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FARMING IN THE CITY OF NAIROBI

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INTRODUCTION

As any visitor to Kenya's capital can see, farming activities are everywhere, not only in the outskirts but also in the heart of the city. Along roadsides, in the middle of roundabouts, along railway lines, in parks, along rivers, under powerlines, in short in all kinds of open, public spaces, crops are cultivated and animals like cattle, goats and sheep are roaming around. What most visitors do not see is that there is even more farming, notably in the backyards of the houses in the residential areas. People of all socio-economic classes grow food whenever and wherever possible. Farming in Nairobi — as well as in cities all over the world — is not a new or recent phenomenon. Urban agriculture is as old as the towns and cities themselves. However, particularly in the less-developed countries, urban farming has grown enormously since the 1980s, especially among the urban poor. This has most of all to do with growing unemployment rates in combination with increased food prices.

The purpose of this paper is to describe urban farming in Nairobi in all its aspects: its magnitude, its characteristics, its importance for those involved, the constraints faced by the farmers, its impact on the environment, the legal and institutional setting, as well as its prospects. In doing so, we base ourselves on the four studies that have been carried out in Nairobi sofar.[1] First, however, it is essential to clarify what we

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[1] The first study was done from October 1984 to January 1985 by the Mazingira Institute. It was a general survey in six Kenyan towns, Nairobi being one of these. In Nairobi, a total of 778 households were interviewed, among whom were 168 urban farmers (references: Lee-Smith et al. 1987; Lee-Smith et al. 1988; Lee-Smith and Memon 1994; Memon and Lee-Smith 1993). The second study consisted of a general survey among 618 cultivators all over the city, carried out by Donald Freeman in May-July 1987 (references: Freeman 1991; Freeman 1993; Lado 1990). The third study, done by Alice Mboganie Mwangi from June to October 1994, focused on poor households only, notably 115 (of whom 48 farmers) in the Korogocho slum area and 62 participating in an Urban Agriculture project in Pumwani and Eastleigh Sub-Locations (references: Mwangi 1995; Mwangi and Foeken 1996; Foeken and Mwangi 1998). Finally, in the same year, i.e. from August to October, Pascale Dennery did a more anthropological study among a small number of urban farmers in Kibera (references: Dennery 1995; Dennery 1996). The research locations of the various studies are indicated on the maps in Appendices 1-3.

mean by 'urban farming'. There are many definitions of the concept, but one of the more practical ones is given by Aldington (1997: 43) who describes it as "farming and related activities that take place within the purview of urban authorities". With the latter, he means "the panoply of laws and regulations regarding land use and tenural rights, use of water, the environment, etc, that have been established and are operated by urban or municipal authorities". In short, then, urban agriculture implies any farming activity within the city boundaries[2], including the cultivation of food and cash crops, animal husbandry, forestry, and flower and garden plants production. Examples from all over the world show that urban agriculture encompasses a very wide range of activities indeed, such as cultivating vegetables on plots or even in boxes, keeping small livestock on roof tops, breeding of fish, raising rabbits in the house, and keeping silk worms on balconies (UNDP 1996).

Usually, three types of urban agriculture are distinguished. The first one concerns farming activities in backyards, referring to growing food or keeping animals on one's own piece of space in the compound. The second one involves farming in open spaces of land not belonging to those who use it. This is the type usually practiced by poor urban households and which has seen such a growth during the last two decades. Finally, there is farming in former rural areas which became part of the city due to the expansion of the city boundaries. In Nairobi, this was the case in 1964 when the city area increased more than tenfold from 65 square kilometres to the present 690. An example of an area that was up to 1964 formally rural (although some parts were already quite urbanised) is Dagoretti which was carved out from Kiambu District to become part of the City of Nairobi (Memon 1982).

LAND USE POLICIES: HISTORICAL OVERVIEW[3]

Up to the present day, Nairobi has ample open space which is (or can be) used for agricultural activities. This dates back to the beginning of the colonial days. When the railway company decided to build its headquarters in Nairobi, it reserved for itself large tracts of land with an eye on future needs. It was not before the 1948 master plan for Nairobi began to be implemented that most of this land was converted into boulevards (such as Uhuru Highway), parks (Uhuru Park, Central Park)

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[2] Peri-urban agriculture, then, refers to farming activities in the zone between the city boundaries and the rural areas, although it is often quite difficult and arbitrary to establish where 'peri-urban' ends and 'rural' starts.

[3] Unless stated otherwise, this section is mainly based on Freeman 1991: 21-44.

and other green, open spaces (like the university sports ground, the arboretum and the park-like grounds of the Railway Club).

A second cause for the existence of extensive open spaces in Nairobi has its roots in the health and sanitary considerations of the colonial authorities. Based on the perception that malaria was transmitted by mosquitoes that had previously bitten infected Africans, particularly children, the Colonial Office in London issued directives in the beginning of the 20th century stating that "all new buildings (...) be located away from native quarters, clear of jungle, at a distance from stagnant waters, and where possible, on high ground" (CO 1901, 885-7; quoted in Frenkel and Western 1988: 216). The result of this policy — and of racially inspired policies as well — was the residential segregation of Europeans, Asians and Africans, with broad sanitary buffer zones between the former and the other two groups.

Thirdly, the above-mentioned 1948 master plan for Nairobi is of great importance. According to Freeman (1991: 35), this "ambitious and truly comprehensive urban plan (...) explains a great deal about the way in which informal urban agriculture has arisen in the city of Nairobi." Based on the Garden City concept of Ebenezer Howard, Nairobi was to be a 'green city', with broad boulevards with roundabouts and large areas of parkland and forest reserves, amongst other things. Moreover, river valleys were to remain open spaces in view of malaria control and drainage during the rainy seasons. In all, almost thirty per cent of pre-1964 Nairobi was to be preserved as open space. Between the launching of the plan and independence in 1963, many of the ideas laid down in the plan were realised, particularly where it concerned the provision of green open spaces.

Shortly after independence, in 1964, a final decision was taken explaining the widespread occurrence of farming in Nairobi, namely the substantial expansion of the city territory mentioned above. Open space planning in the city is administered by zoning regulations dating from the colonial period. Private urban land developers are kept to the creation of riparian ways along drainage lines as well as to all kinds of open spaces around buildings, the size of the spaces depending on the function of the building.

Through the years, zoning regulations have changed somewhat, particularly regarding informal sector activities. Under certain conditions, *jua kali*[4] informal manufacturing and commercial activities are tolerated now. With written permission, livestock may be grazed on the outskirts of the city. The regulations regarding crop cultivation, however, have not changed and still date from the colonial period when it was strictly forbidden (the farms that came to be located within the city boundaries after the city expansion in 1964 are, of course, not illegal). Nevertheless, as Hake (1977: 191) describes, even in the colonial period many African women cultivated crops like maize, beans and other vegetables on small patches of waste land. Particularly during the years of the Emergency (1952-1960), these activities were strongly discouraged by slashing the crops which were believed to be hiding places for Mau Mau rebels. But also after independence, slashing of crops ordered by the city authorities occurred regularly, even in years of acute maize shortages (such as in 1964-65). During the 1980s, however, slashing of crops and harassments became more and more of an exception. The present policy, although formally still illegal, is one of ignoring the activity. Most government officials do not regard agriculture as a legitimate form of urban land use (Dennery 1995: 7), but the reason for tolerating it has most likely to do with the sheer magnitude of the phenomenon, to which we will turn now.

THE MAGNITUDE OF URBAN FARMING IN NAIROBI SINCE THE 1980S

Geographical pattern

Farming is done everywhere in Nairobi: in backyards, along roadsides, rivers and railways, and in parks and industrial areas. Freeman (1991: 54) found plots "even in the very heart of the central business district, between the rear of the main post office and the Catholic cathedral". In July 1996, one of the authors of the present article saw flourishing maize growing between the railway tracks near Nairobi station, some of these plots being hardly more than a few square metres.

Table 1 shows substantial differences concerning the location of plots as recorded during the various surveys. This is partly due to the sampling method (Lee-Smith et al. used households, while Freeman selected plots) and partly to the type of area the survey was held (Lee-Smith et al. and Freeman covering the whole city area, while

[4] Literally, *jua kali* means 'fierce sun', referring to the outdoor nature of the activities in the informal sector.

Table 1
Characteristics of plots

year of survey:	1985	1987	1994	1994
area:	Nairobi	Nairobi	Korogocho	Pumwani/E.
N:	154	618	48	62
location of plots (%)				
- private residential	71	32	-	-
- roadside	10	29	31	7
- riverside	9	16	43	86
size of plots				
- average (sq. m.)	99		3200	1400
- % >=200 sq. m.		76	80	50
- % >= 1000 sq. m.		47	73	29
number of plots				
- % hh's with 2 or more plots	12	30	31	38
distance to plots (%)				
- <1 km		74		
- <10 min. walking			3	68
- >30 min. walking			83	6
plot ownership (%)				
- self/family	33	24	-	-
- private landlord	9	29	24	7
- public land	51	45	74	93
Sources:	Lee-Smith et al. 1987	Freeman 1991	Mwangi 1995	Mwangi 1995

Mwangi's survey took place in two low-income areas only). The Table reveals that although at least one-third of the plots are privately owned, i.e. usually in backyards, the people in the low-income areas can only obtain a *shamba* (Swahili for plot) on either public land (roadsides, riversides) or privately-owned land of somebody else (railsides, in estate, industrial). None of the selected farming households in Korogocho and Pumwani/Eastleigh owned a piece of land, simply because housing conditions are thus crowded that not even the smallest backyard is available. Farming households in the slum area of Kibera use the empty space bordered by the Motoine River and Nairobi Dam in the north, Langata Shopping Centre in the east, Langata Road and residential areas in the south, and residential estates in the west (Dennery 1995). The total area was estimated to be just under 100 hectares.

Plot sizes vary considerably as well (Table 1). Again, this can partly be attributed to sampling methods: the very small average size of 99 square metres found by Lee-Smith et al. in 1985 is undoubtedly related to the high percentage backyard farming. In the three other surveys, plots were much larger, particularly in the very-low-income area of Korogocho. Since the latter area is so densely populated, most plots

are located outside the built-up area in empty spaces owned to the municipality. As a result, distances between the farmers' homes and their *shambas* are quite large (Table 1), which is not only time-consuming but also a disadvantage in terms of theft of crops (see below).

Not only in the low-income areas, but in Nairobi generally, the land on which the plots are located is in most cases public land (Table 1). In the two general surveys, this applied to about half of the cases. Part of the land used by the Kibera slum dwellers was land previously owned by the Prison Authority for crop production. Some of it was allocated to the National Housing Corporation for house building. The remainder is waterway reserve or otherwise public or private land.

Quite a number of farmers have acces to more than one plot, as can be seen in Table 1. Of the four cases in Kibera described by Dennery (1995), three of them had three and the other even five plots, totalling from about 0.5 to 1.8 hectares. Access to multiple plots has several advantages for the farmer. Different ecological qualities of the plots make it possible to widen the range of crops. Moreover, plots separated from each other by considerable distances, as is often the case (Freeman 1991), reduce the risks of losses from theft, pestilence, or destruction by the rightful owners of the land.

Number of people involved

There is only one study, the Mazingira survey of 1984-85, that can claim to present a representative picture of urban farming in Nairobi (as well as five other towns in Kenya).[5] It was found that 22% of the Nairobi households stated to have access to urban land, while 20% were actually growing crops (Lee-Smith et al. 1987: 85). Although these percentages were somewhat lower than the national figures (i.e., the six towns together: 31 and 29%, respectively), it means that around that time some 75,000 households in the City of Nairobi were growing crops on some piece of land within the city limits. Moreover, 7% of the households in Nairobi (17% in the six towns) appeared to keep livestock in town (Lee-Smith et al. 1987: 183). Half of these belonged to the very low income groups.[6] Only one Nairobi household farmed fish, while 20 (3%) kept bees (Lee-Smith et al. 1987: 216, 223). Although urban farming is done by households in all socio-economic classes, poor(er) households are over-

[5] The results of the six towns is laid down in Lee-Smith et al. 1987, the Nairobi study in Lee-Smith et al. 1988.

[6] The 'very low income' group was defined as households with a monthly income of less than KSh. 800 (Lee-Smith et al. 1987: 78-79).

represented. This was confirmed by the study in the slum area of Korogocho carried out in 1994, where it was found that 30% of the households could be classified as urban farmers (Mwangi and Foeken 1996). Based on these findings, it seems fair to estimate the number of households in Nairobi involved in urban farming in the late-1990s in the order of at least 150,000.[7]

WHO ARE THE URBAN FARMERS IN NAIROBI?

Demographic characteristics

The majority of the urban farmers in Nairobi are women (Table 2). In this, Nairobi is not unique, but reflects a general pattern throughout Sub-Sahara Africa. Particularly among the low-income farmers, the percentage of female-headed households is relatively high. Moreover, farmers' households are quite large, certainly if compared with the average size of a Nairobi household in 1989 (3.5 persons). This tends not only to confirm the hypothesis stated by Dennery (1995: 85) saying that "the more mouths to feed, the more time is devoted to food production", but also that this applies particularly to the relatively poor. For many poor women who lack the presence of an adult man in the house and who have children to feed, farming is something of a last resort. This has also to do with their relatively low level of education in comparison with the men, as all studies revealed. Nevertheless, it is surprising that almost one-quarter of the heads of the low-income farming households in both Korogocho and Pumwani/Eastleigh had completed secondary school education. Apparently, lack of employment opportunities forced these people into agriculture.

The large majority of the farmers were not born in Nairobi (Table 2). Most of the migrants came from neighbouring districts, in particular the ones in Central Province which are predominantly inhabited by the Kikuyu. This partly explains why the Kikuyu are the largest group among Nairobi's farmers. Other aspects explaining who is farming and who does not are related to length of stay in Nairobi and personal networks. As Table 2 shows, most migrants engaged in urban farming have been living in Nairobi for quite a long time. This rejects the view which was popular until

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[7] This figure is based on the following assumptions:
- a 1998 population of about 2 million (Kenya 1996: 18);
- an average household size of 3.3 persons (which is a cautious figure, because if the declining trend between 1979 (4.13; see Kenya 1981) and 1989 (3.46; see Kenya 1994) would continue along a linear line, the average household size in 1998 would be 3.00; and hence the estimated number of households practicing urban farming would become 167,000);
- about 25% of the population of Nairobi is engaged in urban farming.

Table 2
Demographic characteristics of the Nairobi farmers

year of survey:	1985	1987	1994	1994
area:	Nairobi	Nairobi	Korogocho	Pumwani/E.
N:	154	618	48	62
gender				
- % female cultivators	62	64	80-85	80-85
- % female-headed households	11		35	39
household size				
- aver. nr. of persons	5.4		6.9	6.8
age of household head				
- % <40 years of age		52	62	40
education of household head				
- % with no formal education	7	29	17	34
- % with at least primary school		43	69	48
- % with secondary school			23	21
migration of household heads				
- % born outside Nairobi		87	90	73
- % 15 years or more in Nairobi		58	63	85
ethnicity of household head				
- % Kikuyu		ca. 50*	48	90
- % Luo			33	-
- % Kamba		ca. 15*	15	8
Sources:	Lee-Smith et al. 1987	Freeman 1991	Mwangi 1995	Mwangi 1995

* Own estimations, based on figures in Freeman 1991: 57-59.

recently that urban farmers are recent migrants from rural areas simply continuing their original way of living in an urban environment before getting adapted to the urban way of life. As has become clear, however, new migrants do not come to the city to practice agriculture but rather to look for formal employment. Not succeeding in this, many of them try to get access to a piece of land in order to grow food. However, one has to be firmly settled in the city in order to be able to obtain a plot; 'settled' meaning that one has to have the right personal network through which land can be acquired. This is where ethnicity comes in. As Mwangi and Foeken (1996) observed,

> On certain occasions in the Korogocho fields, it was said that if a Kikuyu wanted to stop tilling a certain plot, it would be 'sold' to somebody of the same ethnic group as the outgoing farmer. If in any case the plot was passed on to somebody of different ethnicity, sometimes the new individual would be phased out by those farming the surrounding plots by 'digging into the plot' from all sides. Although this is not representative of all the farmers, it has some bearing as to why mostly Kikuyu are urban farmers. A Luo non-farmer in Korogocho complained to have been phased out in this manner.

In the 1994 survey in Korogocho, a group of 67 non-farmers were interviewed as well. Compared with the Korogocho farming households, the non-farmers appeared to be less far in the family life cycle: heads of the households were younger (85% <40 years), they had more young children and households were smaller (5.6). Moreover, their length of stay in Nairobi was much shorter (39% 15 years or more). Another conspicuous characteristic of the non-farmers was the dominance of people from the Luo ethnic group (60%). This underlines the above-mentioned notions about being sufficiently 'settled' in Nairobi. For these more recent migrants, having the right network is even more important since most of them came after 1986, i.e. when most potential farming land had already been occupied.

Socio-economic characteristics

From the 1987 and the 1994 surveys it is clear that relatively few people in the farming households in Nairobi were employed in the formal sector (Table 3). A high percentage of them is either unemployed or performs some casual labour. In the slum areas of Korogocho and Pumwani/Eastleigh, informal trade and food selling was the most mentioned source of income: 60% and 86%, respectively (Mwangi 1995: 22). Among the Korogocho farming households, casual labour ranked second, followed by urban agriculture, indicating that the latter activity constituted a fairly important source of income for them. Interestingly, among the non-farming households in Korogocho, illegal trade and practices (like manufacturing and selling of alcoholic brews, prostitution, street begging and stealing) scored high (24%) in comparison with the farmers' group (10%). Although one has to be very careful with drawing conclusions, this might be an indication that lack of access to agricultural land pushes these destitute people into illegal activities.

There are important differences between males and females regarding other sources of income besides cultivating the urban *shamba*. Freeman (1991: 84-85) found that 75% of the men against 60% of the women had some other form of job. Moreover, men tended to have more often a job in the formal sector, had more often full-time jobs, and enjoyed higher pay rates than women for the same type of work. Women have to rely more on urban cultivation, and more often on multiple plots.

The data on household incomes of the different studies are not easily comparable, due to the different years the surveys were held and different cut-off points of the income classes used by the different authors. Moreover, Lee-Smith et al. (1987;

Table 3
Socio-economic characteristics of the Nairobi farmers

year of survey:	1987	1994	1994
area:	Nairobi	Korogocho	Pumwani/E.
N:	618	48	62
respondents:	cultivators	all adults	all adults
*employment (%)**			
- employed in the formal sector	22	15	24
- casual labourer	58	19	
- unemployed	47		
household cash income (%)			
- very low income**	43	33	44
- low income**	35	25	16
part of household income spent on food (%)			
- 50% or more	49	56	77
- 70% or more	37		
- 75% or more		35	36

* In both Lee-Smith et al. 1987 and Lee-Smith et al. 1988, employment figures are only presented for the whole sample, not for the sub-sample of farming households.
** The figures from Freeman on the one hand and Mwangi on the other, are not easily comparable, due to the different years of the surveys and different cut-off points used. Freeman (1991: 62, 145) defined 'very low' as an annual household cash income of less than KSh. 10,000 and 'low' of KSh. 10,000-20,000. The cut-off points for the Korogocho and Pumwani/Eastleigh surveys were KSh. 12,000 and KSh. 24,000.

Sources:	Freeman	Mwangi	Mwangi
	1991	1995	1995

1988) do not present income figures for the (sub-sample of) farmers, but only for the total sample. Still, as they found that 85% of the urban farmers in Kenya were in the low to very-low income categories[8] (1987: 83) and 82% of the Nairobi sample were in the same two categories (1987: 79), the conclusion can only be that most urban farmers are of poor to very poor households. Similar figures are given by Freeman: 78% of 'his' cultivators could be classified as having a low to very-low income (Table 3). And although the percentages for Korogocho and Pumwani/Eastleigh are somewhat lower, this is due to the fact that the cut-off points are also lower than Freeman's. After what had been said regarding the employment status of the study populations, these high percentages of households belonging to the urban poor are of course not surprising. The same can be said regarding the percentage of household income spent on food. Generally, the farmers' households spend a very large part of their income on food; over one-third of them even 70-75% of their income. It means that this percentage would be even higher if these households were cut off from their farming activities, or otherwise they might starve from hunger.

[8] 'Low' was defined as a cash income of KSh. 800-1699 per month and 'very-low' of less than KSh. 800 per month.

FARMING PRACTICES

Crops

Nairobi has a bimodal rainfall pattern. The long rainy season is from April up to June, the short rains from late October to early December. In 'normal' years, two harvests are possible, though maize — which is *the* staple food — is mostly cultivated during the long rains only. The long-term average is 880 mm of rainfall annually, but the seasonal pattern tends to be quite irregular. In both the studies by Freeman (1991: 93) and by Dennery (1995: 50), complaints were heard about the unreliability of rainfall (droughts, rains too late), the more so because agriculture is predominantly of the rain-fed type.

The Nairobi farmers cultivate a wide range of crops (see Appendix 4). The most commonly produced crops are listed in Table 4. Farmers always plant a variety of crops on their *shambas*. Dennery (1995: 58) gives the example of a farmer in Kibera who cultivated three plots, totalling about 0.7 hectares. Two of the plots were rain-fed where he grew maize, Irish potatoes, beans, pigeon peas and cowpeas. On the third plot, which had water throughout the year, he planted *sukuma wiki*, arrowroot, bananas and sweet potatoes.

Table 4 shows that the basic staples like maize, beans and *sukuma wiki* particularly stand out as the crops cultivated by the large majority of the farmers. According to

Table 4
Main crops produced by the Nairobi farmers*

year of survey:	1985	1994	1994
area:	Nairobi	Korogocho	Pumwani/E.
N:	154	48	62
unit:	% of plots	% households	% households
- sukuma wiki	63	35	73
- tomatoes	?**	23	31
- beans	38	71	73
- cowpeas	12	33	24
- maize	35	71	97
- Irish potatoes	14	23	26
- sweet potatoes	1	17	29
- arrowroot	1	21	26
- bananas	2	17	47
Sources:	Lee-Smith et al. 1987	Mwangi 1995	Mwangi 1995

* Data from Freeman 1991 could not be included in this table since he presents only the percentages of plots on which a certain crop was the "dominant" one.
** Included in 'other vegetables' (31%); see Appendix 4.

Freeman (1991: 89), in terms of frequency of plantings and overall area, maize is the prevalent crop.[9] Under ideal conditions, maize may yield as much as as 1,200 kilos per hectare; however, Freeman (ibid) estimated the average yield at 200 kilos in a good season. As in the rural areas, maize is usually interplanted with beans, which is, again according to Freeman (ibid), the second crop in importance in Nairobi. The importance of the two crops for the low-income strata of the Nairobi population is clearly demonstrated in the figures for Korogocho and Pumwani/Eastleigh.

Sukuma wiki is the local name for a green, leafy vegetable of the spinach variety (*Spinacea oleracea*) and also called kales, literally meaning "to push the week". This refers to the importance of the crop for the subsistence dwellers in their daily diet, due to its high yield and low price. People without much earnings can survive on it especially during the week prior to the end of the month ("push the week") when salaries are earned. It is a fast growing crop, especially in the red soil areas in the city, and has a high nutritional value: its high calcium and phospor contents are almost comparable with that of whole milk (Sehmi 1993). For these reasons, and because it is relatively cheap, *sukuma wiki* is a typical ingredient in the diet of the poor households, favoured as the usual supplement with the basic *ugali* dish (stiff maize porridge).

Appendix 4 shows that many other crops are being cultivated in Nairobi. Some of these are locally important, depending on soil conditions, 'ethnic' preferences, and 'visibility' because of thieves. Conspicuously absent are tree crops, for reasons of limited space (many plots are too small) and uncertainty regarding land tenure. Nevertheless, almost half of the farming households in Pumwani/Eastleigh cultivated bananas (Table 4), which had to do with the fact that access to land was guaranteed for a number of years and that soil conditions were quite favourable (plots located along a stream). The bananas as well as Napier grass were planted mainly to control flooding of the river while at the same time the bananas could be eaten as food and the Napier grass could be sold as fodder to those with livestock.

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[9] The figures based on the other Nairobi-wide survey (Lee-Smith et al. 1987) would perhaps suggest otherwise. However, the different findings by Freeman and by Lee-Smith et al. must undoubtedly be related to the different survey populations. Lee-Smith et al. sampled households, among whom there appeared to be a comparatively large category of backyard farmers with plots too small to grow maize. Freeman selected visible plots, many of which were located in the outskirts of the city where there is a lot of space for farming; hence, the plots he sampled were much larger than the ones in the survey by Lee-Smith et al.

Finally, two special types of crops should be mentioned. The first one concerns ornamental crops, grown in plastic bags and cultivated purely for income purposes. It is commonly more well-to-do people who engage in this activity, having employees to run the plot. The plants are mainly seedlings sold to individuals and landscaping companies. The second crop also concerns seedlings, notably of vegetables, grown on very small plots and also for selling purposes. An interesting example is the Mathare Self-Help Group which has obtained permission from the City Council to till land next to the road in Kariokor. The seedlings are sold to farmers as far as the rural areas of Kiambu.

Animal husbandry

Even though only 7% of the Nairobi households kept some kind of animals in town (Lee-Smith et al. 1988: 36), livestock is a quite common sight, especially in the open spaces in the outskirts of the city. Goats and sheep, as well as one or two cows here and there can easily be seen roaming around along roadsides and on other public spaces. According to the Mazingira study, however, of those who kept animals, poultry was by far the most common species (77%), followed by goats (18%), cattle (16%), sheep (12%), rabbits (10%) and pigs (4%) (Lee-Smith et al. 1987: 191). Comparable figures were found during Freeman's survey (see Lado 1990: 264). In Korogocho and in Pumwani/Eastleigh, 56% and 40% respectively of the farming households kept some livestock, although in general livestock rearing was not very important, the major obstacle being lack of space (Mwangi 1995: 26, 46). As in Nairobi in general, poultry were the most common type in these low-income areas.

Based on the 1985 survey, Lee-Smith and Memon (1994: 79) estimated the number of cattle in Nairobi at 23,000 head. However, "most belonged to dairy farmers at the upper end of the income scale. The poorer Nairobi households keep chickens and rabbits in poultry sheds and hutches because of lack of space."

Farming techniques and inputs

As Freeman (1991: 92) observed, "cultivation practices (...) are for the most part very basic, traditional, and conservative, being dependent on hand labour with only a few simple and inexpensive tools". The *panga* (sturdy bush knife) and *jembe* (hoe) are about the only tools used. The labour needed is mainly done by women. For instance, in 80-85% of the farming households in Korogocho and Pumwani/Eastleigh, the women were responsible for the farming activities (Mwangi 1995: 27).

The survey carried out by the Mazingira Institute in 1984/85 revealed that only 31% of the urban farmers practised crop rotation, 38% took some erosion control measures (mainly terracing), while 18% practised fallowing (Lee-Smith et al. 1988: 26-27). Once more, however, it should be born in mind that the Mazingira sample included many backyards, where such measures are less likely being taken.

Given the traditional way of farming, it is not surprising that the use of 'modern inputs' is limited. Maintaining or improving soil fertility is mainly done by means of animal droppings or organic material (Table 5). Chemical fertilizer is used by a minority of the farmers. Dennery (1995: 74) encountered in Kibera only one farmer using it, the costs involved being the main obstacle for the others. Seeds and seedlings are mainly bought in shops or at the market, even though compared with other Kenyan towns, prices were quite high, at least in the mid-1980s (Lee-Smith et al. 1987: 120). Chemical pesticides and fungicides are also too expensive for most farmers, particularly for those who have a very small plot only; hence the number of farmers using this type of modern input is, again, quite small. The relatively low percentage of farmers in Pumwani/Eastleigh using chemical fertilizer and the high percentage using natural pesticides can be explained by the fact that these farmers participated in an urban agriculture project in which a bio-intensive kind of agriculture was advocated (while, on the other hand, the small plot sizes may also play a role) (Mwangi 1995: 46).

Table 5
Crop production: inputs (% of households)

year of survey:	1985	1987	1994	1994
area:	Nairobi	Nairobi	Korogocho	Pumwani/E.
N:	154	618	48	62
- manure	29	31	49	49
- guano (poultry droppings)		15		
- crop residues/urban waste			51	59
- compost	35			
- mulch	23			
- chemical fertilizer	19	31	29	2
- seedlings	87			
- improved seeds/seedlings			51	30
- natural pesticides	1		32	55
- chemical pesticides	11	)13	17	25
- fungicides	8	)13		
Sources:	Lee-Smith et al. 1987	Freeman 1991	Mwangi 1995	Mwangi 1995

There is little knowledge on inputs for livestock rearing. In the mid-1980s, dipping or spraying was done by 27% of the farmers keeping livestock, while only 10% had their animals being vaccinated (Lee-Smith et al. 1988: 41). In the survey in Korogocho and Pumwani/Eastleigh, almost ten years later, it was found that only one-quarter of the livestock-rearing farmers used veterinary drugs (Mwangi 1995: 28). This partly explains the high mortality rate among the Nairobi livestock. Most farmers give additional feeding to their animals. For instance, in Korogocho and Pumwani/Eastleigh, almost all farmers gave crop residues and/or urban waste as additional fodder, while about 60% also gave grasses (ibid).

Lee-Smith et al. (1988: 28) found that two-thirds of the Nairobi farmers irrigated their crops. This was mainly done with treated water from taps, which is not surprising because of the many backyards in the sample. For many of the poorer farmers, only those who have plots along a river can benefit from the yearly flooding of the river bringing water and nutrients into the soil (but minerals that are harmful for human consumption as well). Irrigation with sewage water is not uncommon in Kibera, as almost 25% of the farmers use it (Dennery 1995: 74). The water is obtained by (illegally) blocking a manhole, giving the man on whose land the manhole was located a powerful position, for instance by demanding very high user fees.

THE IMPORTANCE OF URBAN FARMING FOR THE PEOPLE INVOLVED

In the literature on urban agriculture the benefits for the people involved in this activity are usually strongly emphasised, especially as far as the urban poor are concerned. First of all, it provides them with (additional) food, ideally resulting in a higher level of food consumption in the household and to a better nutritional condition. Secondly, because less food has to be purchased and/or a cash income is realised by selling part of the produce, the household's welfare level can be raised. Finally, since many of these people are not able to find a regular job, farming constitutes an alternative way of employment for them, thus providing a greater existential satisfaction. Moreover, when more developed, urban farming can offer employment to others as well by means of paid jobs.

Source of food

Since most of the crop produce is consumed by the farmers themselves, it is obvious that farming is primarily done to increase the household's food security situation. In all surveys, the main motive for practicing farming in Nairobi was simply 'hunger' or

'a need for food' (Freeman 1991: 105), due to serious financial constraints. One-fifth of the farmers in the survey done by the Mazingira Institute said they 'would starve' in case of losing this source of food (Lee-Smith et al. 1987: 147). One-quarter of the Korogocho farmers mentioned their own urban production as the most important food source during the three years prior to the survey (Mwangi 1995: 34). One Kibera farmer was able to produce a large proportion of the household's food needs (Dennery 1995: 55), while another one managed to produce half the maize his household needed and was self-sufficient in beans (ibid: 56). All four informants in the Kibera study stressed the improvement in their food (as well as income) situation since they started practising urban farming (ibid: 89).

Not only the absolute amount of food, but also the dietary composition is often mentioned as a reason to practice urban farming. According to Freeman (1991: 106), "fresh vegetables to supplement an otherwise bland and nutritionally inadequate diet based on maize meal (...) was a frequent motive of mothers who mentioned that their children needed "catering to"." This explains the popularity of a crop like *sukuma wiki*. But also others, i.e. non-farmers, can benefit from it. Some of the produce of vegetables is sold by the farmers and Lee-Smith et al. (1988: 19) observed that in 1985 selling prices of *sukuma wiki* were somewhat lower than the prices paid in the Soko Mjinga and Kawangware markets, thus making it a cheaper source of food for the farmers' neighbours as well.

By comparing the group of urban farmers in Korogocho with a group of non-farmers in the same area, Mwangi (1995: Chapter 4; see also Mwangi and Foeken 1996) provides more detailed information on the impact of urban farming in terms of food security and nutrition in the households concerned.[10] In qualitative terms, more farmers than non-farmers stated that they had "always or most of the time enough to eat" (35% and 25%, respectively) and that they "do not require any improvement in the food situation" (13% and 6%, respectively). The level of actual food consumption was measured by the intake of energy and proteins during the day prior to the interview. It turned out that, on average, energy intake among the group of urban farmers was somewhat higher than among the non-farmers (a difference of 100 kilocalories per consumer unit per day), despite a lower level of food purchases in the farmers' group. This higher energy intake could be attributed to the households' own food production (the level of protein intake was about the same in both groups).

[10] In terms of average monetary income, the two groups were comparable, although the income variation in the non-farmers' group was somewhat larger.

However, this higher energy intake was not clearly translated into a better nutritional condition of the children, although the percentages of children being wasted, stunted or 'severly malnourished' were higher among the latter group.[11] Another effect of the farmers' activities was a higher material welfare level, due to the fact that they spent less money on the purchase of food ('fungible income'). As Dennery (1995: 70) points out, "Kibera producers considered reduction of food expenses to be one of the main benefits of urban agriculture."

Source of income

Although in all four surveys the large majority of the respondents indicated that the produce was mainly for self-consumption, urban agriculture as a source of income should not be underestimated. Lee-Smith et al. (1988: 19) found that 21% of the farmers sold at least part of their produce. Nairobi-wide, they estimated that about 1.4 million kilograms of crops were sold, out of a total estimated production of 5.2 million kilograms (1988: 20). About 13% of the respondents in Freeman's (1991: 144) survey appeared to sell at least half of their total produce. And also in the low-income areas of Korogocho and Pumwani/Eastleigh, households did sell part of their produce. For instance, in Korogocho at least 40% of the produced green maize, green beans, cow peas, pigeon peas, *sukuma wiki*, amaranth and sugar cane was sold, while in Pumwani/Eastleigh selling was even more common (Mwangi 1995: 64). It should be added, however, that it usually concerned small quantities. Nevertheless, sales are important to meet other basic needs. All Dennery's (1995: 69) respondents in Kibera said they used the revenues primarily for (other) food and such basics as paraffin, and maize and wheat flour, as well as school fees.

Farmers in Kibera expressly stated that they did not produce food crops with the purpose of selling it (Dennery 1995: 66). For most crops, this was indeed the case, as almost the entire produce was self-consumed. Maize and *sukuma wiki*, however, were largely sold. As soon as the maize in the fields is green, i.e. can be consumed, it has to be harvested quickly in order to prevent it from being stolen. Much of it is sold to people who roast the cobs for selling on the streets. It should be noted that both the commercial and the nutritional value of green maize are much lower than

[11] Results were as follows (children in Korogocho aged 6-60 months):

	farmers (N=35)	non-farmers (N=84)
- % stunted (height for age < 90%)	31	38
- % wasted (weight for height < 80%)	2.9	8.3
- % severly malnourished (weight for age < 60%)	0	4.8

Source: Mwangi 1995: 39.

the value of dry maize. Although *sukuma wiki* is primarily meant for domestic use, substantial amounts are sold. This is related to the crop's perishibility and perhaps also to the fact that it can always easily be sold so that an urgent cash need can be fulfilled (ibid: 67).

As with the crops, livestock is primarily kept for the households' own consumption. However, a number of those who keep the animals for subsistence also sell some of it, be it usually on a very marginal scale. For instance, only 40 animals out of a total of over 1,000 were sold by the farmers in the 1985 survey; half of these were sheep (Lee-Smith et al. 1988: 38). Very few farmers keep animals solely for commercial purposes. Dennery (1995: 53) describes an example of a 50 year-old Kikuyu man in Kibera who keeps 10 goats of himself, together with 30 goats and 7 sheep belonging to friends. Through natural increase, the herd expands and the mature animals are sold.

Source of employment

As could be expected, most labour on the Nairobi *shambas* consists of unpaid family labour. The large majority (93%) of the workers in the 1985 survey were unpaid household workers (Lee-Smith et al. 1988: 22). In 1987, 43% of the cultivators in Freeman's (1991: 94-95) sample stated that they received assistance from at least one family member, while almost 20% got help from non-family members. In all, 85% of the respondents paid no money at all to their family and non-family helpers. In only a small minority of the cases (7%), a weekly payment of 100 shillings or more was given to the worker(s). These were usually commercial farmers in the outskirts of the city. In general, then, urban agriculture as a source of employment for others than the actual farmers is (still) negligible.

CONSTRAINTS FACED BY THE URBAN FARMERS

The Nairobi cultivators face multiple problems. In all four surveys, respondents were asked to mention the major problem they faced. The most important of these are presented in Table 6.[12] Moreover, Appendix 5 lists all the problems that were mentioned by the respondents in Korogocho and Pumwani/Eastleigh. On first sight, perhaps the most conspicuous figures in Table 6 concern the percentages of respondents in

[12] It should be noted that Freeman (1991) presents the 'first-mentioned' problem, assuming "that a cultivator would normally mention the most pressing or important problem first" (p. 96). As shown by the results of the 1994 surveys, however, this is a wrong assumption. It follows that the figures in Table 6 based on Freeman may not be entirely comparable with the figures of the other surveys.

1985 and in 1987 stating that they faced no problems. On second thought, however, it is likely that this concerns either people who cultivate in their backyard or commercial farmers in Nairobi's outskirts. Anyway, in Freeman's survey, the group having no problem was even the largest category, which was seen by Freeman (1991: 96) as "a positive and encouraging sign", as it "may be taken as evidence that the climate for this type of urban activity is not as unfavourable as one might suppose." Even if Freeman's optimism is right (which can be doubted), it does not apply to the low-income farmers: in the 1994 surveys in Korogocho and Pumwani/Eastleigh, farmers having 'no problems' were not encountered.

Some of the problems mentioned by the cultivators are not specific to the urban circumstances and are the same as any rural farmer can face. In Table 6, these problems are brought together under the heading of 'natural problems'. Although average annual rainfall is sufficient for a reasonably good harvest of rain-fed crops, the Nairobi farmers face the usual problems related to climatic conditions: rainfall may be too little (or even drought), too much (flooding) or is insufficient in the proper season. Flooding and/or waterlogging is a problem commonly encountered by those who have plots along rivers, as shown for instance by the fact that one-fifth of the

Table 6
Constraints faced by the Nairobi farmers regarding crop cultivation (% of households)

year of survey:	1985	1987	1994	1994
area:	Nairobi	Nairobi	Korogocho	Pumwani/E.
N:	154	618	48	62
type of question:	most serious problem	first-mentioned problem	major problem	major problem
no problems	22	29	-	-
natural problems				
- drought/lack of rain	-	16	4	-
- flooding/waterlogging	-	7	-	2
- poor soil	17	-	-	-
- destruction by animals	24			
- pests/diseases	-	10	17	2
'urban' problems				
- theft of crops	13	7	56	75
- lack of inputs/capital	14	4	17	8
- plot used as toilet	-	-	-	13
- threat of eviction/destruction	-	4	-	-
other problems	10	17	6	-
total	100	100	100	100
Sources:	Lee-Smith et al. 1987	Freeman 1991	1994 survey	1994 survey

cultivators in Pumwani/Eastleigh mentioned this as a problem (Appendix 5), although very of them considered it the most important problem (Table 6). The quality of the soil varies in Nairobi. Moreover, fertility decreases because of the intensive use of the soil and the lack of means to buy fertilisers. It is remarkable that in the Mazingira survey 'destruction by animals' was most often mentioned as the most serious problem, while pests and diseases were mentioned by a few farmers only (Table 6). In the 1994 surveys in Korogocho and Pumwani/Eastleigh, the former problem was of no importance, while more than half of the farmers were complaining about losing part of their crops because of pests and diseases (Appendix 5). As we have seen (Table 5), many farmers in these areas cannot afford pesticides and fungicides.

Undoubtedly, the most important urban-specific problem is theft of crops. Although in 1985 only 13% of the respondents mentioned this as the main problem and in Freeman's survey two years later the percentage was even lower, in the mid-1990s, almost all farmers in Korogocho and Pumwani/Eastleigh said theft was a serious problem and for the majority of them even the major problem. A possible explanation for this increase is that between the mid-1980s and the mid-1990s the economic situation in Kenya has substantially deteriorated, resulting in high levels of unemployment and poverty as well as increased food prices, particularly in Nairobi. Nevertheless, theft of crops is nothing new, as the following story — told by 'N', leader of a gang based in Kangemi, in August 1968 — shows (Hake 1977: 212):

> "But they forgot about their gardens, and we started going there during the night, putting maize into our bags and carrying them by bus into Nairobi, where we sold them in the market. We could sometimes work in different gardens for the whole night, and take with us about 30 bags of maize; in this case we hired a lorry for carriage. Sweet potatoes were needed and we made it our job to supply them. We started this near home, but now we go away because people have known our trick around here."

In 1985, 15% of the Nairobi farmers in the Mazingira survey stated that crops of theirs had been stolen (Lee-Smith et al. 1987: 113). Two years later, 43% of Freeman's (1991: 98) respondents experienced or expected theft of part of their crops.[13] Some even declared to expect to lose half of their crop. Popular crops with thiefs are, amongst others, bananas, cocoyams and maize, as these have a ready market and are difficult to camouflage (Freeman 1993: 13). Women are not only more prone to lose part of their crops than men, they also tend to lose larger quantities, as men are more

[13] Again, the Mazingira sample contained quite a number of backyard garden plots.

likely and better able to guard their crops personally (ibid: 10). In Kibera, guards are sometimes hired for the protection of the crop once it approaches maturity (Dennery 1995: 77). Women can profit from this as well, as long as they are able to contribute to the paying of the guards. Another strategy, besides the early harvesting referred to above, is to restrain from planting high-value crops such as onion and tomatoes, as these "attract thieves" (ibid).

Although never mentioned as a (major) problem, theft of livestock also occurs. Among the Mazingira farmers, 7% of the animals had been stolen during the year prior to the survey, the large majortity being chickens (Lee-Smith et al. 1988: 38). One of the farmers in Kibera once had 20 chickens stolen in a period of one year, driving him to stop raising them (Dennery 1995: 52). Another farmer saw a (pregnant) female goat being stolen.

Since the majority of the farmers in Nairobi are poor to very poor, many of them have no financial means to purchase inputs (Appendix 5). As Dennery (1995: 81) remarks: "Maize production is expensive. Cash is needed to purchase seed and sometimes fertiliser." And, for those who can afford it, "hired labour is an additional expense to complete planting, weeding or harvesting rapidly." But investing in maize production is discouraged because of the risk of theft, thus forcing the crop to be harvested when it is still green and much less rewarding than dry maize.

Many farmers in Pumwani/Eastleigh faced a very specific problem, namely the use of their plots as toilets (Appendix 5). For some of them, it was even the major problem (Table 6). It concerns the plots which are located in the narrow belt between the river and the very densely built-up area. Particularly during the period that the crops are high, the plots provide shelter for the people to relieve themselves. As the authors of this paper have experienced, this is quite a burden for the cultivators of these plots.

Remarkably few farmers mentioned harassment, eviction or destruction of crops by the local authorities as a (major) problem (Table 6, Appendix 5). Apparently, the Nairobi City Council's policy has changed from very restrictive in the past to a laissez-faire attitude nowadays (see below). During the 1960s and 1970s and to a lesser extent also during the 1980s, harassment and destruction of crops as well as houses did occur, as is shown by the following example described by Hake (1977: 96):

> (...) Langata [is] a semi-permanent rural village on the plain to the south-west of the city centre between Kibera, Nairobi Dam, and the Ngong Road Forest. In 1966 there were 80-100 households living for the most part in grass-thatched huts; most were Kikuyu, but there were also some Somali families living in tree-shaded compounds. The 400-500 inhabitants kept their cattle, goats and chickens, and grew maize and vegetables as recognised squatters on State land. (...) In May 1971 (...) the 400 residents were given five days' notice to vacate their houses, which were then destroyed.

Only one out of the 154 farmers in the Mazingira survey had ever been harassed (Lee-Smith et al. 1987: 145). In Freeman's (1991: 142) sample, it had happened to 38 cultivators (6%), a few of them shortly before the interview in 1987. It is usually the (almost mature) maize crop that is destroyed, one of the reasons being that thieves can hide in it. But because most farmers practice mixed cropping, losses of other crops can be substantial as well (ibid: 98). Evictions in Korogocho and Pumwani/-Eastleigh were much more common, since it happened to 27% and 10% of the farmers, respectively, during the years 1989-1993 (Mwangi 1995: 29). Of the 13 evictions reported in Korogocho, five had been effected by people cultivating neighbouring plots, four by the Nairobi City Council, three by legal land owners, and one by the police. In contrast, there were no reports of harassments in Kibera (Dennery 1995: 76).

Closely related to harassment and eviction is the question of land tenure. It is surprising that uncertainty regarding the land used by cultivators was hardly mentioned as the major problem by the respondents in the four surveys (Table 6), although 20% of the farmers in Pumwani/Eastleigh did mention it as one of the problems they faced (Appendix 5). It is the more surprising as most farmers cultivate land that belongs to somebody else (see Table 1) and for which they pay no rent. Moreover, of the *non*-farmers in Korogocho, 80% mentioned not having access to urban land as the major constraint (Mwangi 1995: 44). But also those who are tilling land which is either public or privately owned, continuously face the risk of being evicted by the rightful owner. Especially access to land that belongs to some private developer has become increasingly insecure. In Kibera, for instance, uncertainty of tenure has always been there, but it has only recently become a major concern, the more so since "loss of access to land has a permanent and devastating impact", particularly for those who have no other source of income (Dennery 1995: 72).

The reason that despite these 'threats' so few respondents mentioned insecurity of tenure as a major problem may have to do with the traditional forms of land tenure

that still seem to prevail in some parts of Nairobi (Freeman 1991: 74-78). Most of the open spaces in Nairobi's outskirts were formerly part of Kikuyu land. Under Kikuyu customary law, each piece of land is owned by a clan member for an indefinite period of time. Tenants not part of a clan (in Kikuyu called *ahoi*) could be given access to land by attaching themselves to a powerful elder and pledging work or support, but no formal rent agreement was involved. Although in a rather hypothetical way, Freeman (p. 78) then argues that

> despite the imposition of British land laws during the colonial period, it is probable that traditional concepts of the rights of *ahoi* or landless people who occupy or gain access to land in this area still hold validity for many Kikuyu. Thus, the factor deciding who will have access to open space in the city of Nairobi may not simply be the *de jure* view of public open spaces as untouchable no man's land, and of informal urban cultivators as squatters, devoid of rights, illegally farming City Commission or private land. Rather, the evidence suggests a different perception on the part of both the landless and the landowners in the Nairobi area. There seems to be an acceptance of *de facto* inclusion in the pattern of urban land tenure of a modern urban *ahoi*, who have reasserted their customary right (which once held sway in this region) to usufruct and to security from arbitrary eviction or confiscation of their crops.

PROSPECTS FOR URBAN FARMING IN NAIROBI

Environmental aspects

Urban agriculture is considered by many as an environmental hazard because of the danger of soil erosion and the use of contaminated water for irrigation purposes, while crops cultivated along road sides are prone to air pollution. Since urban farming tends to be more intensive than rural farming, the use of chemical fertilizers, pesticides and insecticides can have a great impact on the urban environment. Animals can not only cause stench but also overgrazing and traffic accidents.

Very little is known about the environmental impact of farming in Nairobi. Soil erosion does take place in Kibera and the farmers practised various ways to keep the process under control (Dennery 1995: 73-74). The most widely used measure was digging drainage ditches in order to prevent gully erosion. Sheet erosion was combatted with crop residues, at the same time enhancing moisture retention. One farmer built rock barriers across the slope of a rather steep plot. As mentioned earlier, farmers do not easily plant trees due to insecurity of tenure, implying that this method of preventing soil erosion cannot be applied.

The rivers flowing through Nairobi are heavily polluted by industrial effluent and human waste.[14] Plots located along these rivers are flooded each year during the rainy season. Although this may be advantageous for maintaining soil fertility, crops can become seriously contaminated with all kinds of minerals harmful for human beings (and animals in case of fodder such as Napier grass). Almost half of the plots of the Korogocho farmers and almost all plots of the farmers in Pumwani/Eastleigh are located along the heavily polluted Nairobi River (authors' own observation) and were liable to seasonal flooding. It is questionable whether farmers in these conditions are fully aware of the risks involved. River water used for irrigation involves the same risks. Moreover, stagnant or slow-flowing water promotes the spread of human diseases such as bilharzia and malaria.

Irrigation with sewage water is often considered beneficial, not only for crop production (the sludge adds nutrients to the soil) but also from a wider environmental point of view. As experiences in Asian cities have shown, partly treated sewage water can very well be used for the production of hydroponic crops and fish. Fish production in Nairobi is negligible, but in some areas (untreated) sewage water is being used for irrigation. Dennery (1995: 74) estimates that about one-quarter of the Kibera cultivators use sewage water. From an environmental viewpoint, over time the use of sewage water for irrigation can be harmful for the soil, as a crust consisting of particles sediment appears over the soil, causing an increase of compaction and making the soil more acidic. As Dennery (1995: 76) notes, eventually some crops cannot grow anymore. One of the Kibera cultivators indeed complained that he was no longer able to grow Irish potatoes in one of his irrigated plots.

Like the recycling of sewage water, recycling of urban solid waste and turning it into compost is often propagated as a kind of panacea for both urban crop production and the improvement of the urban environment. Nairobi's solid waste is collectively dumped at Dandora (commonly known as Mukuru), at a site facing the Korogocho slums across Nairobi River. The waste is never separated which poses a number of environmental and health hazards,, especially because the waste is dumped almost inside Dandora residential estate. A self-help group known as Mukuru Self-Help Group scavenges the dumping site for organic waste in order to make fertilizer which is partly sold and partly used for their vegetable production project near Dandora Catholic Church. A few garbage collectors from the city deliver some of the waste, already separated, to this group. Although the group, which receives some help from

[14] According to Freeman (1991: 101), in 1987 31% of the houses in Nairobi had no flush toilet.

UNDP, is playing a good role in waste recycling, the impact is no more than 'a drop in the ocean'.

Policy aspects

The legal status of urban farming in Nairobi is unclear. According to the current Local Government Act, "urban farming can either be permitted or restricted by local authority by-laws. The Nairobi by-laws only prohibit cultivation on public streets maintainable by the City" (Memon and Lee-Smith 1993: 39). According to the Nairobi City Council Public Health Prosecution Officer, however, crop farming is not allowed within the city boundaries because the crops encourage breeding of mosquitoes while tall crops, such as maize, are said to be hiding places for thugs; so, the farming that takes place within the city boundaries is illegal; hence, sometimes harassments occurred (Munari, personal communication, 1994).

According to the City of Nairobi General Nuisance By-Laws (1961), livestock is not allowed within the city boundaries as it causes a nuisance to other residents. The word nuisance refers to anything that interferes with the residents' peace, such as noise, foul smell, health hazard and disruption of other peoples rest. However, residents can keep animals as long as they obtain permission from the town clerk and keep them in a manner that the animals do not cause a disturbance of any kind to the residents (Munari and Karanja (Training Commandant of Nairobi City Council Training School), personal communication, 1994). This implies that the livestock keeper must have enough (land) space, either on his compound or elsewhere, to ensure that the animals are securely kept. The urban poor are disadvantaged in that they are not in a position to have this kind of space. Nevertheless, it does not mean that the poor of Nairobi do not keep livestock. Their goats and chicken can be seen roaming all over city markets during daytime searching for food and they retire to a safe place during the night. Sometimes, the animals are seized by the City Council but this is not very common.

It may seem as if the Council has come to recognise urban farming as something inevitable for the time being. As Freeman (1993: 20) rightly observes, "the harsh facts of life for the urban poor make government attempts at prohibition or punitive regulation of such things as urban cultivation a futile exercise so long as the underlying conditions fueling explosive urban growth remain unaddressed." However, no policy or by-law has been passed in favour of urban farming.

In the survey by the Mazingira Institute, the respondents (farmers as well as non-farmers) were questioned about their knowledge regarding the legal status of their activities (Lee-Smith et al. 1988: 32). Over 40% of the people thought that urban agriculture was permitted; only one-quarter thought it was forbidden. Of the latter, two-thirds were of the opinion that it should be permitted. Just over one-third of the sampled population thought crop irrigation was allowed. Of those who thought it was forbidden (23%), half thought it should be allowed. As for cattle farming, just one-quarter believed it was allowed, but many more respondents (42%) thought poultry farming was allowed (ibid: 47). Small minorities thought that beekeeping and fish farming were allowed in Nairobi. These findings are in line with a widely felt wish among the Nairobi population to have access to a piece of urban land in order to grow food. The way to realise this is that idle land should be made available free of charge either by the government or by the City Council (ibid: 16).

Another general complaint is the absence of extension services. Compared with the other five towns in the Mazingira survey, Nairobi had the highest percentage of farmers who never received any advice (89%; Lee-Smith et al. 1987: 155). This partly explains the high mortality rate among Nairobi's livestock. The large majority of the farmers said they needed extension advice and that this should be provided by the government.

In terms of cooperation between farmers, Nairobi is also rather 'undeveloped' compared with the other five towns. Less than half of the Nairobi farmers mentioned to cooperate with neighbours, mainly in the form of sharing tools (Lee-Smith et al. 1987: 160-162). Other forms of cooperation included exchange of seeds, cultivation of *shambas*, protection of crops (only two cases in Nairobi), sharing of irrigation water, sharing of fungicides and pesticides, and advising each other on appropriate husbandry practices. Only two of the Nairobi farmers were a member of some formal group, much less than in the other towns, one being a member of a farmers' cooperative and the other of a group (Lee-Smith et al. 1988: 30). Most of the other farmers would like to join some group.

Organising a group with some common goal or objective is easier said than done, however, as Dennery (1995: 103-105) noticed during her fieldwork in Kibera. According to her, "an important disincentive for producers to organise is the powerlessness they feel with regards to their largest problem: ensuring short and long term access to land. (...) Kibera producers, as individuals and a group, see the land issue as

a problem with no solution or one which inevitably means a victory for more powerful groups" (ibid: 105). Moreover, groups are usually formed along ethnic lines and it requires at least 25 participants to be given official recognition by the Chief and Ministry of Culture and Social Services. Another constraint is the seasonality factor: during the period that meetings are most necessary (the growing season), time to attend is restricted due to the labour to be performed on the *shambas*. In short, without the promotion and assistance of some non-governmental organisation, it is not very likely that groups will easily be formed and successfully perform.

Development efforts

Up to now, there has been only one effort to develop urban agriculture in Nairobi (Gathuru 1988; 1993). It is part of a wider project on slum development organised by the Undugu Society of Kenya for 'underprivileged' people living in the low income areas. The society started as a small parking boys (street boys) scheme launched in 1975/76. It has developed into an extensive low income development project. The Undugu Society Urban Agriculture Project (USUAP) started in 1988 and its aim was to provide household level food security for the urban poor. The initial targets area were three slum villages, Kitui-Pumwani, Kanuka and Kinyango on the eastern side of Nairobi, with a population of more than 40,000 persons. Plots with an area of 125 square metres (2.5x50 m) along the Nairobi river were allocated to 70 low income households through the local government. The individuals were given result demonstrations and assistance for a period of two years and left to continue on their own with only technical advice from the Society. The technologies offered are mainly bio-intensive including the use of organic pesticides (Gathuru, personal communication, 1993). Crops grown were meant to be mainly vegetables for consumption and the surplus for sale.

In the project, a number of the policy aspects discussed in the previous section were successfully tackled. First of all, the Society obtained official permission from the City Council to use the land between the villages and the river for cultivation purposes. Secondly, although the participants (only women) cultivate their plots individually, they are organised in a group which has collective control of use and 'ownership'. Finally, the Society provided the group with all kinds of technical advice on crop and animal husbandry.

Most project farmers were quite positive about the impact of the urban agriculture project on their food situation (Mwangi 1995: 44). One aspect to be noted, however,

is that the project also incorporates other income-generating activities such as basket making, selling firewood, and food and vegetable hawking. The programme also comes hand in hand with the shelter improvement project within the Undugu Society and this probably earns the society its good name. It is possible that the respondents were influenced by the other activities that the Society has introduced in the low income area. However, not all households were so positive about the urban agriculture project. They complained of biased selection of who benefited from the other components of the project. Nevertheless, according to Gathuru (1993: 12), the urban farmers participating in the project "have become aware of their rights and responsibilities as food providers and are now key participants in the development of the Kitui-Pumwani village." What the project does show is that there is potential for organising farmers and securing land for long-term agricultural use.

CONCLUSION

One of the more conspicuous features about Nairobi is the fact that the city still contains many open spaces, which are or can be used for farming purposes. Most of the land used to be owned by either the local authorities or the government. During the last 20 years, however, more and more land has been sold to private developers with the purpose of developing it into residential estates. This is a process that has not only been going on until today, but will continue for a long time to come, as natural increase and inmigration will cause the city population to keep on growing rapidly. As a result, slowly but surely, most of the open spaces that still exist today will be entirely built-up with houses, roads and the like. From this perspective, there is not a bright future for agricultural activities in the city, for the simple reason that agriculture cannot compete with other activities in terms of rewards.

However, besides the fact that farming in backyards is not likely to disappear, there will always remain open spaces, for instance along roads, railway lines and rivers, under power lines, etc. In other words, there is certainly potential to develop the sector. As may have become clear from the foregoing, although knowledge on urban farming in Nairobi is far from complete, the sector is seriously and chronically underdeveloped. It is not realistic to think that in the very near future urban farming will be something of the past. Many of the poor urban dwellers rely for their livelihood to a smaller or larger extent on the production of crops or rearing of animals within the city boundaries. The very first thing therefore that has to change is the local authorities' negative attitude regarding farming in the city. As long as there is

no security of tenure, any effort to develop urban agriculture is too risky. As the example of the Undugu Society project and the case of the Mathare self-help group have shown, obtaining official permission to cultivate a piece of land appears to be possible.

Many farmers are tilling plots that do not belong to the local authorities, but to private landlords. These farmers face a very uncertain future as far as their farming activities are concerned, because sooner or later the land will be developed for residential or other purposes. Still, these people could be very much helped by some form of temporary security regarding access to land. Organising themselves into a formal group (either or not with the assistance of a non-governmental organisation) and then signing some kind of contract with the land owner in which access to the land for a specific number of years is guaranteed, could be a great help to secure tenure, even though it is on a temporary basis. At least, the farmers know where they stand then.

From Asian cities we know that there is great potential to combine urban agriculture with such environmental considerations as solid waste disposal and treatment and use of sewage water. Using solid waste — through compost production — requires enormous financial and organisational investments, however. In the present economic situation, this is perhaps not the most realistic short-term option. Using sewage water for farming purposes is another matter. To begin with, according to Ms. Grootenhuis of the Green Towns Project, it is fairly easy to pipe the sewage water into a series of small ponds, in which the water becomes progressively cleaner. As Dennery (1995: 77) points out, "the City would have less sewage water to dispose of and fewer infrastructure costs and food producers would have access to water for irrigation." The cultivation of hydroponic crops possibly combined with fish farming could be other uses. Still, this can only be a realistic option when the water is not too toxic.

Whatever effort is being undertaken to develop farming in Nairobi, particularly for the urban poor, without the local authorities' recognition that these people are permanent City residents, any actions on a scale of some size are not very likely to be successful. Formally, i.e. in terms of the City Council's policies, the urban poor hardly exist. On official maps of Nairobi, the informal residential areas (or slums) are not plotted. Specific programmes targeted at the urban poor in order to improve their nutritional situation do not exist and they are also ignored as far as famine relief is

concerned (Lee-Smith and Memon 1994: 80). Hence, the first step to be taken has to come from the side of the Nairobi authorities, namely, first, to admit that the slum dwellers are a fact of life in the city, and secondly, to develop policies directed at the improvement of the living situation of these people. Urban agriculture, then, should be part of such policies.

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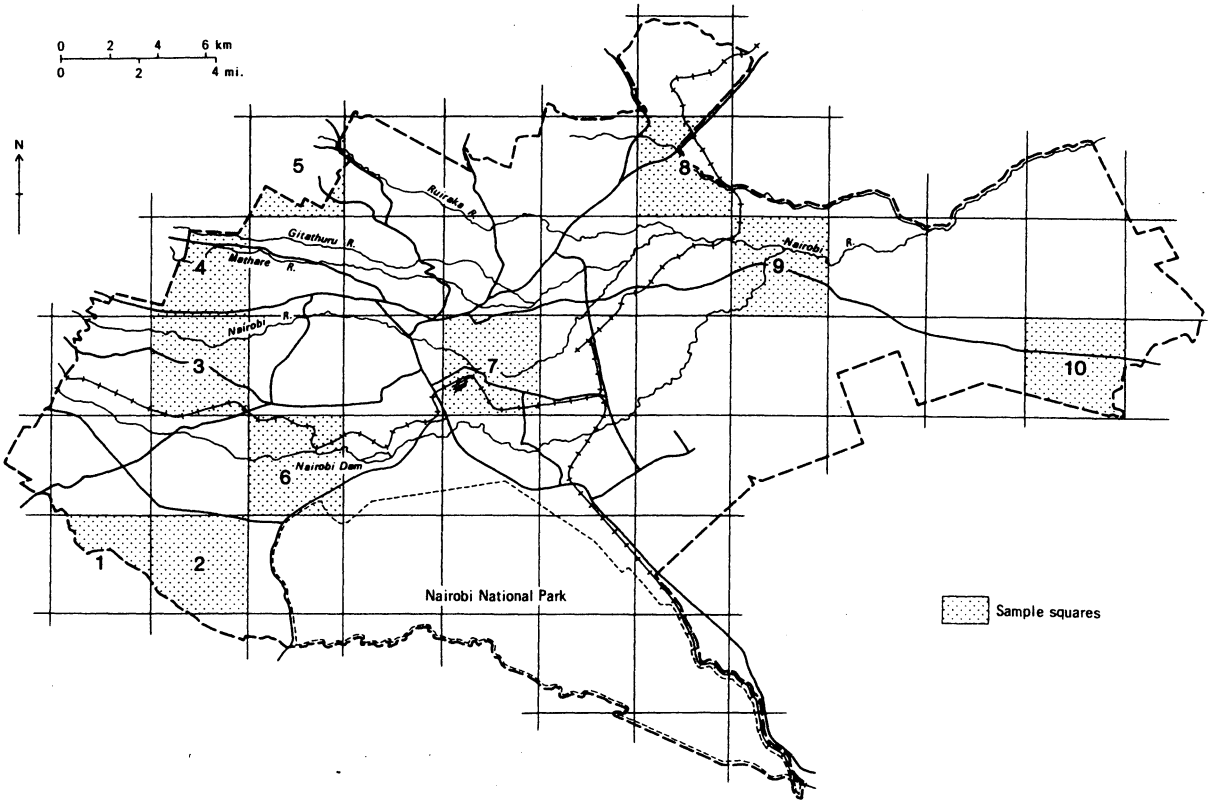
Appendices

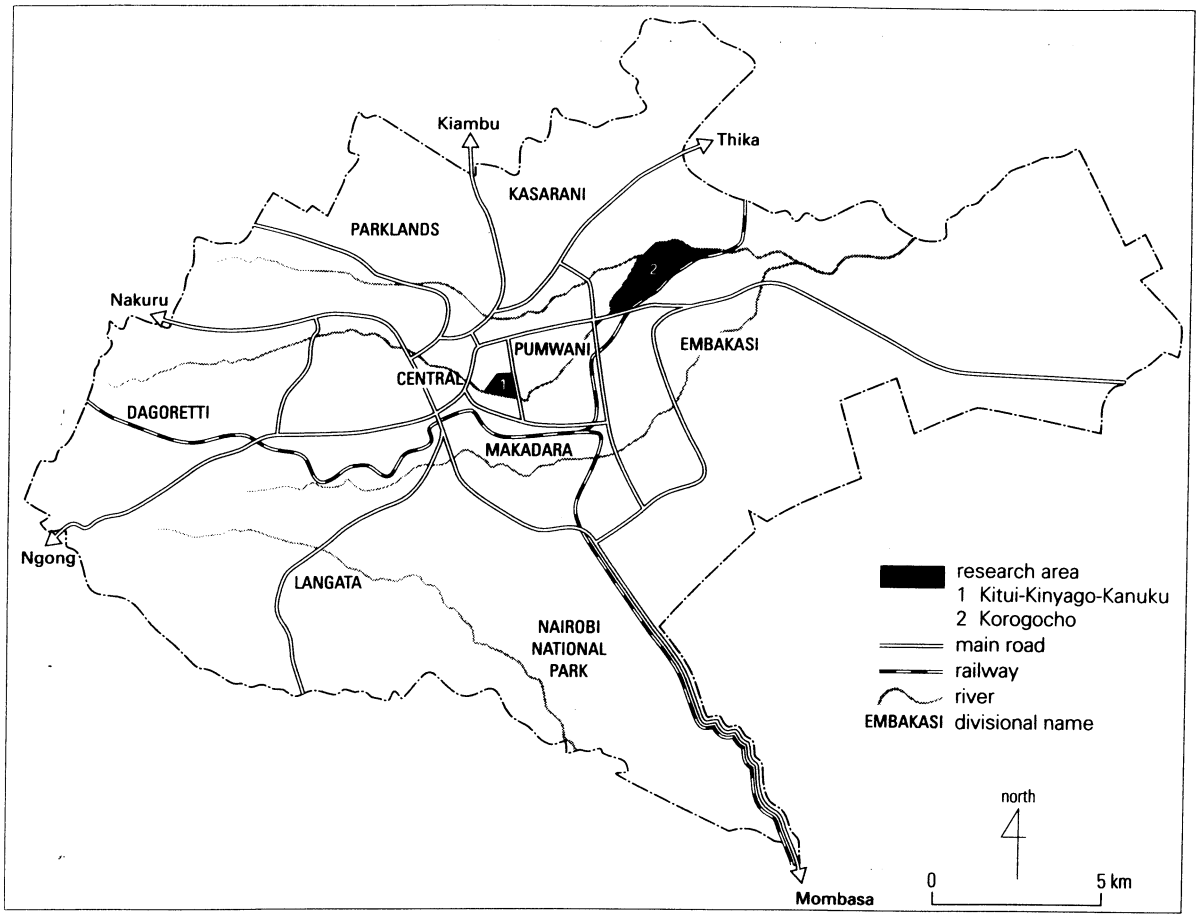
Appendix 1

Research locations of Freeman
(Source: Freeman 1991)



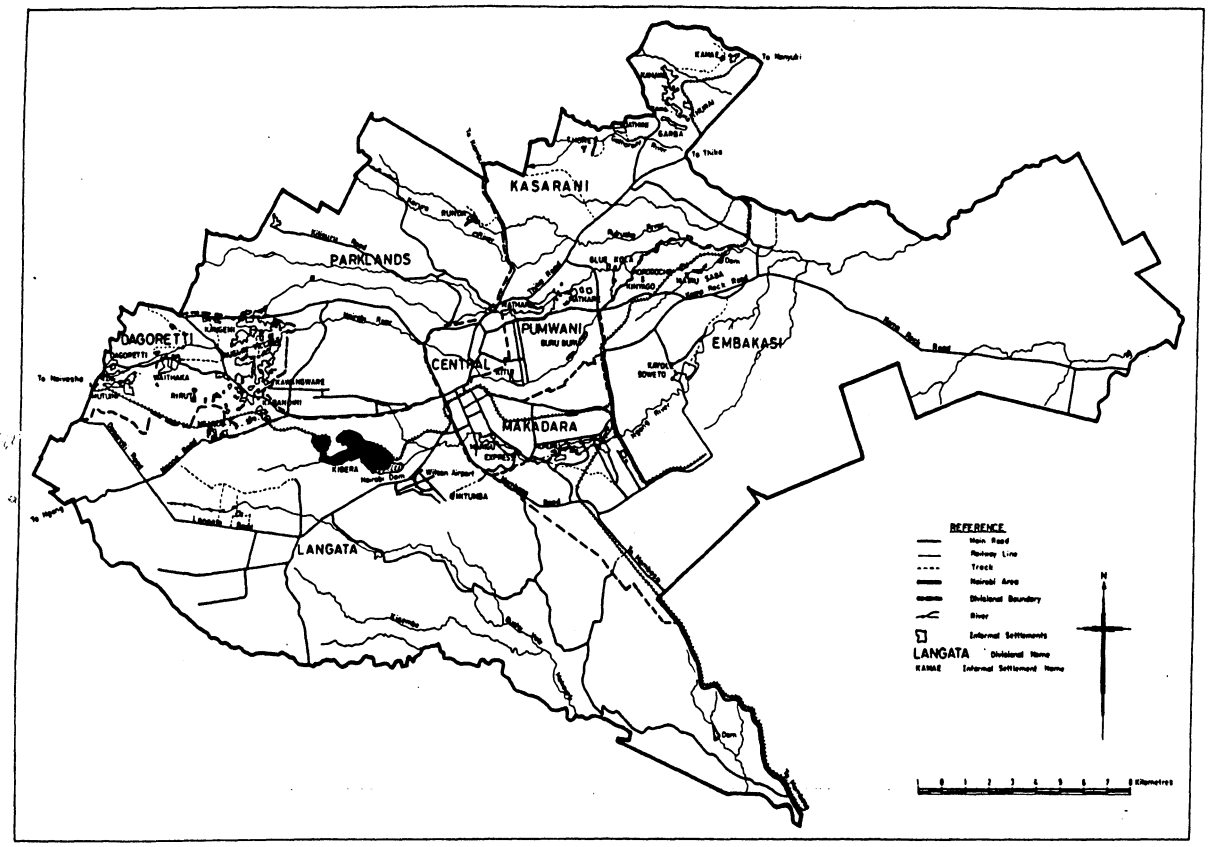
Appendix 2

Research locations of Mwangi
(Source: Mwangi 1995)



Appendix 3

Research location of Dennery
(Source: Dennery 1995)



Appendix 4

Crops produced by the Nairobi farmers*

year of survey:	1985	1994	1994
area:	Nairobi	Korogocho	Pumwani/E.
N:	154	58	99
unit:	% of shambas	% households	% households
vegetables			
- sukuma wiki	63	35	73
- onions/leafy onions	12	4	11
- leafy onions		10	24
- spinach	10	8	13
- cabbage	2	2	3
- tomatoes		23	31
- other vegetables	31	-	-
- amaranth		17	36
- egg plant		-	2
legumes			
- beans	38	71	73
- cowpeas	12	33	24
- peas	1		
- garden peas		4	8
- pigeon peas		6	-
- green grams	-	-	2
cereals			
- maize	35	71	97
- sorghum		10	-
- finger millet		2	-
- other cereals	1	-	-
root crops			
- Irish potatoes	14	23	26
- sweet potatoes	1	17	29
- arrowroot	1	21	26
- cassava	-	13	8
- other root crops	1	-	-
fruits			
- bananas	2	17	47
- citrus	1	-	-
- pumpkin	-	10	23
cash crops			
- sugar cane	-	4	13
- other cash crops	1	-	-
- napier grass		2	11

* Data from Freeman 1991 could not be included in this table since he presents only the percentages of plots on which a certain crop was the "dominant" one.

Sources:	Lee-Smith et al. 1987	Mwangi 1995	Mwangi 1995

Appendix 5

Korogocho and Pumwani/Eastleigh: problems regarding urban agriculture (% of households)

	Korogocho (N=48)	Pumwani/ Eastleigh (N=62)
no problems	-	-
natural problems		
- lack of rain	13	7
- flooding	2	19
- soil erosion	4	-
- pests/diseases	58	53
- poor yields	2	-
'urban' problems		
- access to land	4	2
- no land security	4	18
- harassment	15	3
- no technical advice	2	-
- transportation	2	-
- theft of crops	81	94
- lack of capital	29	16
- lack of inputs	10	10
- lack of tools	2	10
- no assisting labour	-	2
- access to food for livestock	4	-
- plot used as toilet	-	31
- jealousy	2	-

Source: 1994 survey

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