materu	1993	UA	Dar es Salaam
25	Mattee et al.	1989	UA	Tanzania
26	Mbelwa	1993	L	Morogoro
27	Mgale	1998	UA	Dar es Salaam, Dodoma
28	Mlozi	1993	UA	Tanzania
29	Mlozi	1994	UA	Tanzania
30	Mlozi	1995a	UA	Dar es Salaam
31	Mlozi	1995b	UA	Tanzania
32	Mlozi	1996	UA	Dar es Salaam
33	Mlozi	1997a	UA	Dar es Salaam
34	Mlozi	1997b	L	Dar es Salaam
35	Mlozi	1998	C	Dar es Salaam
36	Mlozi	1999	UA	Tanzania
37	Mlozi	2001a	UA	Tanzania
38	Mlozi	2001b	UA	Tanzania
39	Mlozi	2001c	L	Tanzania
40	Mlozi & Hella	2001	L	Mbeya, Morogoro
41	Mlozi et al.	1989	L	Tanzania
42	Mlozi et al.	1992	UA	Tanzania
43	Mosha	1991	UA	Tanzania

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Table A2.1, continued

	author(s)	year	C/L/UA	city/town
44	Msangi	1997	L	Morogoro
45	Mtweve	1987	L	Dar es Salaam
46	Mvena et al.	1991	UA	Dar es Salaam, Morogoro, Dodoma, Mbeya, Makombako, Kilosa
47	Mwamfupe	1994	UA	Dar es Salaam
48	Ngoda	1991	L	Dar es Salaam
49	Nkonya	1997	UA	Morogoro
50	Nyamrunda & Sumberg	1997	L	Dar es Salaam
51	Sawio	1993a	UA	Dar es Salaam
52	Sawio	1993b	UA	Dar es Salaam
53	Sawio	1994	UA	Dar es Salaam
54	Sawio	1996	UA	Dar es Salaam
55	Sawio	1998	UA	Dar es Salaam
56	Schippers & Lewcock	1994	UA	Dar es Salaam
57	Shauri	1989	UA	Dar es Salaam
58	Shimbe	1997	L	Morogoro
59	Stevenson et al.	1994	C	Dar es Salaam, Dodoma, Arusha
60	Stevenson et al.	1996	C	Dar es Salaam
61	Sumberg	1997a	L	Dar es Salaam
62	Sumberg	1997b	L	Dar es Salaam
63	Sumberg	1998	L	Dar es Salaam
64	Tesha	1996	UA	Dar es Salaam
65	Tukay	1990	L	Dar es Salaam
66	Yachkaschi	1997	C	Dar es Salaam, Dodoma, Arusha

C = crop cultivation
L = livestock keeping
UA = urban agriculture (C + L)

Annex 3: Tables with Chapter 3

Table A3.1 Demographic characteristics of household heads, by town (%)

		Morogoro (N=300)	Mbeya (N=308)	Total (N=608)
Sex	male	82.0	83.4	82.7
	female	18.0	16.6	17.3
	Total	100	100	100
Age	21-30	6.0	3.0	4.5
	31-40	14.0	13.1	13.6
	41-50	35.8	23.9	29.8
	51-60	28.4	30.2	29.3
	61-70	11.7	22.3	17.1
	71-80	4.0	6.6	5.3
	>80	-.-	1.0	0.5
	Total	100	100	100
Residency	full-time resident	75.3	88.6	82.0
	regularly absent	22.1	11.4	16.6
	other	2.7	-.-	1.3
	Total	100	100	100
Marital status	married monogamously	73.2	77.3	75.2
	married polygamously	9.4	3.2	6.3
	divorced/separated	3.3	1.9	2.6
	widowed	6.7	14.0	10.4
	single	7.4	3.6	5.4
	Total	100	100	100
Educational level	no education	12.4	13.6	13.0
	primary school, up to standard 4	11.4	14.9	13.2
	primary school, standard 5-7	33.6	28.6	31.0
	secondary, form 1-4	22.1	24.0	23.1
	secondary, form 5-6	3.0	2.6	2.8
	more than secondary school	17.4	16.2	16.8
	Total	100	100	100
Occupational status	regularly employed	34.4	13.0	23.4
	self-employed	49.7	67.5	58.8
	temporarily employed	3.7	2.9	3.3
	casual labourer	1.0	-.-	0.5
	unemployed	11.2	16.6	14.0
	Total	100	100	100

Source: Survey data 2000.

Table A3.2 Migration characteristics of household heads, by town (%)

		Morogoro (N=300)	Mbeya (N=308)	Total (N=608)
Born in Morogoro/Mbeya?	yes	65.9	83.4	74.7
	no	34.1	16.6	25.3
	Total	100	100	100
		(N=197)	(N=252)	(N=449)
Arrival in Morogoro/Mbeya	before 1960	12.6	15.9	14.5
	1960-69	12.1	18.3	15.7
	1970-79	28.0	28.3	28.2
	1980-89	29.1	23.1	25.6
	1990-99	18.1	14.3	15.9
	Total	100	100	100
Reasons to come to Morogoro/Mbeya (Total>100%)	lack of land in area of origin	5.1	0.4	2.5
	lack of work in area of origin	6.6	3.6	4.9
	to look for work	7.1	19.4	14.1
	to work	64.3	53.6	58.3
	had relatives here	8.2	6.7	7.4
	followed spouse	3.6	6.7	5.4
	came with parents	13.3	8.7	10.7
	to attend school	3.1	2.4	2.7
	other	1.5	9.9	6.3
Region of origin	Arusha	1.1	0.8	0.9
	Dar es Salaam	0.6	0.4	0.5
	Dodoma	2.3	0.0	0.9
	Iringa	5.6	6.5	6.1
	Kagera	4.6	0.8	2.2
	Kigoma	2.3	0.4	1.1
	Kilimanjaro	23.7	4.9	12.5
	Lindi	0.6	0.4	0.5
	Mara	2.8	1.1	1.8
	Mbeya (rural)	5.6	78.3	49.1
	Morogoro (rural)	29.4	1.5	12.7
	Mtwara	1.7	0.4	0.9
	Mwanza	2.3	0.4	1.1
	Pwani (Coast)	1.1	0.0	0.5
	Ruvuma	2.3	0.8	1.4
	Shinyanga	1.1	0.4	0.7
	Singida	2.3	0.4	1.1
	Tabora	5.1	1.1	2.7
	Tanga	4.0	0.8	2.0
	outside Tanzania	1.7	0.8	1.1
	Total	100	100	100

Source: Survey data 2000.

Table A3.3 Non-farm income-generating activities, by town (%)

		Morogoro (N=300)	Mbeya (N=308)	Total (N=608)
Paid employment		35.7	26.9	31.3
Business	'business'	40.7	29.5	35.0
	food vending	10.7	1.3	5.9
	shop keeper	3.0	8.4	5.8
	making local brew	2.7	6.2	4.4
	craft making	5.7	3.2	4.4
	contractor	1.3	0.3	0.8
	fishing	1.3	0.0	0.7
Other*	driver	2.7	1.0	1.8
	masonry	1.0	1.6	1.3
	painting	0.3	0.0	0.2
	advocate	0.0	0.3	0.2

* Not clear whether paid employment or business.
Source: Survey data 2000.

Table A3.4 Frequencies of households farming, by location, type of farming and town (N)

		Morogoro	Mbeya	Total
Urban farming?	yes	271	287	558
	no	29	21	50
	Total	300	308	608
Rural farming?	yes	89	152	241
	no	211	156	367
	Total	300	308	608
Urban farming	crop cultivation only	157	48	205
	livestock keeping only	28	93	121
	crops & livestock	86	146	232
	Total	271	287	558
Rural farming	crop cultivation only	87	137	224
	livestock keeping only	0	2	2
	crops & livestock	2	13	15
	Total	89	152	241

Source: Survey data 2000.

Table A3.5 Characteristics of urban farmers, urban crop cultivators and urban livestock keepers (%)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		urban farming?		*urban crop cultivating?*		*urban livestock keeping?*	
		yes (558)	no (50)	yes (437)	no (171)	yes (353)	no (255)
Housing density	low	10.9	0.0	15.8	7.0	18.7	5.9
	medium	22.6	12.0	21.1	23.4	26.6	14.9
	high	62.9	88.0	63.2	69.6	54.7	79.2
	Total	100	100	100	100	100	100
Household size	1-3 members	20.8	24.0	22.9	16.4	13.0	32.2
	4-6 members	44.6	42.0	46.0	40.4	46.5	41.6
	7-9 members	25.4	30.0	22.4	34.5	29.7	20.4
	10+ members	9.1	4.0	8.7	8.8	10.8	5.9
	Total	100	100	100	100	100	100
Income category (Tsh)	up to 50,000	48.2	46.7	46.4	52.5	46.1	50.8
	50,00-90,000	32.0	37.8	32.9	31.3	31.8	33.2
	>90,000	19.8	15.6	20.7	16.3	22.0	16.0
	Total	100	100	100	100	100	100
Age class of household head	21-40 years	17.8	20.4	18.2	17.6	15.1	22.1
	41-60 years	59.8	51.0	60.4	55.9	61.3	56.1
	>60 years	22.3	28.6	21.4	26.5	23.6	21.7
	Total	100	100	100	100	100	100
Sex of household head	male	82.8	82.0	81.7	85.4	86.1	78.0
	female	17.2	18.0	18.3	14.6	13.9	22.0
	Total	100	100	100	100	100	100
Educational level of household head	none	12.4	20.0	12.9	13.5	9.6	17.8
	(partly) primary school	43.3	54.0	43.2	46.8	37.7	53.4
	(partly) secondary school	26.4	20.0	25.7	26.3	29.2	21.3
	more than secondary school	17.8	6.0	18.2	13.5	23.5	7.5
	Total	100	100	100	100	100	100

Source: Survey data 2000.

Table A3.6 Characteristics of urban crop cultivators and urban livestock keepers, by town (%)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		urban crop cultivating?				*urban livestock keeping?*			
		Morogoro		Mbeya		Morogoro		Mbeya	
		yes (243)	no (57)	yes (194)	no (114)	yes (114)	no (186)	yes (239)	no (69)
Housing density	low	6.2	8.8	27.8	6.1	14.0	2.2	20.9	15.9
	medium	32.1	21.1	7.2	24.6	56.1	14.0	12.6	17.4
	high	61.8	70.1	64.9	69.3	29.8	83.9	66.5	66.7
	Total	100	100	100	100	100	100	100	100
Household size	1-3 members	29.2	24.6	14.9	12.3	13.2	37.6	13.0	17.4
	4-6 members	39.5	40.4	54.1	40.4	40.4	39.2	49.4	47.8
	7-9 members	23.0	29.8	21.6	36.8	35.1	17.7	27.2	27.5
	10+ members	8.2	5.3	9.3	10.5	11.4	5.4	10.5	7.2
	Total	100	100	100	100	100	100	100	100
Income category (Tsh)	up to 50.000	44.7	30.9	48.6	63.8	28.4	50.3	54.6	52.4
	50.00-90.000	32.8	36.4	33.0	28.6	35.8	32.0	30.0	36.5
	>90.000	22.6	32.7	18.4	7.6	35.8	17.7	15.4	11.1
	Total	100	100	100	100	100	100	100	100
Age class of household head	21-40 years	20.7	17.5	15.1	17.7	17.7	21.5	13.9	23.9
	41-60 years	64.0	64.9	55.7	51.3	72.6	59.1	55.9	47.8
	>60 years	15.3	17.5	29.2	31.0	9.7	19.4	30.3	28.4
	Total	100	100	100	100	100	100	100	100
Sex of household head	male	81.5	84.2	82.0	86.0	92.1	75.8	83.3	84.1
	female	18.5	15.8	18.0	14.0	7.9	24.2	16.7	15.9
	Total	100	100	100	100	100	100	100	100
Educational level of household head	none	12.9	10.5	12.9	14.9	3.5	17.9	12.6	17.4
	(partly) primary school	43.2	52.6	43.3	43.9	23.7	58.2	44.4	40.6
	(partly) secondary school	26.6	19.3	24.7	29.8	35.1	19.0	26.4	27.5
	more than secondary school	17.4	17.5	19.1	11.4	37.7	4.9	16.7	14.5
	Total	100	100	100	100	100	100	100	100

Source: Survey data 2000.

Annex 4: Tables with Chapter 4

Table A4.1 Characteristics of urban plots, by town (%)

		Morogoro (N=307)	Mbeya (N=266)	Total (N=573)
Plot size (acres)	up to 0.5	13.0	25.3	18.7
	0.51-1.00	25.6	39.7	32.2
	1.01-2.00	22.5	19.8	21.3
	2.01-4.00	20.1	7.8	14.4
	>4.00	18.8	7.4	13.5
	Total	100	100	100
Type of land tenure	own land	47.8	72.6	59.4
	government land	20.4	12.2	16.5
	family land	13.7	6.1	10.1
	landlord	6.7	4.9	5.9
	relative's land	7.4	3.4	5.5
	other	4.0	0.8	2.5
	Total	100	100	100
Paying rent?	yes	9.9	6.8	8.3
	no	90.1	93.2	91.7
	Total	100	100	100
Location of plot	in own compound	32.4	43.5	37.6
	road side	40.8	19.2	30.8
	river side	16.7	13.1	15.0
	peri-urban	2.0	15.4	8.2
	railway side	5.0	2.3	3.8
	in industrial area	0.7	3.5	2.0
	under power line	2.3	0.8	1.6
	within residential area	0.0	2.3	1.1
	Total	100	100	100
Means of transport to plot	walking	27.1	43.1	34.6
	mini-bus	30.4	34.4	32.3
	walk/bicycle	13.7	5.3	9.8
	bicycle	11.7	6.9	9.4
	bicycle/mini-bus	11.0	2.7	7.1
	own cart	3.7	3.1	3.4
	walk/bicycle/mini-bus	2.0	1.1	1.6
	other	0.3	3.4	1.8
	Total	100	100	100
Cultivate plot since	before 1960	4.3	1.9	3.2
	1960-69	2.0	3.1	2.5
	1970-79	9.4	21.2	14.8
	1980-89	28.4	22.3	25.6
	1990-99	55.9	51.5	53.8
	Total	100	100	100

Source: Survey data 2000.

Table A4.2 Relation between household size and average land size (in acres) per household (linear regression), by town

No. of persons per household	Morogoro		Mbeya	
	Av. size >0	Av. size >1	Av. size >0	Av. size >1
2	2.59	2.70	2.63	3.33
3	3.40	3.54	1.74	2.65
4	2.35	2.74	1.55	1.96
5	2.40	2.94	2.11	2.33
6	4.38	4.66	1.87	2.21
7	4.34	4.71	1.98	2.29
8	2.94	3.09	2.03	2.23
9	2.21	2.65	2.00	2.30
10	4.07	4.89	1.32	1.50
≥ 11	7.61	7.61	3.02	3.61
Correlation coefficient	0.57	0.63	0.10	-0.12

Source: Survey data 2000.

Table A4.3 Relation between income category and average size of plots 1 and 2 combined (in acres) per household (linear regression), by town

Income category (Tsh per month)	Morogoro (N = 235)			Mbeya (N = 184)		
	Av. size	Av. size	No. of hh.	Av. size	Av. size	No. of hh.
< 50,000	3.06	3.06	105	1.76	1.76	89
50,000 – 70,000	4.03	4.03	54	1.86	1.86	43
70,001 – 90,000	2.70	2.70	23	2.42	2.42	18
90,001 – 110,000	4.82	4.82	18	2.73	2.73	14
110,001 – 130,000	2.85	2.85	13	2.31	2.31	4
130,001 – 150,000	2.13	--	4	0.89	--	6
150,001 – 170,000	3.63	--	4	1.25	--	2
> 170,000	6.51	6.51	14	2.81	2.81	8
Correlation	0.38	0.71		-0.03	0.82	
R^2	0.15	0.50		0.0009	0.68	

Source: Survey data 2000.

Table A4.4 Plot size characteristics, by town and gender of household head

	Plot 1				Plot 2			
	Morogoro		Mbeya		Morogoro		Mbeya	
H'hold head:	Male	Female	Male	Female	Male	Female	Male	Female
N:	192	41	155	33	43	6	49	8
Percentage:	78	76	60	65	17	11	19	16
Size:								
- average	2.81	2.53	1.62	1.39	2.92	1.50	1.11	1.47
- mode	1	1	1	1	1	0.50	1	2.00
- median	2	2	1	1	2	1.25	1	1.50

Source: Survey data 2000.

Table A4.5 Plot ownership, by town and gender of household head (%)*

Gender of h'hold head→ / Land ownership↓	Morogoro male (N=241)	Morogoro female (N=59)	Mbeya male (N=202)	Mbeya female (N-43)
- own land	45.6	39.0	72.3	67.4
- family land	11.6	16.9	6.4	4.7
- relative's land	7.5	5.1	3.0	4.7
- other	35.3	39.0	18.3	23.3
Total	100	100	100	100

* Plots 1 and 2 only.
Source: Survey data 2000.

Table A4.6 Distribution of location of plot 1, by town and housing density (%)

	Own compound	River side	Road side	Railway side	Peri-urban	Other	Total
Morogoro (N=238)							
- low	0.4	0.8	4.2	0.4	0.0	0.4	6.3
- medium	17.2	3.4	12.2	0.0	0.0	0.4	33.2
- high	13.4	12.2	26.9	4.2	2.5	1.3	60.5
Total	31.1	16.4	43.3	4.6	2.5	2.1	100
Mbeya (N=193)							
- low	21.8	1.0	3.1	1.0	0.0	1.0	28.0
- medium	3.6	1.6	2.1	0.0	0.0	0.0	7.3
- high	16.6	11.4	15.0	2.1	15.0	4.7	64.8
Total	42.0	14.0	20.2	3.1	15.0	5.7	100

Source: Survey data 2000.

Table A4.7 Frequency of crops grown, by type of crop and town (%)

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
A) As % of all households						
- maize	215	71.7	172	55.8	387	63.7
- beans	0	0.0	89	28.9	89	14.6
- rice	51	17.0	2	0.6	53	8.7
B) As % of crop cultivating households						
- maize	215	79.9	172	82.7	387	81.1
- beans	0	0.0	89	42.8	89	18.7
- rice	51	19.0	2	1.0	53	11.1
- bananas	22	8.2	1	0.5	23	3.8
- cassava	18	6.7	0	0.0	18	3.8
- *mchicha*	6	2.2	11	5.3	17	3.6
- tomatoes	6	2.2	10	4.8	16	3.4
- pumpkins	16	5.9	0	0.0	16	3.4
- cowpeas	13	4.8	0	0.0	13	2.7
- irish potatoes	0	0.0	13	6.3	13	2.7
- sunflower	4	1.3	6	1.9	10	2.1
- sweet potatoes	7	2.6	1	0.3	8	1.7
- cabbage	3	1.1	4	1.9	7	1.5
- wheat	0	0.0	5	2.4	5	1.0
- pawpaws	5	1.9	0	0.0	5	0.8
- green peas	0	0.0	4	1.3	4	0.8
- sorghum	4	1.3	0	0.0	4	0.8
- coconut	2	0.7	0	0.0	2	0.4
- coffee	0	0.0	1	0.5	1	0.2
- okra	1	0.3	0	0.0	1	0.2

Note: Based on number of times mentioned, hence Total>100%
Source: Survey data 2000.

Table A4.8 Distribution of end-use of production, by percentage of use

Percentage of use	subsistence	given away	cash
0	0.0	82.4	51.2
1-19	3.3	12.9	10.6
20-39	4.2	3.8	15.5
40-59	13.1	0.9	14.1
60-79	23.5	0.0	4.9
80-99	12.2	0.0	3.8
100	43.7	0.0	0.0
Total	100.0	100.0	100.0

Source: Survey data 2000.

Table A4.9 Distribution of persons responsible for maize production, by age group of household head (%)

age of household head		HH	Spouse	Parent	Child	HH+S	Other	Total
	(N)	*(216)*	*(55)*	*(18)*	*(17)*	*(69)*	*(10)*	*(385)*
21-40	*(69)*	47.8	15.9	5.8	2.9	21.7	5.8	100
41-60	*(232)*	57.8	14.2	3.9	4.3	17.7	2.2	100
≥ 60	*(84)*	58.3	13.1	6.0	6.0	15.5	1.2	100
Total	*(385)*	56.0	14.0	5.0	4.0	18.0	3.0	100

Note: HH = household head; S = spouse.
Source: Survey data 2000.

Table A4.10 Major persons responsible for major crops, by town (%)

	1st responsible		2nd responsible		3rd responsible	
	Morogoro	Mbeya	Morogoro	Mbeya	Morogoro	Mbeya
- maize	HH - 47.0%	HH - 67.6%	HS - 22.3%	SP - 16.2%	SP - 12.6%	HS - 12.1%
- beans	-	HH - 61.3%	-	SP - 20.4%	-	HS - 7.5%
- rice	HH - 43.1%	-	SP - 27.5%	-	CH - 15.7%	-
- bananas	HH - 50.0%		SP - 31.8%	-	OT - 18.2%	-
- cassava	HH - 63.2%	-	SP - 31.6%	-	B/S - 5.3%	-
- pumpkins	HH - 43.8%	-	SP - 37.5%	-	CH - 18.8%	-

Note: HH = household head, SP = spouse, HS = household head and spouse, CH = child, B/S = brother or sister, OT = others.
Source: Survey data 2000.

Table A4.11 Characteristics of maize selling and responsibility of production, by type of residency of household head (%)

	Households selling maize			Person responsible for maize production		
Type of residency	sold ≥ 0.5	sold < 0.5	none	HH	spouse	HH+S
- full time resident	14.6	14.6	70.8	56.5	13.0	17.9
- regularly absent	20.0	25.7	54.3	55.7	18.6	15.7
Total	15.6	16.7	67.7	56.3	14.0	17.5

Note: HH = Household head; S = spouse.
Source: Survey data 2000.

Table A4.12 Money received as assistance for crop cultivation and its source, by town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
Received money?						
- no	87	36.1	80	41.5	167	38.5
- yes	154	63.9	113	58.5	267	61.5
Total	241	100	193	100	434	100
Source of money received:						
- own money	129	83.8	97	85.8	226	84.6
- neighbour	2	1.3	2	1.8	4	1.5
- from the bank	0	0.0	0	0.0	0	0.0
- relatives	4	2.6	3	2.7	7	2.6
- informal lending	8	5.2	0	0.0	8	3.0
- family member	9	5.8	11	9.7	20	7.5
- own + informal lending	2	1.3	0	0.0	2	0.7
Total	154	100	113	100	267	100

Source: Survey data 2000.

Table A4.13 Access to and source of technical advice for crop cultivation, by town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
Received technical advice?						
- no	126	52.9	100	51.8	226	52.4
- yes	112	47.1	93	48.2	205	47.6
Total	238	100	193	100	431	100
Source of technical advice:						
- extension officer	71	63.4	50	54.3	121	59.3
- programme	5	4.5	10	10.9	15	7.4
- neighbour	15	13.4	16	17.4	31	15.2
- relative	3	2.7	0	0.0	3	1.5
- friend	5	4.5	6	6.5	11	5.4
- family member	11	9.8	8	8.7	19	9.3
- SUA	1	0.9	0	0.0	1	0.5
- Uyole Agric. Centre	0	0.0	2	2.2	2	1.0
- ext. off. + fam. member	1	0.9	0	0.0	1	0.5
Total	112	100	92	100	204	100

Source: Survey data 2000.

Table A4.14 Use of in-kind labour for crop cultivation and its sources, by town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
No. of households using in-kind labour	140	57.9	126	65.6	266	61.3
Source of in-kind labour:						
- spouse	58	41.4	47	37.6	105	39.6
- sons	63	45.0	73	58.4	136	51.3
- daughters	55	39.3	64	51.2	119	44.9
- relatives	24	17.1	15	12.0	39	14.7
- friends	4	2.9	4	3.2	8	3.0
- working groups	4	2.9	4	3.2	8	3.0

Note: Number of times mentioned, so Total>100%.
Source: Survey data 2000.

Table A4.15 Sources of hired labour for crop cultivation, by town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
No. of households using hired labour	149	61.6	115	60.2	264	61.0
Source of hired labour:						
- rural women	34	23.6	31	26.5	65	24.9
- rural men	31	21.5	28	23.9	59	22.6
- rural male youth	25	17.4	14	12.0	39	14.9
- rural female youth	24	16.7	11	9.4	35	13.4
- urban people	64	44.4	62	53.0	126	48.3

Note: Number of times mentioned, so Total >100%.
Source: Survey data 2000.

Table A4.16 Means of transport with crop cultivation: frequency of use, by town

	Morogoro		Mbeya		Total	
Means of transport	N	%	N	%	N	%
- head-carried	50	20.7	78	40.4	128	29.4
- bicycle	51	21.1	18	9.3	69	15.9
- ox-cart	3	1.2	3	1.6	6	1.4
- one-ton pick-up	102	42.1	58	30.1	160	36.8
- seven-ton lorry	54	22.3	62	32.1	116	26.7
- tractor	22	9.1	1	0.5	23	5.3
- daladala (matatu)	0	0.0	1	0.5	1	0.2
- own car	1	0.4	0	0.0	1	0.2
Total (no. of households)	242		193		435	

Note: Number of times mentioned, so Total>100%.
Source: Survey data 2000.

Table A4.17 Problems with crop cultivation in town, by type of problem and town (%)

	all problems mentioned			major problem		
	Morogoro (N=232)	Mbeya (N=182)	Total (N=414)	Morogoro (N=228)	Mbeya (N=180)	Total (N=408)
- no problem	2.2	4.9	3.4	2.2	4.9	3.4
- poor weather	49.6	19.2	36.2	39.9	12.2	27.7
- lack of capital	16.4	34.6	24.4	13.6	31.1	21.3
- pests	18.1	7.7	13.5	9.6	3.9	7.1
- high input costs	6.5	20.3	12.6	3.1	15.6	8.6
- lack of inputs	3.4	20.9	11.1	2.2	12.2	6.6
- theft	8.6	9.9	9.2	5.3	5.6	5.4
- high transport costs	9.9	6.6	8.5	6.1	0.6	3.7
- poor seed germination	9.5	1.1	5.8	5.3	1.1	3.4
- vermins	6.0	2.2	4.3	3.5	2.2	2.9
- labour shortage/costs	3.4	3.8	3.6	1.8	0.6	1.2
- lack of improved seeds	4.3	1.6	3.1	1.3	0.0	0.7
- destruction by livestock	3.0	2.7	2.9	0.4	1.7	1.0
- low production	0.9	3.8	2.2	0.0	1.1	0.5
- low soil fertility/erosion	2.6	1.7	2.2	1.8	1.7	1.7
- diseases	2.2	1.1	1.7	0.4	1.1	0.7
- no tractor hire services	2.6	0.0	1.4	0.9	0.0	0.5
- lack of irrigation water	1.3	1.7	1.4	0.9	1.7	1.2
- water logging	0.9	1.1	1.0	0.4	0.6	0.5
- untimely farm operations	0.9	1.1	1.0	0.0	0.6	0.2
- weeds	1.7	0.0	1.0	0.0	0.0	0.0
- long distance to field	0.9	0.5	0.7	0.4	0.0	0.2
- shortage of land	0.4	1.1	0.7	0.4	1.1	0.7
- poor cultivation method	0.0	0.6	0.3	0.0	0.6	0.2
- storage	0.4	0.0	0.2	0.4	0.0	0.2
Total				100	100	100

Source: Survey data 2000.

Annex 5: Tables with Chapter 5

Table A5.1 Percentage households keeping livestock, by type of livestock and town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
A) As % of all households						
- improved cattle	60	20.0	149	48.4	209	34.4
- goats/sheep	34	11.3	40	13.0	74	12.2
- local chicken	35	11.7	34	11.0	69	11.3
- pigs	14	4.7	53	17.2	67	11.0
- local cattle	2	0.7	53	17.2	55	9.0
- ducks	18	6.0	18	5.8	36	5.9
- improved chicken	13	4.3	21	6.8	34	5.6
- rabbits	1	0.3	4	1.3	5	0.8
- other poultry (turkey/guinea fowl)	0	0.0	3	1.0	3	0.5
Total number of households	300		308		608	
B) As % of livestock-keeping households						
- improved cattle	60	52.6	149	62.3	209	59.2
- goats/sheep	34	29.8	40	16.7	74	21.0
- local chicken	35	30.7	34	14.2	69	19.5
- pigs	14	12.3	53	22.2	67	19.0
- local cattle	2	1.8	53	22.2	55	15.6
- ducks	18	15.8	18	7.5	36	10.2
- improved chicken	13	11.4	21	8.8	34	9.6
- rabbits	1	0.9	4	1.7	5	1.4
- other poultry (turkey/guinea fowl)	0	0.0	3	1.0	3	0.5
Total number of households	114		239		353	

Source: Survey data 2000.

Table A5.2 Livestock rearing system, by type of livestock and town

	Morogoro		Mbeya		Total	
Rearing system	N	%	N	%	N	%
Improved cattle						
- zero-grazing	54	91.5	133	89.9	187	90.3
- zero-grazing + free range	5	8.5	13	8.8	18	8.7
- free range	0	0.0	2	1.4	2	1.0
Total	59	100.0	148	100.0	207	100.0
Goats/Sheep						
- zero-grazing	14	42.4	21	53.8	35	48.6
- zero-grazing + free range	19	57.6	17	43.6	36	50.0
- free range	0	0.0	1	2.6	1	1.4
Total	33	100.0	39	100.0	72	100.0

Source: Survey data 2000.

Table A5.3 Distribution of livestock keeping being a full-time occupation, by town

	Morogoro		Mbeya		Total	
	N	%	N	%	N	%
- no	98	86.0	142	59.7	240	68.2
- yes	16	14.0	96	40.3	112	31.8
Total	114	100.0	238	100.0	352	100.0

Source: Survey data 2000.

Table A5.4 Relationships between educational level of household head and selected characteristics of improved cattle keeping

Educational level:	none	primary school	secondary school	> secondary school
avg. heads of improved cattle per h'hold	2.3	2.6	3.3	4.3
% practicing zero-grazing	86.7	93.9	86.6	87.9
% using veterinary drugs	86.7	83.9	98.5	100.0
% using feed supplements	92.3	88.7	94.0	98.3
% using urban waste as feed	60.0	54.5	67.2	51.7
% using crop residues as feed	53.3	51.5	62.7	72.4
% receiving technical advice	93.3	87.9	95.5	98.3

Source: Survey data 2000.

Table A5.5 Reasons to keep livestock, by town

	Morogoro		Mbeya		Total	
Reason	N	%	N	%	N	%
- needed food	91	80.5	191	80.6	282	80.6
- needed income	79	69.9	188	79.3	267	76.3
- diversify income	29	25.7	35	14.8	64	18.3
- hobby	3	2.7	2	0.8	5	1.4
- had no job	0	0.0	0	0.0	0	0.0
- tradition	1	0.9	2	0.8	3	0.8
- inherit	0	0.0	1	0.4	1	0.3
Total	113		237		350	

Note: Number of times mentioned, so Total>100%.
Source: Survey data 2000.

Table A5.6 Major reason to keep livestock, by town

	Morogoro		Mbeya		Total	
Reason	N	%	N	%	N	%
- needed food	53	46.9	100	42.2	153	43.7
- needed income	31	27.4	103	43.5	134	38.3
- diversify income	19	16.8	14	5.9	33	9.4
- food + income	8	7.1	10	4.2	18	5.1
- hobby	2	1.8	5	2.1	7	2.0
- tradition	0	0.0	4	1.7	4	1.1
- inheritance	0	0.0	1	0.4	1	0.3
- had no job	0	0.0	0	0.0	0	0.0
Total	113	100.0	237	100.0	350	100.0

Source: Survey data 2000.

Table A5.7 Problems with livestock keeping in town, by type of problem and town (%)

	all problems mentioned			major problem		
	Morogoro (N=114)	Mbeya (N=236)	Total (N=350)	Morogoro (N=114)	Mbeya (N=238)	Total (N=352)
- no problem	14.0	17.8	16.6			
- diseases	42.1	39.4	40.3	29.8	25.6	27.0
- shortage of fodder/pasture	32.5	22.9	26.0	18.4	16.8	17.3
- high costs of inputs	14.1	22.0	19.4	9.7	13.9	12.5
- lack of capital	4.4	12.7	10.0	3.5	11.8	9.1
- death/poisoning	10.6	7.6	8.6	5.3	2.9	3.7
- poor market/low prices	8.8	3.8	5.4	8.8	2.9	4.8
- theft	5.3	5.5	5.4	3.5	1.7	2.3
- lack of space	2.6	1.7	2.0	2.6	0.8	1.4
- infertility of animals	1.8	1.7	1.7	1.8	1.7	1.7
- poor veterinary services	0.0	2.1	1.4	0.0	2.1	1.4
- lack of transport	0.0	1.3	0.9	0.0	0.4	0.3
- lack of labour	0.9	0.8	0.9	0.0	0.0	0.0
- lack of shelter	0.0	0.8	0.6	0.0	0.8	0.6
- livestock levies	0.0	0.8	0.6	0.0	0.8	0.6
- low production	0.9	0.4	0.6	0.0	0.0	0.0
- predators	0.9	0.0	0.3	0.9	0.0	0.3
- poor quality feed	0.9	0.0	0.3	0.9	0.0	0.3
- too much abortion	0.9	0.0	0.3	0.9	0.0	0.3
- lack of knowledge	0.9	0.0	0.3	0.0	0.0	0.0
Total				100	100	100

Source: Survey data 2000.

Annex 6: Tables with Chapter 6

Table A6.1 Importance of urban farming, by type of farming and town (%)

		Morogoro	Mbeya	Total
Urban crop cultivation	(N=)	(243)	(194)	(437)
could not survive without it		9.9	8.2	9.2
major food source		46.1	29.9	38.9
major income source		1.2	0.5	0.9
additional food source		19.3	20.1	19.7
additional income source		2.1	0.0	1.1
major food and major income source		6.6	8.2	7.3
major food and additional income source		7.0	18.0	11.9
major income and additional food source		0.4	1.0	0.7
additional food and additional income source		5.3	13.4	8.9
could do without it		2.1	0.5	1.4
Total		100	100	100
Urban livestock keeping	(N=)	(114)	(239)	(353)
could not survive without it		7.9	9.3	8.8
major food source		7.9	7.2	7.4
major income source		14.9	7.2	9.7
additional food source		15.8	13.9	14.5
additional income source		23.7	10.1	14.5
major food and major income source		5.3	20.3	15.4
major food and additional income source		0.0	5.5	3.7
major income and additional food source		2.6	2.5	2.6
additional food and additional income source		20.2	24.1	22.8
could do without it		1.8	0.0	0.6
Total		100	100	100

Source: Survey data 2000.

Table A6.2 Importance of urban farming, by type of farming and household characteristics (%)

		(N)	could not survive without	food source	income source	food & income source	could do with-out
Urban crop cultivation							
household	<50,000	(195)	6.7	60.0	1.5	30.3	1.5
monthly	50,000-90,000	(138)	13.8	52.9	1.4	31.2	0.7
income (Tsh)	>90,000	(87)	6.9	60.9	4.6	25.3	2.3
household	1-3	(100)	8.0	62.0	2.0	26.0	2.0
size	4-6	(201)	9.0	58.7	3.0	28.4	1.0
(members)	7-9	(98)	10.2	53.1	1.0	34.7	1.0
	10+	(38)	10.5	63.2	0.0	23.7	2.6
sex of	male	(357)	7.6	59.7	2.0	29.4	1.4
h'hold head	female	(80)	16.3	53.8	2.5	26.3	1.3
Urban livestock keeping							
household	<50,000	(155)	8.4	25.2	22.6	43.9	0.0
monthly	50,000-90,000	(106)	9.4	13.2	25.5	50.9	0.9
income (Tsh.)	>90,000	(74)	6.8	29.7	27.0	35.1	1.4
household	1-3	(46)	19.6	17.4	23.9	39.1	0.0
size	4-6	(162)	6.2	22.8	25.3	44.4	1.2
(members)	7-9	(105)	8.6	22.9	22.9	45.7	0.0
	10+	(38)	7.9	21.1	23.7	47.7	0.0
sex of	male	(302)	9.3	21.9	24.2	44.4	0.3
h'hold head	female	(49)	6.1	22.4	24.5	44.9	2.0

Source: Survey data 2000.

Table A6.3 Characteristics of rural plots, by town (%)

	(N*=; plots)	Morogoro (110)	Mbeya (212)	Total (322)
Location of plot	Morogoro Rural	89.0	0.5	31.2
	Kilosa	8.3	0.0	2.9
	Mbeya Rural	0.0	74.1	48.4
	Mbarali	0.0	13.2	8.6
	Rungwe	0.0	8.8	5.7
	elsewhere	2.7	3.4	3.1
	Total	100	100	100
Ownership of plot	own land	55.7	74.8	68.3
	family land	17.0	9.2	11.9
	relative's land	11.3	3.9	6.4
	landlord	10.4	7.3	8.3
	government	5.7	4.9	5.1
	Total	100	100	100
Size of plot (acres)	up to 1	10.0	34.0	25.6
	1.1-2	22.7	30.5	27.8
	2.1-4	22.7	20.7	21.4
	4.1-10	24.5	12.8	16.9
	10.1-50	14.5	1.0	5.8
	>50	5.5	1.0	2.6
	Total	100	100	100
User of plot	myself	97.1	97.1	97.1
	other	2.9	2.9	2.9
	Total	100	100	100
Person responsible	member of urban household	87.2	84.7	85.5
	relative living there	3.7	7.7	6.3
	hired labour	3.7	3.3	3.5
	manager	0.0	2.4	1.6
	h'hold member + someone else	5.5	2.0	3.1
	Total	100	100	100
Type of usage	crop cultivation only	96.3	94.7	95.3
	livestock keeping only	0.0	1.0	0.6
	both crops and livestock	2.7	2.4	2.5
	idle	0.9	1.9	1.6
	Total	100	100	100
Food/income source?	food source only	40.2	66.2	57.3
	income source only	0.9	5.8	4.1
	both food and income	58.9	28.0	38.5
	Total	100	100	100

* Missing cases have been left out.
Source: Survey data 2000.

Table A6.4 Most important food sources in 1998/99, by town (%)*

(N=)	Morogoro (296)	Mbeya (302)	Total (598)
- own urban production	23.3	18.5	20.9
- own rural production	7.0	11.0	9.0
- urban production + rural production	5.7	14.0	9.9
- urban production + rural production + purchased	0.7	4.2	2.5
- urban production + purchased	35.0	24.4	29.6
- urban production + purchased + donations/gifts	0.3	0.0	0.2
- rural production + purchased	9.7	10.1	9.9
- purchased	15.7	13.3	14.5
- purchased + donations/gifts	0.3	0.6	0.5
- donations/gifts	0.0	0.3	0.2
Total	100	100	100

* Missing cases have been left out.
Source: Survey data 2000.

Table A6.5 "Did you always have enough to eat in 1998/99?", by town (%)*

(N=)	Morogoro (296)	Mbeya (301)	Total (597)
- yes, always	45.3	74.1	59.8
- most of the time	19.6	11.0	15.2
- about half of the time	28.4	10.3	19.3
- now and then	2.4	1.3	1.8
- never	4.4	3.3	3.9
Total	100	100	100

* Missing cases have been left out.
Source: Survey data 2000.

Table A6.6 "Did you always have enough to eat in 1998/99?", by various characteristics and town (% "yes")

		Morogoro			Mbeya		
		(N)	yes, always	half the time or less	(N)	yes, always	half the time or less
Household monthly income (in Tsh)	<50,001	(120)	32.5	36.7	(155)	71.0	16.1
	50,001-90,000	(97)	42.3	45.4	(89)	79.8	11.2
	>90,000	(70)	67.1	21.4	(42)	73.8	14.3
Household size	1-3 members	(84)	40.5	39.3	(43)	76.7	14.0
	4-6 members	(118)	44.1	34.7	(146)	77.4	11.0
	7-9 members	(71)	47.9	35.2	(83)	77.1	18.1
	10+ members	(23)	60.9	21.7	(29)	44.8	27.6
Sex of h'hold head	male	(242)	48.3	33.1	(250)	73.6	15.6
	female	(54)	31.5	11.1	(51)	76.5	11.8
Age of h'hold head	21-40	(59)	50.8	33.9	(47)	74.5	10.6
	41-60	(190)	46.3	33.2	(161)	75.8	14.9
	>60	(46)	34.8	43.5	(90)	71.1	16.7
Educational level household head	none	(37)	27.0	51.4	(40)	67.5	25.0
	(partly) primary	(131)	32.8	42.0	(131)	72.5	16.8
	(partly) secondary	(75)	56.0	28.0	(81)	74.1	8.6
	>secondary	(51)	74.5	17.6	(49)	83.7	12.2

* Missing cases have been left out.
Source: Survey data 2000.

Table A6.7 "How did you cope with food shortages?", by town (%)*

	(N=)	Morogoro (152)	Mbeya (65)	Total (217)
- purchased food		90.1	41.5	75.6
- purchased food + did small business		1.3	15.4	5.5
- purchased food + increased cultivation		0.7	1.5	0.9
- purchased food + donations		2.6	1.5	2.3
- did small business		1.3	13.8	5.1
- did small business + received donations		0.0	3.1	0.9
- found paid employment		3.3	0.0	2.3
- increased cultivation		0.0	1.5	0.5
- went occasionally without food		0.0	3.1	0.9
- received donations from children/relatives		0.0	13.8	4.1
- earned money with rent from the house		0.7	1.5	0.9
- exchanged produce		0.0	3.1	0.9
Total		100	100	100

* Missing cases have been left out.
Source: Survey data 2000.

Table A6.8 "How to improve your food situation?", by town (number of times mentioned; %)*

(N=)	Morogoro (184)	Mbeya (153)	Total (337)
Farming general	*47.3*	*60.1*	*53.2*
• cultivate more land	41.3	37.3	39.5
• increase production	3.8	16.3	9.5
• put more effort into agriculture	1.1	6.5	3.6
• produce own food	1.1	0.0	0.6
Crops: inputs/techniques	*39.7*	*48.0*	*43.7*
• use chemical fertiliser	9.2	26.1	16.9
• use improved seeds	8.7	13.7	11.0
• practice timely/early planting	8.2	0.7	4.7
• use pesticides/insecticides/herbicides	3.8	4.6	4.2
• use farmyard manure	2.2	3.3	2.7
• cultivate different types of crops	3.3	0.0	1.8
• use irrigation	2.7	0.0	1.5
• plant drought-resistant crops	1.1	0.0	0.6
• use good farm implements	0.5	0.0	0.3
Money/capital	*20.1*	*45.0*	*31.3*
• borrow money/find capital	18.5	35.9	26.4
• input costs should be reduced	1.6	5.2	3.3
• income-generating activities	0.0	3.9	1.6
Farm management	*26.6*	*9.2*	*18.7*
• good management practices	25.0	3.3	15.1
• use modern/better technologies	1.6	5.9	3.6
Advice/assistance	*14.0*	*10.5*	*12.5*
• advice from extension officers	7.6	4.6	6.2
• assistance from government	4.3	2.6	3.6
• farming to be encouraged	1.6	1.3	1.5
• farmers should be trained	0.5	2.0	1.2
Storage	*9.8*	*2.0*	*6.2*
• provide good storage	8.2	1.3	5.0
• store enough food	1.6	0.7	1.2
Livestock	*1.6*	*6.5*	*3.9*
• keep more/improved livestock	1.6	6.5	3.9
Other	*2.1*	*0.7*	*1.5*
• use tractor/agric. machinery/transport	1.1	0.7	0.9
• fence farms	0.5	0.0	0.3
• measures against thieves	0.5	0.0	0.3

* Missing cases have been left out.
Source: Survey data 2000.

Annex 7: Tables with Chapter 7

Table A7.1 Urban crop cultivators: awareness of damage to the urban environment, by town (%)

		Morogoro	Mbeya	Total
		(N=240)	(N=189)	(N=429)
Aware of damage to the urban environment?	yes	33.3	39.2	35.9
	no	66.7	60.8	64.1
	Total	100	100	100
		(N=78)	(N=70)	(N=148)
Types of damage (nr. of times mentioned)	erosion	28.2	81.4	53.4
	deforestation	30.8	20.0	25.7
	overcropping/loss of fertility	16.7	0.0	8.8
	environmental destruction	10.3	2.9	6.8
	environmental pollution	6.4	5.7	6.1
	mosquitoes in crops	5.1	7.1	6.1
	crop residues piling up/setting fire	11.6	0.0	6.1
	destruction of water sources	5.1	2.9	4.1
	soil pollution due to chem. fertiliser	1.3	4.3	2.7
	health hazards	2.6	2.9	2.7
	cutting vegetables cause winds	3.8	0.0	2.0
	cutting vegetables cause floods	1.3	0.0	0.7
	blocking of roads (roadside cultivation)	1.3	0.0	0.7
		(N=240)	(N=189)	(N=429)
Measures against damage by crop cultivation?	yes	33.3	42.1	37.2
	no	66.7	57.9	62.8
	Total	100	100	100
		(N=78)	(N=80)	(N=158)
Which measures? (nr. of times mentioned)	measures against soil erosion*	20.5	82.5	51.9
	tree planting	56.4	41.3	48.7
	mixed cropping/crop rotation	15.4	0.0	7.6
	proper farming system	11.5	1.3	6.3
	use of organic/farmyard manure	3.8	8.8	6.3
	avoid cutting trees/cultivation near river	7.7	3.8	5.7
	control/avoid fire	9.0	1.3	5.1
	cut-off drain from plot	0.0	5.0	2.5
	timely weeding	2.6	1.3	1.9
	fencing cultivated area	0.0	3.8	1.9
	other	1.3	2.6	1.9

* Construction of terraces, contour farming, construction of ridges and protection of slopes by using it only as pasture or avoid planting there.
Source: Survey data 2000.

Table A7.2 Urban crop cultivators: awareness of and measures against environmental damage due to crop cultivation, by various characteristics and town (% "yes")

		Morogoro			Mbeya		
		(N)	aware? "yes"	meas-ures? "yes"	(N)	aware? "yes"	meas-ures? "yes"
Housing density	low	(15)	60.0	60.0	(54)	48.1	44.4
	medium	(78)	26.9	24.1	(14)	28.6	26.7
	high	(150)	33.3	34.9	(127)	34.6	40.9
Household monthly income (in Tsh)	<50,001	(105)	29.5	30.2	(91)	35.2	40.7
	50,001-90,000	(77)	41.6	38.2	(61)	32.8	42.6
	>90,000	(53)	24.5	30.2	(34)	61.8	48.6
Sex of h'hold head	male	(198)	34.3	34.8	(160)	39.4	34.8
	female	(45)	26.7	24.4	(35)	31.4	24.4
Age of h'hold head	21-40	(50)	30.0	33.3	(30)	46.7	40.0
	41-60	(155)	35.5	34.2	(107)	39.3	43.5
	>60	(37)	27.0	27.8	(56)	32.1	37.5
Educational level household head	none	(31)	32.3	33.3	(25)	12.0	24.0
	(partly) primary	(104)	34.6	37.1	(84)	35.7	40.5
	(partly) secondary	(64)	37.5	34.4	(49)	42.9	42.0
	>secondary	(42)	23.8	21.4	(37)	54.1	51.4
Person responsible (maize)	household head	(102)	37.3	37.6	(117)	35.9	42.7
	spouse	(27)	18.5	22.2	(28)	46.4	53.6
	head & spouse	(53)	34.0	34.0	(21)	38.1	23.8
Received technical advice?	yes	(112)	34.8	34.8	(93)	36.6	41.9
	no	(126)	32.5	31.2	(100)	40.0	41.0
Type of technical advice	professional	(78)	34.6	33.3	(62)	37.1	45.2
	non-professional	(34)	35.3	38.2	(30)	36.7	36.7

Source: Survey data 2000.

Table A7.3 Use of inputs for crop cultivation, by various characteristics and town (% users)*

		Morogoro						Mbeya					
		(N)	chem. fert.	pesti-cides	insect-icides	man-ure	crop resid.	(N)	chem. fert.	pesti-cides	insect-icides	man-ure	crop resid.
Housing density	low	*(15)*	*26.7*	*0.0*	*6.7*	*0.0*	*6.7*	(54)	70.4	53.7	63.0	79.6	22.2
	medium	(78)	30.8	14.1	24.4	43.6	39.7	*(14)*	*71.4*	*7.1*	*28.6*	*64.3*	*21.4*
	high	(150)	20.0	15.3	10.7	4.7	28.7	(126)	75.4	29.4	33.3	54.8	24.6
Household monthly income (in Tsh)	<50,001	(105)	16.2	12.4	11.4	7.6	37.1	(90)	71.1	22.2	24.4	62.2	23.3
	50,001-90,000	(77)	22.1	10.4	16.9	13.0	15.6	(61)	82.0	44.3	60.7	57.4	27.9
	>90,000	(53)	39.6	22.6	17.0	35.8	34.0	(34)	70.6	55.9	58.8	70.6	20.6
Sex of h'hold head	male	(198)	22.7	13.1	16.2	17.7	32.3	(159)	74.2	35.8	42.1	62.3	25.8
	female	(45)	28.9	17.8	8.9	13.3	24.4	(35)	71.4	28.6	37.1	62.9	14.3
Age of h'hold head	21-40	(50)	24.0	18.0	24.0	10.0	24.0	(29)	75.9	27.6	51.7	72.4	27.6
	41-60	(155)	25.8	14.2	14.2	22.6	27.7	(107)	72.9	37.4	45.8	64.5	26.2
	>60	(37)	13.5	8.1	5.4	2.7	54.1	(56)	75.0	33.9	28.6	51.8	17.9
Educational level household head	none	(31)	19.4	16.1	12.9	3.2	22.6	(25)	64.0	12.0	24.0	40.0	16.0
	(partly) primary	(104)	14.4	14.4	11.5	5.8	30.8	(84)	75.0	29.8	32.1	60.7	25.0
	(partly) secondary	(64)	26.6	10.9	17.2	17.2	31.3	(48)	77.1	37.5	52.1	66.7	22.9
	>secondary	(42)	45.2	16.7	21.4	52.4	38.1	(37)	73.0	56.8	59.5	75.7	27.0
Person responsible (maize)	h'hold head	(102)	25.5	19.6	16.7	11.8	23.5	(117)	68.4	34.2	36.8	63.2	27.4
	spouse	(27)	22.2	11.1	11.1	22.2	29.6	(28)	92.9	50.0	46.4	60.7	17.9
	both	(53)	28.3	13.2	17.0	26.4	49.1	(21)	81.0	38.1	57.1	57.1	19.0
Received technical advice?	yes	(112)	28.6	19.6	23.2	18.8	34.8	(93)	79.6	38.7	41.9	59.1	26.9
	no	(126)	19.8	9.5	7.9	14.3	27.0	(100)	69.0	31.0	41.0	66.0	21.0
Type of technical advice	professional	(78)	30.8	20.5	28.2	17.9	37.2	(62)	80.6	46.8	40.3	53.2	27.4
	non-professional	(34)	23.5	17.6	11.8	20.6	29.4	(30)	76.7	23.3	46.7	70.0	23.3

* In italic: N's too small to permit comparisons.
Source: Survey data 2000.

Table A7.4 Urban livestock keepers: awareness of damage to the urban environment, by town (%)

		Morogoro	Mbeya	Total
		(N=114)	(N=239)	(N=353)
Aware of damage to the urban environment?	yes	60.2	50.8	53.9
	no	39.8	49.2	46.1
	Total	100	100	100
		(N=60)	(N=118)	(N=178)
Types of damage (nr. of times mentioned)	erosion	50.0	44.1	46.1
	destruction of crops/trees	18.3	35.6	29.8
	dirtiness	15.0	30.5	25.3
	bad smell	26.7	20.3	22.5
	noise	25.0	5.9	12.4
	destruction of gardens	3.3	6.8	5.6
	deforestation	3.3	5.1	4.5
	can cause accidents	1.7	3.4	2.8
	destruction of water sources	0.0	0.8	0.6
	do not cause damage	1.7	0.0	0.6
		(N=112)	(N=235)	(N=347)
Measures against damage by livestock keeping?	yes	61.6	66.4	64.8
	no	38.4	33.6	35.2
	Total	100	100	100
		(N=68)	(N=154)	(N=222)
Which measures? (nr. of times mentioned)	zero-grazing	80.9	84.4	83.3
	proper disposal of animals' waste[1]	13.2	23.3	20.3
	use manure for crop cultivation[2]	14.7	5.8	8.6
	planting trees	5.9	1.9	3.2
	tethering[3]	5.9	0.0	1.9
	reduce number of animals	0.0	1.9	1.4
	advice from extension officers	0.0	0.6	0.5

Notes: 1) Mainly by keeping the manure in a pit.
2) Mainly on rural farm.
3) Including 'keep animals away from neighbours' (one case).

Source: Survey data 2000.

Table A7.5 Urban livestock keepers: awareness of the negative effects of livestock keeping, by town (%)

		Morogoro	Mbeya	Total
		(N=111)	(N=236)	(N=347)
Agree that live-stock transmits diseases?	yes	69.4	49.6	55.9
	no	30.6	50.4	44.1
	Total	100	100	100
		(N=77)	(N=113)	(N=190)
Types of diseases (nr. of times mentioned)	tuberculosis	62.3	82.3	74.2
	anthrax	5.2	46.9	30.0
	worms	32.5	12.4	20.5
	tetanus	16.9	0.9	7.4
	diarrhoea	3.9	3.5	3.7
	rabies	2.6	3.5	3.2
	brucellosis	3.9	0.0	1.6
	flue	2.6	0.0	1.1
	typhoid	2.6	0.0	1.
	pneumonia	2.6	0.0	1.1
	sleeping sickness	1.3	0.0	0.5
		(N=111)	(N=235)	(N=346)
Agree livestock causes discomfort?	yes	75.7	66.0	69.1
	no	24.3	34.0	30.9
	Total	100	100	100
		(N=82)	(N=151)	(N=233)
Types of discomfort (nr. of times mentioned)	noise	76.8	61.6	67.0
	smell	76.8	60.3	66.1
	feed on crops	8.5	28.5	21.5
	dirtiness	3.7	16.6	12.0
	cause accidents	4.9	10.6	8.6
	attract flies	11.0	1.3	4.7
	religious discomfort	4.9	0.7	2.1
	jealousy	0.0	2.6	1.7
		(N=111)	(N=234)	(N=345)
Agree that livestock causes noise?	yes	80.2	68.8	72.5
	no	19.8	31.2	27.5
	Total	100	100	100
		(N=88)	(N=161)	(N=249)
From which animals? (nr. of times mentioned)	pigs	87.5	82.0	83.9
	cattle	72.7	70.2	71.1
	goats/sheep	36.4	47.8	43.8
	dogs	30.7	28.6	29.3
	poultry	18.2	13.0	14.9
	donkey	0.0	0.6	0.4
		(N=110)	(N=233)	(N=343)
Agree livestock causes smell?	yes	80.0	75.1	76.7
	no	20.0	24.9	23.3
	Total	100	100	100

Source: Survey data 2000.

Table A7.6 Urban livestock keepers: awareness of the negative effects of livestock keeping and measures, by various characteristics and town (% "yes")*

		Morogoro							Mbeya						
		(N)	dam-age	meas-ures	dis-eases	discom fort	noise	smell	(N)	dam-age	meas-ures	dis-eases	discom fort	noise	smell
Housing density	low	*(16)*	*81.3*	*81.3*	*68.8*	*62.5*	*68.8*	*56.3*	(50)	58.0	70.0	54.0	82.0	88.0	86.0
	medium	(64)	62.5	56.3	75.0	79.7	79.7	82.8	(30)	70.0	86.7	46.7	80.0	86.7	86.7
	high	(34)	44.1	58.8	52.9	67.6	79.4	76.5	(159)	44.0	59.7	47.8	56.6	57.2	66.7
Household monthly income (in Tsh)	<50,001	(31)	64.5	67.7	77.4	74.2	77.4	80.6	(124)	42.7	60.5	46.0	58.9	58.9	66.9
	50,001-90,000	(39)	64.1	71.8	69.2	76.9	76.9	79.5	(68)	58.8	75.0	58.8	76.5	79.4	83.8
	>90,000	(39)	48.7	41.0	61.5	71.8	76.9	71.8	(35)	62.9	71.4	48.6	71.4	80.0	80.0
Sex of h'hold head	male	(105)	58.1	58.1	66.7	75.2	78.1	78.1	(199)	50.3	63.3	50.3	65.8	67.3	72.4
	female	*(9)*	*77.8*	*88.9*	*77.8*	*55.6*	*77.8*	*66.7*	(40)	50.0	75.0	42.5	60.0	67.5	77.5
Age of h'hold head	21-40	(20)	65.0	55.0	70.0	65.0	65.0	70.0	(33)	48.5	75.8	51.5	57.6	66.7	72.7
	41-60	(82)	62.2	64.6	69.5	78.0	82.9	80.5	(133)	48.9	66.9	48.1	69.2	73.7	79.7
	>60	*(11)*	*36.4*	*45.5*	*54.5*	*63.6*	*72.7*	*63.6*	(72)	54.2	58.3	50.0	61.1	55.6	62.5
Educational level household head	none	*(4)*	*50.0*	*25.0*	*50.0*	*75.0*	*75.0*	*75.0*	(30)	20.0	33.3	16.7	46.7	43.3	50.0
	(partly) primary	(27)	59.3	70.4	74.1	85.2	92.6	92.6	(106)	49.1	62.3	50.9	59.4	63.2	68.9
	(partly) secondary	(40)	52.5	57.5	57.5	65.0	70.0	70.0	(63)	54.0	82.5	52.4	71.4	71.4	81.0
	>secondary	(43)	67.4	60.5	74.4	74.4	76.7	74.4	(40)	70.0	70.0	62.5	82.5	90.0	90.0
Person responsible (improved cattle)	h'hold head	(36)	77.8	77.8	75.0	72.2	75.0	77.8	(106)	49.1	63.2	45.3	56.6	60.4	68.9
	spouse	*(16)*	*62.5*	*68.8*	*62.5*	*81.3*	*75.0*	*81.3*	(24)	62.5	83.3	62.5	87.5	91.7	87.5
Received technical advice?	yes	(100)	60.0	61.0	70.0	74.0	78.0	77.0	(210)	50.5	67.1	52.4	67.1	69.0	74.3
	no	*(13)*	*61.5*	*61.5*	*53.8*	*76.9*	*84.6*	*84.6*	(23)	52.2	56.5	26.1	56.5	60.9	73.9
Type of technical advice	professional	(35)	54.3	57.1	74.3	77.1	74.3	82.9	(43)	69.8	76.7	60.5	67.4	72.1	79.1
	non-professional	*(6)*	*50.0*	*33.3*	*66.7*	*83.3*	*100*	*83.3*	(25)	44.0	56.0	56.0	68.0	56.0	76.0

* In italic: N's too small to permit comparisons.
Source: Survey data 2000.

Table A7.7 Urban livestock keepers: use of urban waste and crop residues for livestock, by various characteristics and town (% users)*

		Morogoro			Mbeya		
		(N)	urban waste yes	crop residues yes	(N)	urban waste yes	crop residues yes
Household monthly income (in Tsh)	<50,001	(31)	25.8	35.5	(124)	52.4	47.6
	50,001-90,000	(39)	30.8	48.7	(68)	66.2	67.6
	>90,000	(39)	23.1	46.2	(35)	74.3	65.7
Sex of h'hold head	male	(105)	24.8	44.8	(199)	57.3	55.8
	female	*(9)*	*44.4*	*33.3*	(40)	67.5	55.0
Age of h'hold head	21-40	*(20)*	*15.0*	*35.0*	(33)	54.5	51.5
	41-60	(82)	30.5	48.8	(133)	57.1	52.6
	>60	*(11)*	*18.2*	*27.3*	(72)	65.3	62.5
Educational level household head	none	*(4)*	*25.0*	*0.0*	(30)	53.3	43.3
	(partly) primary	(27)	18.5	37.0	(106)	56.6	50.0
	(partly) secondary	(40)	27.5	42.5	(63)	66.7	58.7
	>secondary	(43)	30.2	53.5	(40)	57.5	75.0
Person responsible (improved cattle)	household head	(36)	41.7	63.9	(106)	61.3	56.6
	spouse	*(16)*	*31.3*	*62.5*	(24)	70.8	62.5
Received technical advice?	yes	(100)	26.0	46.0	(210)	61.0	56.7
	no	*(13)*	*30.8*	*30.8*	(23)	52.2	56.5
Type of technical advice	professional	(92)	28.3	50.0	(196)	61.7	58.7
	non-professional	*(8)*	*0.0*	*0.0*	*(14)*	*50.0*	*28.6*
Type of livestock	large	(61)	27.9	44.3	(177)	58.2	54.8
	large + small	(27)	37.0	63.0	(51)	66.7	66.7
	small	(26)	11.5	23.1	*(10)*	*30.0*	*10.0*
Urban crop cultivator?	yes	(86)	23.3	40.7	(146)	64.4	56.2
	no	(28)	35.7	53.6	(93)	50.5	54.8

* In italic: N's too small to permit comparisons.
Source: Survey data 2000.

Table A7.8 Disposal of animal waste, by town (%)

	Morogoro	Mbeya	Total
(N=)	(114)	(233)	(347)
- all for own crop cultivation	54.4	38.6	43.8
- part for own crop cultivation, give rest to neighbours	18.4	18.0	18.2
- give all to neighbours	7.9	11.2	10.1
- part for own crop cult./give to neighbours/dump in compound	0.0	9.4	6.3
- dump all in the compound	8.8	2.6	4.6
- part for own crop cultivation/dump in compound	1.8	5.2	4.0
- sell all of it	0.0	5.6	3.7
- part for own crop cultivation, sell the rest	2.6	3.4	3.2
- part to neighbours, dump the rest in compound	4.4	1.7	2.6
- part to neighbours, dump the rest in the street	0.0	1.7	1.2
- part to neighbours, sell the rest	0.9	0.9	0.9
- part for crop cult./give to neighbours/sell the rest	0.0	1.3	0.9
- part for crop cult./give to neighbours/give to school	0.9	0.4	0.6
Total	100	100	100

Source: Survey data 2000.

Annex 8: Mbeya by-laws on urban crop cultivation, 1982

The Mbeya Municipal Council Bylaws

THE LOCAL GOVERNMENT (URBAN AUTHORITIES) ACT 1982
(NO. 8 OF 1982)
BYLAWS
MADE UNDER SECTION 80
THE MBEYA MUNICIPAL COUNCIL (REGULATIONS OF CULTIVATION) BYLAWS, 1982

1. These Bylaws may be cited as the Mbeya Municipal Council (Regulations of Cultivation) Bylaws, 1987 to be read with Rule 16 of Cap. 101 and shall apply specifically to that part of Mbeya Municipal Council as defined in the schedules to these Bylaws.
2. "Council" means the Mbeya Municipal Council.
   "Municipal Director" means the person for the time being performing the duties of the Municipal Director of the Mbeya Municipal Council and shall include the Acting or Deputy Director.
   "Insect or Plant Pest" includes any insect or pest which is harmful to the growing crops or which may be harmful to surrounding crops and vegetation.
   "Permanent and Semi-permanent Crop" includes maize, pyrethrum, finger millet, rice, sorghum, sweet potatoes, sugarcane, bananas, coffee, cassava, wheat and sunflower.
   "Plant disease" means any disease which is harmful to growing crops or which may be harmful to surrounding crops and vegetation.
3. No person shall plant or cultivate any crops in any of the areas indicated in the 1st schedule appended to these Bylaws.
4. All crops may be cultivated in the areas indicated in the second schedule provided that no person shall plant any permanent crops in those areas without a written permission from the Municipal Director of the Mbeya Municipal.
5. The Council may by a resolution annex from time to time areas to the schedule as it deems proper.
6. 1) No person shall plant or cultivate any permanent crop or semi-permanent crop in prohibited areas without the written permission of the Municipal Director.
   2) No person shall cultivate in any surveyed areas by using tractors, oxen, ploughs or any machinery that shall destroy the survey beacons.
7. 1) No person shall cultivate for the purpose of planting any crop in any surveyed plot or public open spaces or children playing grounds.
   2) i) For the purpose of a better and effective implementation of the provisions of section 7-(1) to these Bylaws the council shall take immediate actions to out or destroy in any manner whatsoever any crop planted or cultivated in any surveyed plot or open space.
   Provision that the Council shall not do so if the person purported to be the owner holding a right in such surveyed plot is known and available. In such case a three days notice shall be issued by the Council to such person to remove the crops fort with failure to such person shall be deeply to have committed an offence.
   ii) Save as is otherwise provided the Council shall take immediate measures to out or destroy any crop planted or cultivated in survey plots or open spaces. If the owner or the person who did the act, is not in the soonest known and available, and there after, the Council may make a follow up to recover from that person the expenses it incurred.
8. 1) Every resident who holds land in accordance with the local customary law or lease hold relating to land tenure and who is allowed to cultivate under Bylaw 4 and the schedule to

the Bylaw, shall unless otherwise provided in writing by authorized officer, cultivate and maintain the area of such cash crops or food crops.

2) Subject to the provision of section 8 - (1) of these Bylaws, every person who holds such land, shall be obliged to cultivate or plant his land in accordance with the principles of good plant husbandry as shall be directed by the authorized officer for the purpose of maintaining and improving productivity and preserving fertility of the soil.

i) For the purpose of proper crop husbandry every person shall plant at a proper planting time and all plants shall be planted by adopting proper spacing.

ii) Application of the required fertilizer and insecticides shall be an obligation.

iii) Proper weeding at the right time shall be done by every person who will cultivate any land.

iv) Every person shall plant crops by using certified seeds in the case of maize only hybrid seeds from authorized dealers shall be used

v) No person shall cultivate or plant crops on sloping grounds or areas without adopting contour ploughing and planting on terraces.

vi) It is declared that any crop/crops which will be found and proved by the Council's Authorized Officers to lack the foregoing ingredients shall be dealt with in accordance with the provisions of these Bylaws or any other law applicable for this purpose.

9. Any person planting or cultivating any crop or plant and finding such crop infected with either insect or plant pest or disease shall report such infestation to the Council and shall comply with such instructions as may be given by the Council or its duly authorized officers for the destruction of such insect or plant pest or disease.
10. 1) Any officer or employee of the Council duly authorized in writing may at all reasonable times enter into or upon any land or premises for the purpose of inspecting and or carry out works which in the opinion of the Council are a contravention to the provisions of these Bylaws and may recover all costs and expenses incurred by the Council from the person who has failed to comply with the provisions of these Bylaws.

    2) Save as is otherwise provided, and without prejudice to the generality of these Bylaws the Council shall take action to destroy any crop planted in restricted areas in any way and carry another works which in its opinion are contraventions to the provisions of these Bylaws and shall recover all costs incurred by it from the person who has failed to comply with the provisions of these Bylaws.
11. Any person who contravenes or fails to comply with any of the provisions of these Bylaws shall be guilty of an offence and shall be liable to a fine not less than five thousand shillings and not exceeding ten thousand shillings or to imprisonment for a term not exceeding 12 months.
12. The Local Government (Mbeya Municipal Council) Regulations of Cultivation Bylaws 1963 are hereby repealed.

FIRST SCHEDULE (BYLAWS 3)

AREAS WHERE CULTIVATION OF CROPS IS COMPLETELY PROHIBITED

a) The area covering the whole administrative ward of Sisimba, Maendeleo, Nonde, Majengo, Mabatini, Mbalizi Road, Sinde, Ruanda, Ilomba, Nzovwe and Isanga.
b) The area covering the whole administrative ward of Iyunga except that part which borders the triangular portion to Mbalizi direction
c) All areas of Road Reserve and all other areas along the main roads up to a distance of fourteen meters from the road bank.
d) All public open spaces including children grounds and all surveyed plots being held under any law for the time being in Tanzania.

SECOND SCHEDULE (BYLAWS 4)
AREAS WHERE CULTIVATION MAY BE CARRIED OUT UNDER PERMISSION

The area covering the whole administrative wards of Ilemi, Itende, Uyole and the area covering Ilolo Valley in Sinde ward up to a distance of fifteen meters from the river bank.

The common seal of the Mbeya Municipal Council was hereunto affixed in pursuance of a Resolution passed at the meeting of the Council duly convened and held on the 30th day of June, 1987 and the same was so affixed in the presence of:-

LYDIA NGWALE
MUNICIPAL DIRECTOR
MARKO FUNGAMTAMA
MAYOR

Annex 9: Morogoro by-laws on urban livestock keeping, 1999

The Morogoro Town Council Bylaws

THE LOCAL GOVERNMENT (URBAN AUTHORITIES) ACT, 1982
BY LAWS
Made under Section 80
THE MOROGORO MUNICIPAL COUNCIL (ANIMALS IN URBAN AREA)
Bylaws, 1999

1. These Bylaws, may be cited as the Morogoro Municipal Council (Animals in Urban Area) Bylaws, 1999 and shall apply throughout the area of jurisdiction of Morogoro Municipal Council.
2. In these Bylaws, unless the context otherwise requires:
   "Animal" means cattle, donkey, goat, horse, pig and sheep but does not include a dog.
   "Pounds" means the animals pound maintained by the Council.
   "Authorised officer", means Health Officer Municipal Inspector or Senior Officer of the Council.
   "Director" means the Municipal Director of the Morogoro Municipal Council and includes his/her Deputy.
   "Council" means Morogoro Municipal Council.
   "Medical Officer of Health" means the medical Officer of Health of the Council.
   "Urban area" means the area lying within the jurisdiction of the Morogoro Municipal Council as may from time to time be instituted.
   "Specified areas" means those areas within the area in which animals can be kept and allowed to move.
3. The Council shall earmark certain areas to be known as "specified areas" within the Urban area for the purpose of keeping animals as set out in urban area along which to move an animal or animals and permits shall be issued by the Council in respect of animals authorized in the Urban area.
4. All persons using specified areas and routes shall obey all due and delinquent directions of the Municipal Director for the purpose of avoiding overstocking and preserving order and regularity in the specified areas by ensuring that the animals do not move to the lands adjoining the specified areas.
5. Subject to any permit issued under these Bylaws allowing animals to be moved, all animals within the urban area shall be kept in a building, structure or enclosure approved and maintained to the satisfaction of the Council.
6. The Medical Officer or any other authorized officer may require any person keeping animals in the urban area to make such arrangements for the removal of manure, liquid filth and refuse as he/she shall consider necessary.
7. The Medical Officer or any authorized officer may at any reasonable time enter upon any area premises in which animals are kept, or in which he has a good reason to believe that animals are being kept, for the purpose of inspecting such premises and any person obstructing such officer or hindering him or giving him false information shall be guilty of an offence.
8. No animal shall be kept in a building or part of such building that is used for human habitation in any surveyed and developed area.
9. No animal shall be moved through any part of the urban area other than the specified areas and routes set out in schedule "A" and "D" hereto unless as set out in schedule "B" provided that no permit shall be necessary for the movement of animals in a motor vehicle.

10. All animals being moved to any abattoir shall follow the established routes in schedule "D" hereto but shall not graze on the way to the abattoir.
11. Any Police Officer or any authorized officer may take or cause to be taken to the pound:
    (a) Any animal being kept within the urban area in non-specified area or being moved through an unauthorized route.
12. The owner of any animal impounded under these Bylaws shall be required to pay pound fees as set out in schedule "C" hereto.
13. 1) No animal impounded under these Bylaws shall be released until the pound fees have been paid in the case of first offender.
    2) The Council shall not be held responsible for the disappearance of any animal so impounded.
    3) The proceed of sale of the animal so impounded and disposed of shall after deduction of any sum due to the Council:
        (a) In the case of any unclaimed animal be retained by the Council in a deposit account for a period of six months after which time it shall if still unclaimed be paid into the General Revenue of the Council.
        (b) In the case of an animal retained for non-payment of pound fees be paid to the owner.
14. The court may in case of second and habitual offender order that the animals forming the subject matter of the Criminal proceeding be forfeited.
15. It shall be lawful where an order of confiscation has been made under Bylaws 14 for the Council to take possession of the animal or animals and consequently become the owner thereof.
16. Any person who shall contravene or fail to comply with any of the provisions of these Bylaws shall be guilty of an offence and shall be liable on conviction to a fine not exceeding T.Shs. 50,000/= or twelve months imprisonment or to both such fine and imprisonment of addition the court may order any permit issued to him under these Bylaws be cancelled.
17. The previous Morogoro Municipal Council (Animals in Urban Area) Bylaws, 1995 are hereby revoked.

The Seal of the Morogoro Municipal Council was affixed in pursuance of a resolution passed at a meeting duly convened on 11th November, 1998 and the same affixed in the presence of:

Signed
O.T. Mloka,
MAYOR,
Signed
Paulo Baruti,
MUNICIPAL DIRECTOR,
MOROGORO MUNICIPAL COUNCIL

I approve,

Signed
Hon. Kingunge Ngomable-Mwiru (MP),
MINISTER FOR REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

Dodoma,
Date: 6th June 1999

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