Urban Agriculture and Sustainable Urban Development: A Case Study of Nairobi, Kenya

by

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Abstract

Agricultural development has historically focused on rural areas and the needs of rural populations, it has virtually ignored cities. Indeed, farming was an activity perceived to be 'traditional' and not befitting modern concepts of urban development. Nevertheless, urban agriculture has persisted and expanded in Third World cities to reduce hunger and malnutrition amongst the urban poor. Urban agriculture is documented as occurring in numerous cities throughout the developing world as a 'survival strategy'.

This study takes urban agriculture beyond 'survival' and evaluates urban agriculture for its contribution to the development of sustainable cities. Increasingly, finding ways to achieve sustainable development is becoming the challenge for planners. Sustainable development calls for an integrated approach to the problems of Third World Cities. Social, ecological and economic issues need to be addressed in a comprehensive manner: widespread environmental damage is often symptomatic of social and economic problems. This study examines the background literature to sustainable development and urban agriculture to find positive links between them. I use the city of Nairobi, Kenya as my study site. Urban agriculture in Nairobi has already been adopted by small NGOs through development projects. Their projects target a small number of cultivators and provide them with technical assistance. Meanwhile hundreds of other 'urban farmers' continue to cultivate without any outside assistance. What if any, additional benefits does the incorporation of urban agriculture into a development project bring the farmers? This research answers that question by using the City of Nairobi, as a case study and adopting a comparative approach to the sampling method

Prior to developing my survey an extensive literature review, meetings with government officials, UN workers, rural farm managers and project leaders helped develop a contextual framework to evaluate urban agriculture. To determine the advantages of project assisted cultivation my study examines three urban agriculture projects facilitated by two NGOs - the Undugu Society of Kenya and the Help Self-Help Center. Fifty-five cultivators were chosen for study out of a total population of 200. Because it would be difficult, if not impossible, to determine the total number of cultivators farming without project assistance, a control group of 'non-project' farmers representing one-third of the 'project' sample were selected for comparison.

I used a questionnaire presented to the cultivators to assess the strengths and weaknesses of current practices and to determine the contribution of urban agriculture to sustainable urban development. Meetings and discussions have shown that there is a growing awareness of the benefits of urban agriculture, yet, it still goes unrecognized by development planners and government officials. I provide recommendations as to how current practices can be improved and how policy can support urban agriculture. Currently, policy, land use regulation, and general mismanagement of environmental resources are restricting the ability of urban agriculture to expand and flourish. Dedicated policy and programmes would expand the direct and indirect benefits of urban farming to improve the livelihood of urban residents and to improve the health and sustainability of urban centers.

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CHAPTER 1

Introduction and Background to Urban Agriculture

1.0 Introduction

Traditionally, research on agricultural practices has focused on rural areas and the needs of the rural farming population. However, in recent years the phenomenon of urban agriculture has been documented in development literature as an increasingly important 'survival strategy' (Rakodi, 1988) for the urban poor. Faced with high food costs and growing insecurity of food supply, the urban poor in cities around the globe have taken to growing their own crops on vacant land giving rise to 'Cities of Farmers' (Freeman, 1991). To date, urban agriculture has been studied primarily within the context of a 'survival strategy' but now, is being re-evaluated with the context of developing sustainable cities.

In spite of the documented contribution of urban agriculture toward hunger and poverty alleviation as well as resource conservation in Third World cities, many governments have chosen to discourage it or at best to ignore it. These governments fail to encourage urban cultivation for many reasons: perceptions that urban agriculture is a temporary and transient activity; fears that livestock will spread disease; fears that malaria will increase with changed drainage patterns; and concern that fields of maize along roadways will obstruct vision, increasing the likelihood of traffic accidents (Lee-Smith, 1994). Such beliefs inhibit agricultural production without recognizing that these possible problems can be managed to achieve greater potential benefits, benefits that can potentially outweigh the

perceived costs. If officially recognized for its benefits, and promoted with appropriate policy, can urban agriculture make an even greater contribution to sustainable urban development?

This study was undertaken in Nairobi, Kenya during the months of April through August, 1996. The study was initiated in light of the growing concern for 'sustainable' development and the ever-increasing levels of economic disparity in Third World Countries. Many development models to date have been based on economic growth and the rationale that overall economic growth will eventually 'trickle-down' to all members of society. In most countries this has not happened and the rich are getting richer and the poor, poorer. My research decidedly goes against the mainstream thinking that economic growth and markets must be development priorities. Instead it advocates the need to strike a balance between economic growth, social development and ecological integrity. A certain activity may not be the best use of land or resources strictly in economic terms; but, what is the value if we factor in social and ecological benefits? Such thinking is applied to the methodology and analysis of this study.

1.1 Research Questions

This thesis seeks to determine whether urban agriculture is a viable activity with potential to contribute to urban sustainability. That is:

a) does urban agriculture provide low-income urban residents, especially women, with significant social and economic benefits?

b) if so does is urban agriculture also make a contribution to sustainable urban development for the City of Nairobi?, and

c) how can urban agriculture be encouraged and promoted as an integral component of urban development to enhance its contribution to sustainability?

These questions will be addressed by examining urban agriculture as it is carried out as an 'informal sector' activity. There is a great deal of discussion about the sustainable development of human settlements. However, much of the research in this area relates to infrastructure and the physical environment, rarely including the wider social and economic aspects of sustainable development. Urban agriculture should be studied for its potential to serve social and economic goals and contribute to sustainable urban development.

Furthermore, with respect to the issue of women in development, urban agriculture is an often neglected activity (Freeman, 1993, Rakodi, 1988). In rural Africa the responsibility for cultivation lies primarily with women. Studies have shown that when removed to an urban setting women again are responsible for cultivation (Freeman, 1993, Rakodi, 1988, Mazingira Institute, 1987) Cultivation is part of a strategy for food security that is also an extension of the women's domestic role, and part of their 'reproductive' activities (Rakodi,

1988). Does urban agriculture also contribute to the empowerment of women? What, if any, other benefits are there to the needs of women in development?

Photo 1.1

The Urban Farmers of Mailisaba

1.2 The Need to Study Sustainable Urbanization

> We can't eradicate cities. Nor would we want to. But we must recognize that cities disconnect us from nature and each other. They exist by draining resources from the planet while spreading toxic materials and debris. And if we regard all living things on earth as an immense supraorganism (which some have called Gaia) then cities must be seen as the Gaian equivalent of cancer. (Suzuki, in Goodland, 1995)

Cities are seen by some as blights on the natural environment, consuming far more resources than they produce, creating environments that are polluted and unhealthy. Nevertheless, by the year 2025 it is expected that over two thirds of the world's population will live in urban areas as cities grow at two and a half times the rate of rural areas (World Resources, 1996). Furthermore, in many countries intermediate cities or secondary cities are growing at a faster rate than the major or primary cities. These secondary cities, ones with populations between one and ten million have been termed "million cities" (Table 1.1)

Table 1.1

Population in Cities with More Than 1 Million Residents by Region, 1950 - 2015

Total Population in All Cities with More Than 1 Million Residents (population in millions)

Region	1950	1970	1990	2015
Africa	3	16	59	225
Latin America	17	57	118	225
Asia	58	168	359	903
Europe	73	116	141	156
North America	40	78	105	148

Source: World Resources 1996-97, p. 9

It is predicted that by 2015 there will be as many as 516 'million cities', up from 270 in 1990. Much of the growth in these cities is concentrated in spontaneous or squatter settlements that develop on the urban fringe. These informal settlements place tremendous

strain on urban infrastructure and yet are often outside the taxation reach of the local government (World Resources, 1996).

Cities can provide many benefits through economies of scale, greater access to health care and education, greater opportunities for entrepreneurship and the attainment of wealth. However, when improperly managed and supporting thousands more people than originally planned for, cities, especially poor cities, become a quagmire of problems. Inadequate infrastructure leads to unhygenic living conditions, overcrowding, air and water pollution. Because of high unemployment many urban residents are forced to live in abject poverty with little hope of ever improving their standard of living. The ever-increasing size and number of 'megacities', especially in the developing world have captured global attention and forced people to recognize the need for global solutions to the problems of rapid urbanization.

The concept of sustainability was first introduced to address the problems of deteriorating natural environments. Loss of forests and soils, desertification, air and water pollution and loss of species were recognized as problems that required a 'sustainable' approach to the management of global resources. However, the environment in which the majority of the earth's population reside is that of the city: given this, the concept of sustainability has been introduced to the management of the built, as well as the natural environment.

Cities are most commonly seen as the engines for economic development. However, there is insufficient attention to the relationships among politics, social development and the

ecological and economic systems of a city. If these interdependent relationships are to be reconciled then the way in which "cities are understood, planned and managed must be changed"(Ducci, 1996). The challenge to governments, planners, individuals and communities is to find ways to pursue integrated development. Globally, better ways to manage the urban environment need to be explored in an attempt to balance human needs within the limits of the physical environment.

CHAPTER 2

Defining the Research Problem

2.0 Defining 'Sustainable Development'

This study asks whether urban agriculture is a socially, ecologically and economically viable activity that can contribute to sustainable development and whether it should be encouraged in the context of sustainable urban development. Since the term 'sustainable development' can be interpreted in numerous my working definition is outlined below.

An early definition of development was put forth by the United Nations in its Declaration of Human Rights: "development is about meeting basic human needs and the right of all persons to an adequate standard of living for health and well being" (Hardoy, 1992). This includes adequate food, clothing, housing and medical care and other social services (Hardoy, 1992). Development projects should, therefore, aim to attain certain goals that will assist urban residents in meeting their basic needs.

Early development projects consisted primarily of income-generating schemes that incorporated social equity with changing economic status. The realization that rising average incomes did not necessarily result in equity led to projects that distinguished between the social and economic objectives of development. These, growth and equity, remained the two objectives of development until a third, that of the environment or the ecological aspect was added. By the 1980's, researchers throughout the world had

gathered evidence that showed environmental degradation and unhealthy living conditions presented a hindrance to the development process (Munasinghe, 1992). Given this, 'sustainable' development was the name given to development that encompasses all three of these objectives; economic, social and environmental. Development needs to occur in each of these areas for it to be comprehensive, integrated and sustainable.

However, since the term 'sustainable' was first introduced and coupled with 'development' its meaning has been subject to many different interpretations and uses. The most widely accepted definition of "sustainable development", and the one accepted by the Government of Kenya, is put forth by the Bruntland Commission in *Our Common Future*, 1987. Sustainability is the ability to "meet the needs of the present generation without compromising the ability of future generations to meet their own needs."(World Commission on Environment and Development, 1987). However, as one author states

> unfortunately this definition begs all the relevant questions. What are the present needs... are we to accept or to freeze the present pattern of global consumption?...Present needs is an ambiguous concept that can be interpreted in several different ways...the concept of future needs is even more vague and ill defined"(Serageldin et al., 1994)

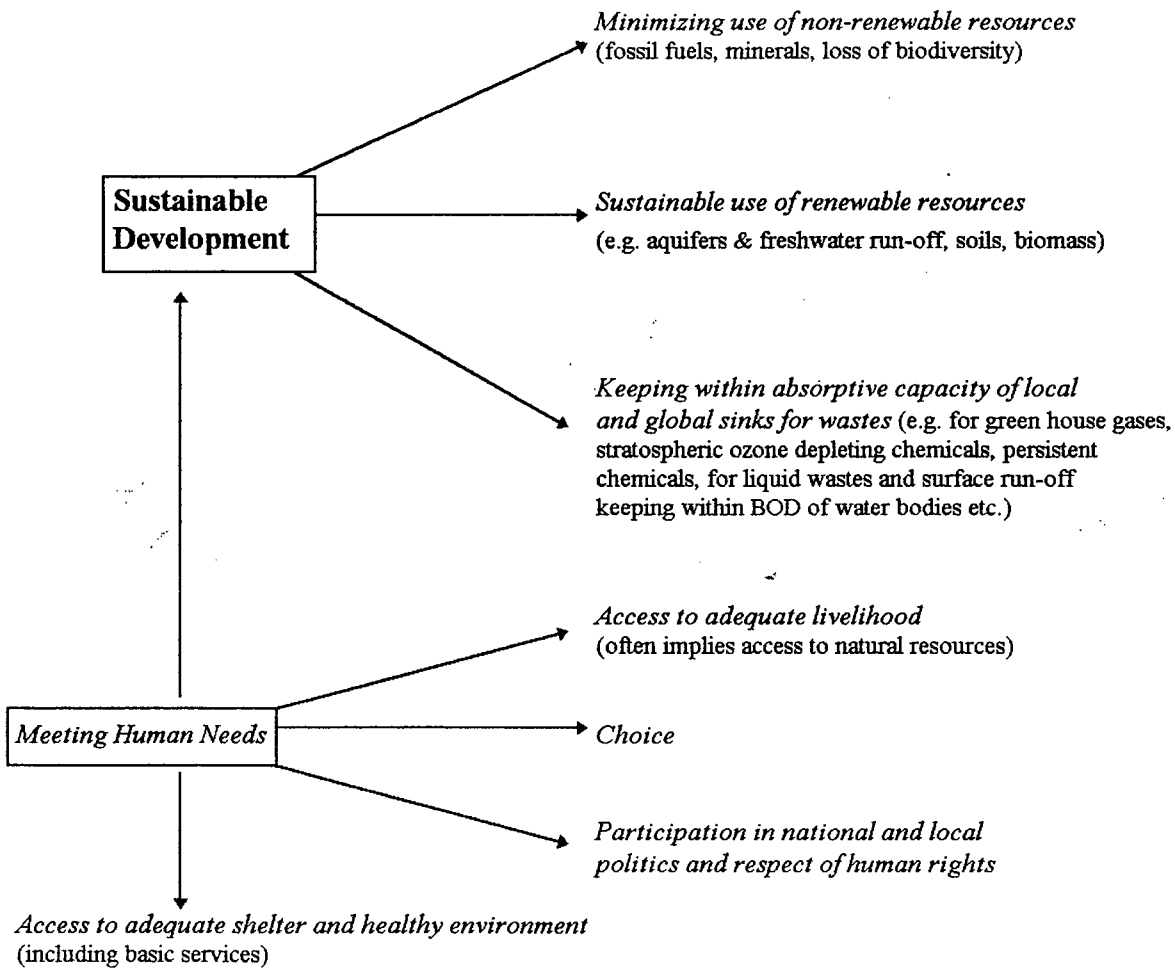
Given the ambiguous nature of the term several different models or theories have arisen to clarify and promote a generally acceptable meaning of sustainable development.

Hardoy, Satterthwaite and Mitlin (1992) state that the term 'sustainable' is most often applied to ecological 'sustainability', and meant in terms of "natural resource use and use of local and global sinks which can be sustained without compromising the ability of future generations to meet their own needs"(Hardoy et al., 1992, p.180). The tendency to equate

sustainability with natural resource use presents difficulties when trying to integrate social, political and economic issues with environmental factors: Is social sustainabliity or political sustainability possible or desirable? The authors choose to define 'sustainability' within an ecological context and place social, economic and political concerns within the realm of development, and the meeting of basic human needs.(Fig. 2.1) 'Sustainable development' occurs when economic, social and political goals have been met, and natural resources are being utilized in a sustainable manner.

Figure 2.1

Components of Sustainable Development

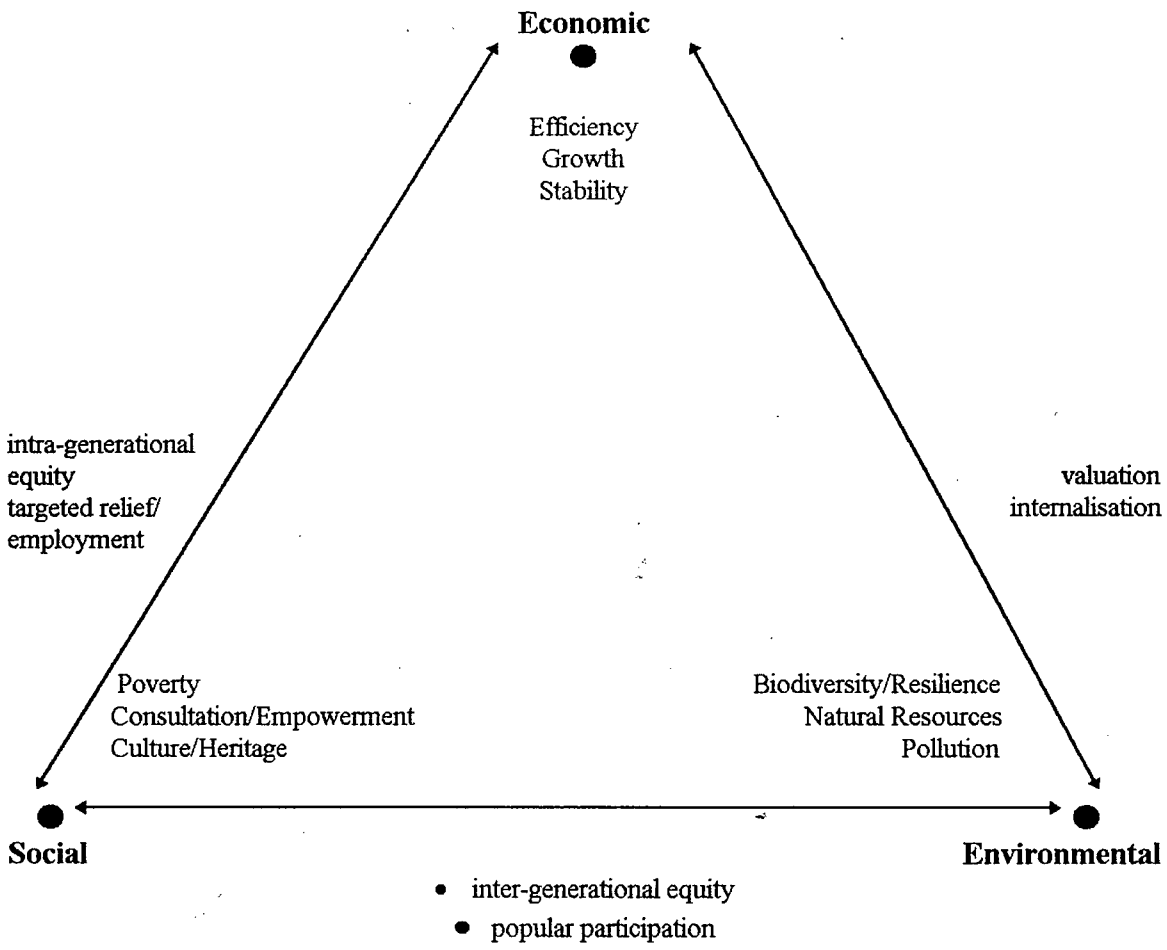


Source: Hardoy et al. 1992, p. 182

Another model of sustainable development is put forth by Munasinghe (1992) in "Key Concepts and Terminology of Sustainable Development". He conceptualizes sustainable development as tradeoffs between the three main objectives of development, economic, social and ecological so that a stable balance is achieved.(Figure 2.2)

Figure 2.2

Tradeoffs Among the Three Main Objectives of Sustainable Development



Munasinghe states that the economic approach to sustainability is based on "the concept of the maximum flow of income that could be generated while at least maintaining the stock

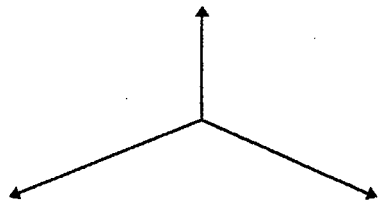
of assets or capital that yield these benefits"(Munasinghe, 1992). His view of ecological sustainability focuses on the need to maintain the stability of local, regional and global ecosystems. And, social sustainability is again about maintaining stability, but amongst social and cultural systems. The main issue of sustainability, that is of maintaining capital stock, must be consistent with economic efficiency, growth and stability. This is not to imply that the ecosystem must remain unchanged but to preserve the resilience of the natural ecosystem and its ability to adapt to change (Musasinghe, 1992).

The reconciliation of all these issues is necessary for sustainable development. However, it is difficult to reconcile the economic, social, and environmental goals of development due to competing demands for resources and a failure to consider the needs of future generations. To conceptualize sustainable development in terms of tradeoffs could imply continuous losses in some areas as a result of gains in others. Or, it could mean trading off objectives to find a balance between economic, social, and ecological concerns. The later would be more desirable but presents society with a greater challenge. Any balance between economics and ecological or social concerns must consider today's needs as well as the needs of future generations. Munasinghe suggests that "renewable resources, especially if they are scarce, should be utilized at rates less than or equal to the natural rate of regeneration"(Munasinghe, 1992). This would optimize the benefits without reducing the stock of natural resources. Reconciling economic and ecological concerns within a "pluralistic and consultative social framework to facilitate the exchange of information" will allow for participation and a recognition of the social concerns of sustainable development (Munasinghe, 1992).

Figure 2.3

Three Goals of Economic Development

Economic Objectives
Growth
Equity
Efficiency



Social Objectives
Empowerment
Participation
Social Mobility
Social Cohesion
Cultural Identity
Institutional Development

Ecological Objectives
Ecosystem Integrity
Carrying Capacity
Biodiversity
Global Issues

From: Goodland, 1995, p.31

Robert Goodland advances a third conceptualization of sustainability in: *The Concept of Sustainability* (Figure 3.3) He defines sustainability within the three goals of development: economic objectives, social objectives and ecological objectives. His conceptualization of sustainable development implies that the goal of development should be to attempt to achieve all objectives simultaneously, with a minimum amount of trade-offs. Some trade-offs will always be necessary to achieve the optimal balances between competing interests.

What is important to note in all of these models is the common concept that sustainable development includes a social, economic, and ecological dimension. All are necessary components of a comprehensive strategy of development. Rees' 1988 definition of sustainability summarizes the ideas put forth in the above models and theories. He states that sustainable development constitutes:

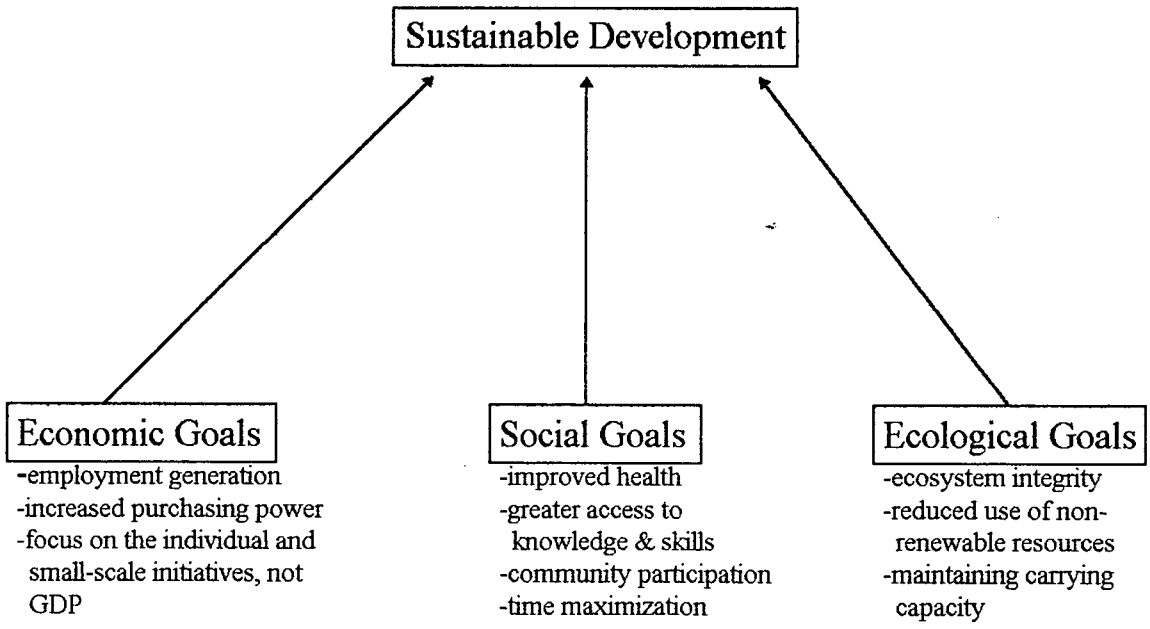
> positive socioeconomic change that does not undermine the ecological and social systems upon which communities and societies are dependent.
> Its successful implementation requires integrated policy, planning and social learning processes; its political viability depends on the full support of the people it affects through their governments, social institutions and their private activities.
> (Rees, 1988)

For positive socioeconomic change, development initiatives must contribute to the attainment of basic needs by meeting economic goals and providing opportunities for social development in an environment that is healthy, productive and self-reliant. Sustainable development also includes the empowering of individuals and groups, promoting equity and building institutional capacity to ensure a lasting impact.

Based upon these ideas and the need to balance the economic, social and ecological dimensions of development, I have developed the following diagram to conceptualize my view of 'sustainable' development.

Table 2.4

Balancing the Goals of Development to Achieve 'Sustainable' Development



This study is advocating a different approach to development that does not prioritize any one development goal: an activity that is not 'economically efficient' may be promoted or encouraged in light of its strong social and/or ecological benefits. Given this definition and conceptualization, this study examines urban agriculture and its potential to contribute to sustainable urban development.

2.1 Defining Urban Agriculture

The United Nations Development Programme (UNDP) in Urban Agriculture: Food, Jobs and Sustainable Cities presents what is perhaps the most comprehensive review of urban agriculture to date. This study includes data from 30 countries complied over a four year period, 1991-95. Urban agriculture in this volume is defined as:

> an industry that produces, processes, and markets food and fuel, largely in response to the daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and reusing natural resources and urban wastes, to yield a diversity of crops and livestock.(UNDP, 1996)

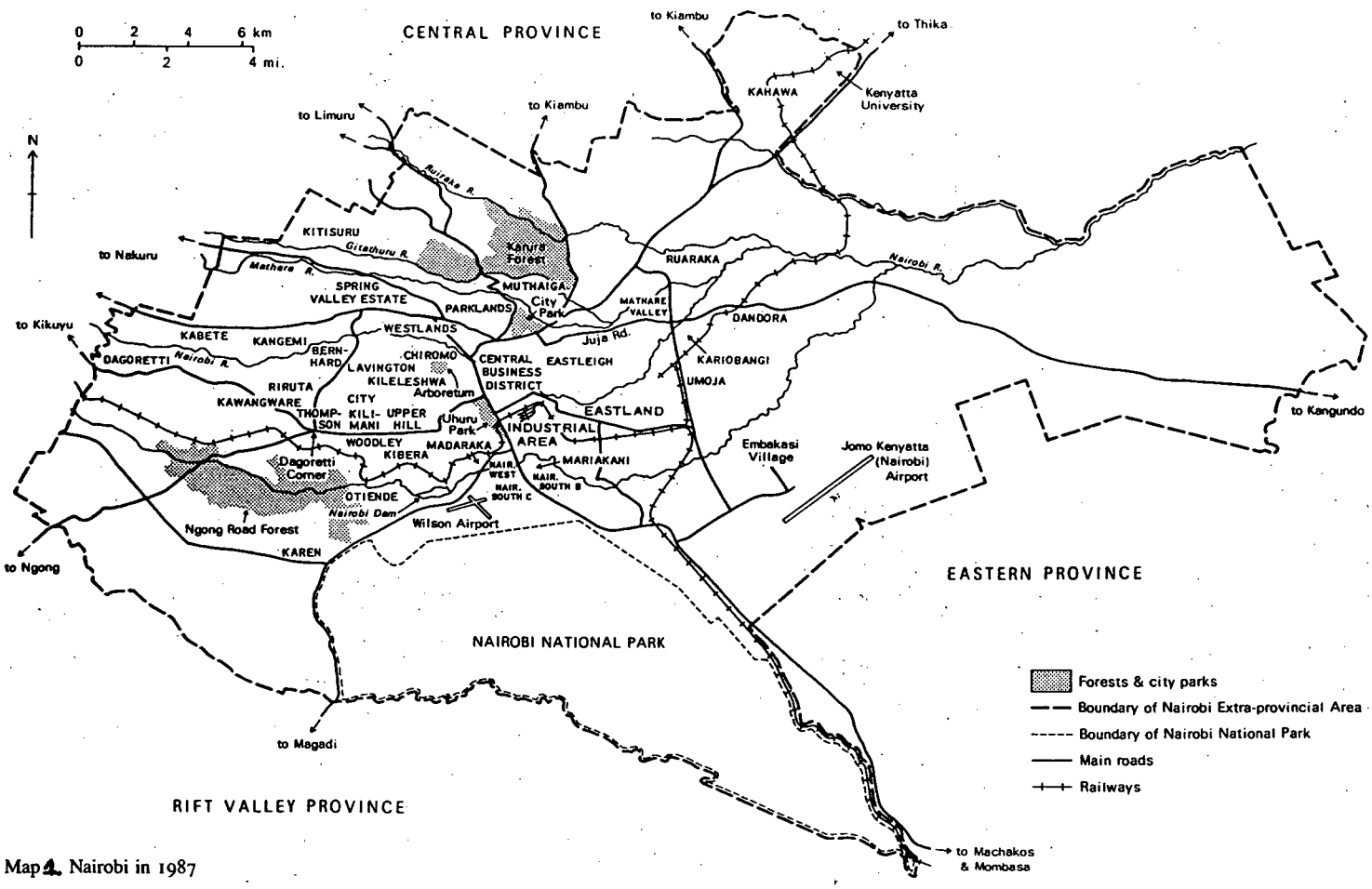
This is a definition which presents the wide scope and many varied activities that are included as urban cultivation. Urban agriculture is more commonly defined as: the growing of food crops, fruit trees and the raising of livestock within urban areas (Egziabher, 1994). Irene Tinker remarks that there is a need for urban agriculture researchers to standardize the definitions of the term so data can be collected and compared quantitatively (Tinker, forward to Egziabher, 1994). Studies of urban agriculture have included animal husbandry, excluded it or studied it exclusively (Mlozi, 1995, Mvena, 1991, Mlozi, 1989). Some studies include peri-urban areas whereas others look at the urban area exclusively (Memon, 1993, Lee-Smith & Memon, 1993). While the definition of urban agriculture remains unstandardized, researchers should define their use of terms and the scope of their study.

2.2 Urban Agriculture: The Potential in Kenya

Urban agriculture, for the purpose of this study, is defined as the practice of growing food crops and fruit trees for individual consumption or resale within an exclusively urban area. Livestock husbandry is excluded to narrow the scope of the study. The study area is the city of Nairobi, Kenya, the urban boundaries being those defined by the Nairobi City Council.(Map 1) The plots city residents cultivate are called 'shambas', the Swahili term for 'garden'.

MAP 1

The City of Nairobi, Kenya



Map 1. Nairobi in 1987

Nairobi, like most African cities, is experiencing rapid urbanization due mainly to rural - urban migration. Kenya has been experiencing a 4.9% urban growth rate with over 20% of the total population now residing in urban areas (Table 2.1). (In Kenya any settlement with a population in excess of 2000 people is defined as urban.) Like many other developing countries, Kenya's urban hierarchy is characterized by urban primacy: An estimated 2.036 million people or 36.1% of the total urban population live in Nairobi. The next six largest cities contain a total of 1.804 million people or 32% of the population.

Table 2.1

Kenya
Projected Urban and Rural Population as a percentage: 1994-1996

Year	1990	1994	1995	1996
Urban	4.17	5.12	5.38	5.65
Rural	18.60	20.58	21.06	21.53
Total	22.77	25.70	26.44	27.18
Urban as % of Total	18.31	19.92	20.35	20.78

Source: National Development Plan 1994-1996 p.74

Increasing urbanization has been accompanied by a 4.2 percent loss in agricultural production since independence in 1963. The contribution of agriculture to gross domestic product (GDP) has declined from 45 percent to 28 percent by 1992 (National Development Plan, 1993). Furthermore, National Development Policy favours agricultural production for export. Farms are increasingly being turned over to the production of tea, fresh flowers and vegetables, for export to foreign markets. The decreased food supply coupled with increasing demand is creating an imbalance that threatens national food security. For the urban poor this problem is exacerbated as it is estimated that food costs

are up to 60 percent higher in urban areas than in rural areas (Helmore & Ratta, 1995, Mougeot, 1994). New sources of food are required to feed the rapidly increasing urban population at a reasonable cost. Urban agriculture is a source that is increasingly being recognized for its potential contribution to increasing food security.

Many urban residents, especially rural migrants, were previously employed in agriculture. This can be advantageous since food cultivation can continue to provide employment and an important point of entry into the informal urban economy. Further, it is recognized by international development planners that urban agriculture can contribute significantly to alleviating poverty, encouraging gender and economic equity, generating income, improving health and nutrition and the overall sustainability of urban areas (see Egziabher, 1994). This study has been undertaken to see if this is the case today in Nairobi, Kenya

Nairobi provides an excellent setting to study the growth and development of urban agriculture for several reasons. Nairobi, along with many other East African cities was designed by the British colonial government. The physical design of the city lends itself to the development of a thriving system of urban agriculture. Tracts of open space in the form of parks and boulevards were incorporated into the city plan in an attempt to create a healthy, malaria-free city. Residential housing, the European clubs and other facilities were constructed on spacious plots of land at a very low population density. The result today is an abundance of vacant or underutilized land that provides an ideal setting for urban agricultural activities (Freeman, 1991).

Furthermore, a study conducted by the Mazingira Institute in Nairobi found that approximately 64 percent of urban residents grow their own food contributing an estimated 25.2 million kg. of crops to the national economy (Lee-Smith & Memon, 1993). Food that is grown within the city is used for home consumption and petty trading (Freeman, 1993). These statistics indicate that urban agriculture is a thriving activity in Kenya. Nairobi can serve as a case to evaluate the extent to which urban residents are meeting their basic needs by engaging in urban cultivation and the extent to which urban agriculture is contributing to sustainable urbanization in Nairobi.

CHAPTER 3

Theory and Methodology

3.0 Research Objectives

The research objectives of this study are:

- To determine the most commonly stated social, economic and ecological goals of urban development and development projects.

- To determine whether and in what ways urban agriculture contributes to improving diets, health and income and thereby to meeting the goals of sustainable urban development.

- To assess the extent to which urban agriculture makes a contribution to the goals and needs of women in development., discussed within the context of social development;

- Given the results of the above, to determine how planners can encourage and promote urban agriculture as an integral component of urban and apply this knowledge to the development and implementation of specific policies and projects.

3.1 Research Rationale and Theory

Agricultural research has traditionally favoured rural regions so few urban areas have implemented development projects that attempt to promote urban agriculture. With urban populations growing rapidly, development specialists are beginning to place more emphasis on the urban environment. Agriculture-related research projects should also reflect this urban orientation.

There is a growing recognition of the need for an integrated approach to development: urban improvement projects need to address issues of the physical and natural environment but also attempt to incorporate income generation and the improvement of the status of women. The development of urban agriculture could be beneficial for social sustainability in the city while providing urban residents with food and greater economic benefits.

Donald Freeman's 1987 study of Nairobi found four primary motivations for urban cultivation. These are: hunger, the need to supplement a starch-rich diet; to supplement cash income; and to reduce daily food expenditures. Many researchers mention these four categories as the primary motivations for cultivation (Smit & Nasr, 1992; Egziabher, 1994; Lee-Smith & Memon, 1994; Rakodi, 1988; Sanyal, 1987). Freeman's study, conducted almost 10 years ago, will provide a basis for comparison to determine if the motivations for cultivation today remain the same. The motivations for cultivation may help to direct policy and to maximize the benefits of urban agriculture.

The majority of developing countries, including Kenya have outlined their strategies and priorities for national development, yet few include urban agriculture (Thaman, 1995). The Kenyan government is determined to "move toward national and local development that is economically, socially and ecologically sustainable..."(Government of Kenya, 1993). To accomplish this move toward sustainable development the 1994-1996 National Development Plan set three broad goals:

1. to secure renewed economic growth with greater self-reliance
2. to improve the health, income and living conditions of the majority of Kenyans, and;
3. to ensure key economic and sectoral policies to support development that is sustainable.

The Seventh National Development Plan was developed under the theme of "Resource Mobilization for Sustainable Development (Government of Kenya, 1993). The following is a list of Kenya's stated 'imperatives' for achieving sustainable development in the country.

- ensure an equitable and sustainable pattern of development;
- sustain growth to meet the needs and aspirations of the majority;
- reduce widespread rural and urban poverty
- modify the rate and spatial distribution of population growth;
- ensure sustainable agriculture and increase food security;
- improve human and environmental health;
- provide adequate shelter and services, especially for the poor;
- conserve and enhance the environment and natural resource base;
- make efficient use of energy and expand the use of new and renewable resources;
- ensure sustainable industrial production and use of environmentally sound technologies
- improve national and local capacities for sustainable development planning and management and;
- strengthen international cooperation and programs in support of sustainable development

Moreover, the Government expressed its "main concern and focus for 1994-1996 to be the extended concept of sustainable human development as introduced by the United Nations Development Programme (UNDP)". This is "development *of* the people *for* the people and *by* the people." The 1994-1996 plan elaborates that " development of the people means investing in human capabilities, whether in education or health or skills, so that they can work productively and creatively." (Government of Kenya, 1993)

The role of agriculture in the Seventh Development Plan is well documented and given a high priority; however, agriculture development is placed within the context of rural development: urban agriculture is not mentioned. Given the noted development goals, it appears that urban agriculture has the potential to be incorporated into the existing development plan. Urban agriculture is currently flourishing within Nairobi and other Kenyan cities. It is an activity that is undertaken by urban residents without encouragement and shows a creative and self-reliant approach to overcoming adverse living conditions. Recognition, by the Government of Kenya, of the compatibility of urban agriculture with the current National Development Plan could, in turn lead to recognition of the farmers efforts and overall benefits of urban cultivation.

This study documents the relationship between current urban agriculture practices and the goals of sustainable development. Recognition of this activity and its incorporation into the strategies for development can help in promotion and attainment of the national development goals. An examination of the economic, social and ecological benefits of urban agriculture identifies compatibility with Kenya's development strategy. Division of

the benefits of urban agriculture into these categories further shows compatibility with the goals of integrated and sustainable development.

Economics: The economic goals of development are relatively simple: to create employment and increase the purchasing power of the household unit. Many economic development projects focus upon generating income to allow purchase of a greater number and variety of goods and services. In a study of urban food gardening of the South Pacific Islands, Thaman, 1995 concluded that urban agriculture has the potential to contribute to the economic benefit of a nation through encouraging import substitution, improving the balance of payments, and maximizing food self-sufficiency and thereby reducing the need for food imports and foreign currency (Thaman, 1995). Kenya is burdened with a large foreign debt and a negative balance of trade. However to explore the relationship of urban agriculture to the national economy is not within the scope and intention of this research. This study will assess the economic benefits of urban agriculture, and how they can be maximized.

Social: Friedmann (1994) outlines eight bases of social power which are examples of social development goals. These goals are: access to defensible life space; financial resources; social networks; appropriate information; instruments of work and livelihood; and knowledge and skills, along with the development and utilization of surplus time and participation in social organizations. Targeting these bases takes development beyond simply meeting basic needs: it gives the urban poor the ability to take control of, and participate in the development process and their own livelihood. Some of these social

development goals may be met with the attainment of economic goals. Increased income helps meet social goals such as improving housing and working conditions, gaining access to knowledge and skills to name a few.

From the research collected to date urban agriculture is noted for its contribution to the role of women in development and its contribution to improving the health and nutrition of the urban population. Rakodi (1988) makes reference to the dual role of women in the household economy as they undertake both reproductive and productive tasks: reproductive tasks being those of childbearing and rearing and productive tasks being those women do to secure food and income.

The dual role of women in the urban household has now been expanded include a community manager, a triple role (Moser, 1993). It is women who manage their community and are the ones who formulate, organize and are responsible for the success of their neighbourhood. Often it is only the productive work of women that is recognized, the reproductive and community managing work is seen as "natural" and not valued accordingly (Moser, 1991). The lack of recognition of their triple role leads to the perception by planners and officials that women have 'free time' which they can use to participate in development projects (Moser, 1993). Women in reality do not have 'free-time' after fulfilling their productive, reproductive and community managing roles. Requiring participation in development projects places an additional burden upon them. Development projects need to recognize the triple role of women and be compatible with

the reproductive, productive and community management work that women already engage in. Where does urban agriculture fit in?

Ecological: Ecological goals of development are more general in nature but need to be comprehensive. The concept of a city's 'ecological footprint' provides a format in which the ecological goals of development can be placed. The total area of land required to sustain a city is what Rees has termed the 'ecological footprint' of the city. This term is coupled with the idea of 'carrying capacity' - the maximum rate of resource consumption and waste discharge that can occur within an area without inhibiting the ability of the area to function as an ecosystem (Rees, 1992). The idea of maintaining carrying capacity is often misunderstood. A given region may be functioning as an ecosystem, but only because the given region is in effect 'importing' carrying capacity from elsewhere, i.e. it has exceeded its own carrying capacity. With global trade ecological footprints are extended to capture resources from thousands of miles away. (Kenya's vegetable exports to Europe are evidence of the extension of Europe's footprint to Kenya) Countries such as Japan and the Netherlands are often held up as models of economic success. However, to foster economic growth they are forced to use appropriated carrying capacity, exporting wastes and importing natural resources that deplete another county's capital stocks (Rees, 1996).

When development planners are formulating projects the limits imposed by ecological footprints and carrying capacity need consideration. Ecological goals need to be formulated to ensure that development is not contributing to the decline of the urban

ecological system. Projects should be planned in a manner that aims to minimize the size of the urban area's ecological footprint through projects that focus on finding a balance between production and consumption. This can both increase a region's self-reliance (by increasing the use of local resource and conserving local carrying capacity) and reduce its dependence and impact on distant sources and sinks. To do so, the urban environment needs more "circular, rather than linear systems for water, sewerage, solid waste disposal, foods and fuel." (Perlman, 1993)

Cities today have developed primarily in a way that resembles a through-put system. Resources are transported in from rural hinterlands to be used for production or consumption. The post-production wastes along with post-consumer waste are usually discarded, either 'exported' in air and water to become sources of pollution in the urban bio-region. This open loop urban ecosystem needs to be closed to reduce the environmental impact of cities and allow for sustainable urbanization (UNDP, 1996).

With the introduction of recycling, reduction and reuse city planners can implement strategies that will help to close these open loops: urban agriculture is consistent with such a strategy as it incorporates all these features. Urban agriculture utilizes the waste and by-products of other activities. The incorporation of conservation, and recycling and reuse to make third world cities more self reliant and ecologically sustainable is a matter in need of immediate attention. This study looks for ways to further incorporate the goals of ecologically sustainable development into current practices.

3.2 Research Methods

An important objective of this study was to examine the potential of urban agriculture to meet the economic, social and ecological goals of sustainable development. Based on this objective the project methodology was divided into six stages:

1. Identifying the goals and objectives of sustainable urbanization and sustainable development. From this a framework was developed to assess the present role and potential of current urban agriculture practices to meet these objectives.

2. A survey of 74 urban residents presently engaged in cultivation to provide the data for the assessment. The survey data also show areas in which current practices can be expanded upon or improved to maximize the benefits of urban cultivation.

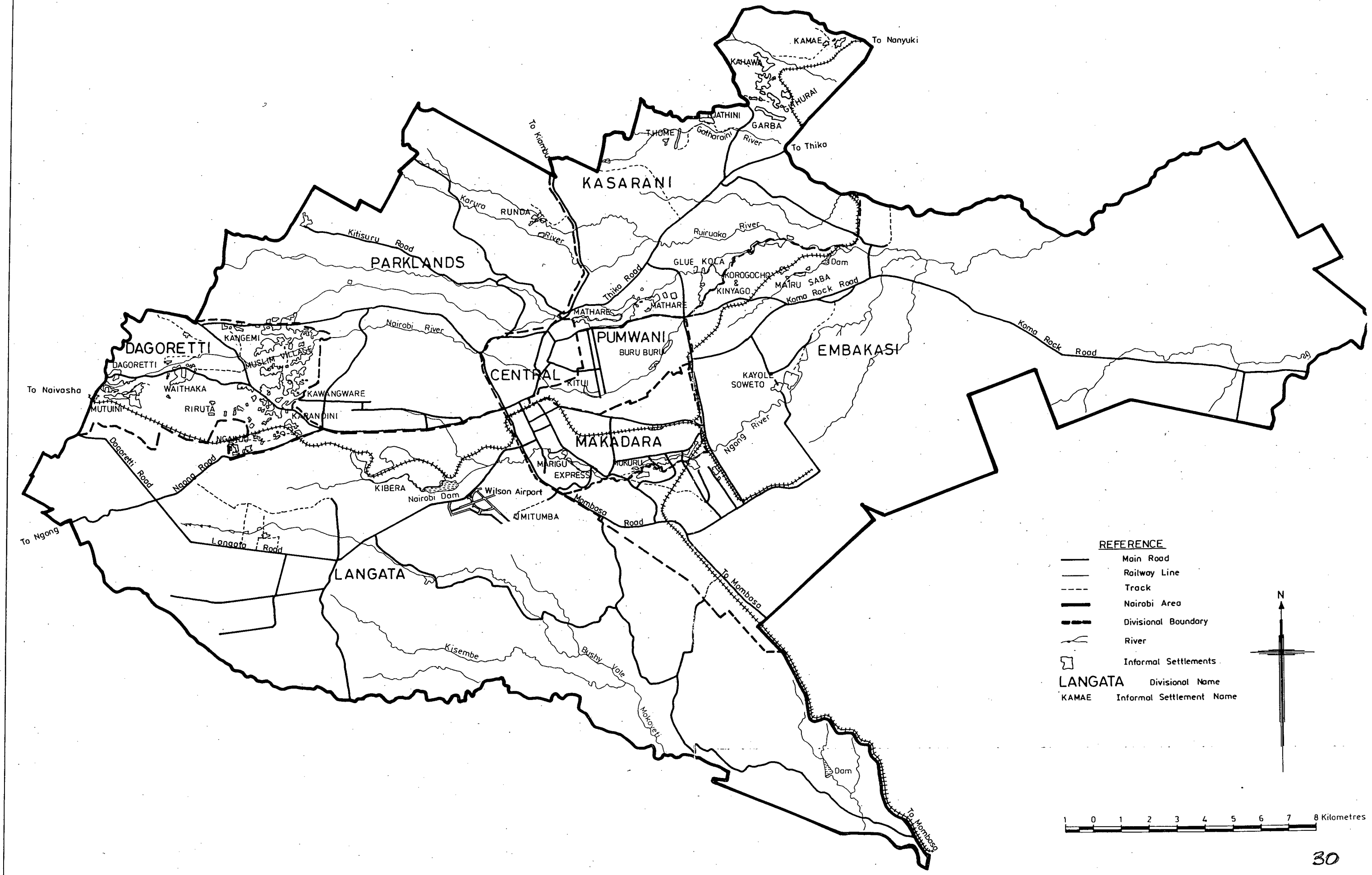
3. Preliminary analysis and follow-up surveys with ten cultivators to obtain further information about specific aspects of urban cultivation.

4. Interviews with the NGO project coordinators to gather data for assessing potential intervention points if urban agriculture is to be incorporated into a development project.

5. Meetings and discussion with officials from the Government of Kenya to determine the extent to which current policies and attitudes affect urban agriculture.

6. Data analysis and evaluation of urban agriculture in light of the goals of sustainable urbanization.

The final section discusses the policy relevance of the analysis and suggests specific policy directions.


KASARANI
PARKLANDS
DAGORETTI
CENTRAL
PUMWANI
EMBAKASI
MAKADARA
LANGATA
To Nanyuki
To Thika
To Kiambu
To Naivasha
To Ngong
To Mombasa
KAMAE
KAHAWA
HURAI
GARBA
GATHINI
THOME
Gotharaini River
Kitisuru Road
Karura
RUNDA
River
Ruiruaka River
GLUE
KOLA
KOROGOCHO
&
KINYAGO
Dam
MATRU SABA
Koma Rock Road
Thika Road
MATHARE
Nairobi River
KANGEMI
MUSLIM VILLAGE
DAGORETTI
WAITHAKA
RIRUTA
MUTUINI
KAWANGWARE
KARANDINI
NGANDU
Dagoretti Road
Ngong Road
BURU BURU
KITUI
KAYOLE
SOWETO
Ngong River
MARIGU
EXPRESS
MOKURU
KIBERA
Nairobi Dam
Wilson Airport
MITUMBA
Mombasa Road
Langata Road
Kisembe
Bushy Vale
Nokoreti
Dam
REFERENCE
Main Road
Railway Line
Track
Nairobi Area
Divisional Boundary
River
Informal Settlements
LANGATA Divisional Name
KAMAE Informal Settlement Name
N
1 0 1 2 3 4 5 6 7 8 Kilometres

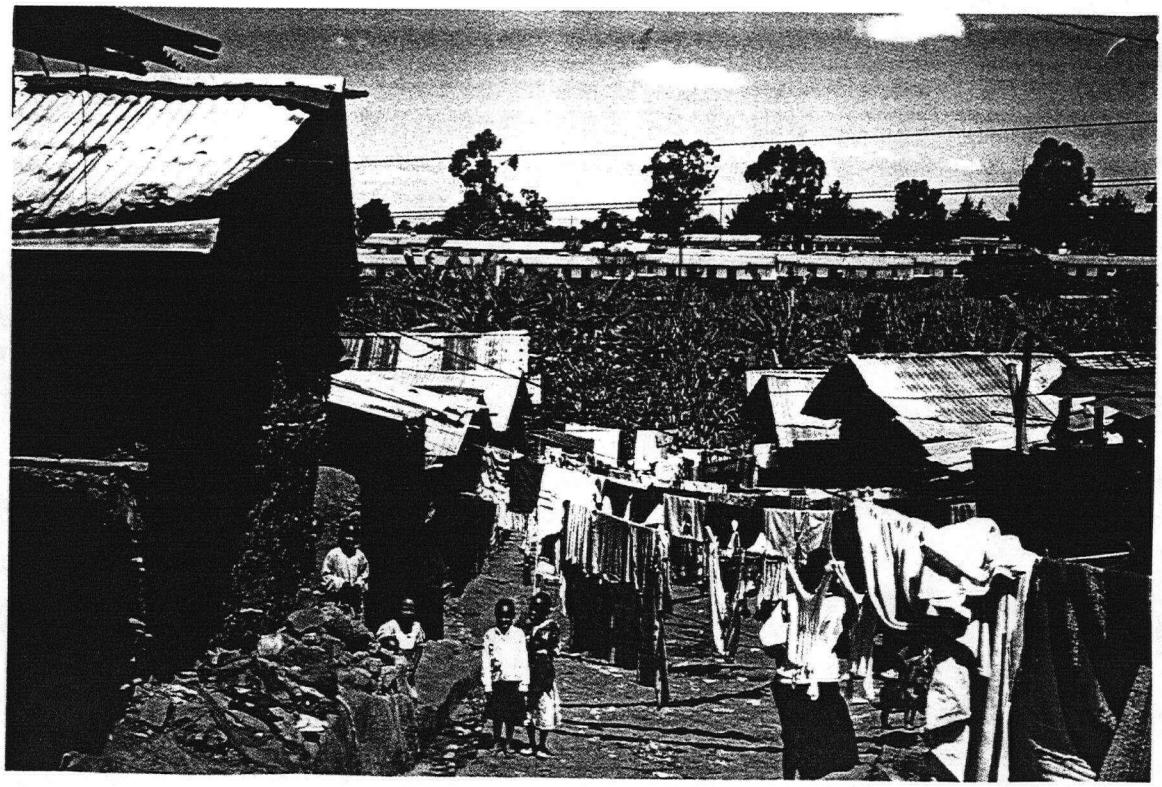
30

3.3 Sample Population

The survey group was drawn exclusively from persons currently engaged in cultivation within the Nairobi City boundaries. In 1992 the City of Nairobi measured approximately 684 square kilometers with an average population density of 2,200 people per square kilometer. However, one third of the population lives in 25.4 square kilometers giving the low-income areas and city slums a density of up to 55,000 people per square kilometer. (Map 2) It is the residents of these low income areas that present planners with their greatest challenge: how to integrate the urban poor into a strategy of sustainable urbanization. Three study areas, Kitui-Pumwani, Mailisaba and Kibera were chosen as representative of the thirty-one low-income settlements found within the seven administrative districts of Nairobi.

Photo 3.1

Kitui-Pumwani Village with Shambas in the Background



Kitui-Pumwani is a 10 ha. settlement located on the periphery of the city center with an estimated population of 10,000 people. The average household income ranges from K.Shs 100-6,000 per month (Matrix, 1993).[1] The area has been upgraded with the assistance of a local NGO and has been in existence for approximately 25 years (Njenga, personal correspondence).

Mailisaba is a relatively new settlement located about 15 km. from the city center. It is approximately 40 ha with an estimated population of 12,000 persons. The average household income is estimated at K.Shs. 900 per month. Since the settlement has only been in existence for 5 years it has seen no upgrading, and there is a lack of basic infrastructure, however, several NGO's are active in community development projects (Matrix, 1993).

Photo 3.2

The Mailisaba Shambas with Mailisaba Village in the Background

[1] At the time of writing $1 CDN = K.Shs. 39.

Kibera, located approximately 7 km. from the city is part of the largest group of informal settlements in Nairobi and has been in existence since the 1940's. Kibera covers 225.6 ha with a total population of 248,160. Average incomes are in the range of K.Shs 700-1800 per month. There are many NGO's active in this area providing educational, business and social services. Due to the extremely high population density in Kibera settlement, access to infrastructure and other basic services is extremely limited (Matrix, 1993).

Photo 3.3

Cultivation in the Small Shambas of Kibera Settlement

The sample population was divided into two groups. The first was a core group of fifty-five cultivators from Kitui-Pumwani, Mailisaba, and Kibera. They are farming with the assistance of two local NGO's, the Undugu Society of Kenya (USK) and the Help Self-Help Center (HSHC). The sample group is taken from a total population of two hundred cultivators assisted by the two NGO's in the three sample areas. The USK and HSHC

projects were selected as they met the criteria of having urban agriculture as a part of an integrated community development project within a low-income area.

The second is a control group of nineteen cultivators working within the same low-income areas but without the assistance of an NGO. (It is impossible to determine the total number of cultivators working within Nairobi city. The nineteen cultivators represent approximately one-third of the NGO sample.) This comparative approach was taken to demonstrate the extent to which practices are contributing to sustainable urban development and to what extent being part of an assisted urban agriculture project improves cultivation practices.

Studies have shown that urban cultivators include both low-income residents and higher-income residents (Mlozi, 1995, Sawio, 1994, Mvena, 1991). However, given the greater need for assistance, this study will draw upon the experiences of low-income residents.

Photo 3.4

Middle Income Housing in Bura Bura Settlement:
Urban Agriculture is Practiced throughout the City of Nairobi.

3.4 Survey Instrument and Method

The samples were chosen after initial meetings with Mr. Njenga of the Undugu Society and Mr. Karia, formerly of the Undugu Society. Mr Karia was one of the original Undugu Society workers who helped initiate the urban agriculture project in Kitui-Pumwani. Prior to arriving in Nairobi, I was unaware that urban agriculture projects had been initiated by local NGOs. As the projects already existed I decided to make the study a comparison between NGO assisted cultivators and ones unassisted. The KPP project was selected because of it being the largest and longest running urban agriculture project in Nairobi. Originally, only the KPP and Mailisaba projects were going to be included in the study. Mailisaba was selected because it was run by a different NGO - the Help Self-Help Center, and the location of the project on the outskirts of the city contrasted well with the inner city location of KPP. However, it was decide that the project at Kibera would also be included because the small plots and location within the heart of Kibera slum provided a great contrast to the other projects.

The first survey that was drawn up had more questions that were designed to obtain quantitative data: i.e.: what it the total quantity of vegetables you harvest? This initial survey was administered to a test group of 10 KPP residents. This group was selected as the test group because they are members of the largest group and would not compromise the selection of the remaining sample. The test survey showed the cultivators were unable to answer many of the qualitative questions. As a result some were eliminated and the others modified to best obtain answers (Appendix 1).

The surveys were administered with the assistance of translators as the majority of residents speak either KiSwahili, Kikuyu, or Kiamba. The translators were residents of Kitui-Pumwani village who had conducted interviews for previous studies. Some residents would have been able to fill in the questionnaires themselves but many would not. In an effort to maintain consistency the translators asked all the questions and recorded all the answer. The exception being a few residents who spoke English extremely well and I undertook these interviews.

The cultivators in the NGO assisted projects were chosen at random. They were interviewed on the days when they had project meetings and were selected for questioning from the meeting. The non-project cultivators were chosen entirely at random. An effort was made to find cultivators whose plots were located in the vicinity of the NGO assisted locations. Non-project cultivators were selected as found by either driving through the areas or walking through the vacant lands where signs of cultivation were obvious.

The selection process for the follow up interviews with female cultivators was again at random. The cultivators names were recorded separately so that I could keep track of who had been interviewed for the purpose of payment. From this list female cultivators were randomly chosen and asked to participate in the follow-up surveys (Appendix 2). This survey was developed after the initial surveys were administered and some analysis completed. The follow-up survey was administered to obtain more qualitative data about the overall lives of women in low-income settlements. The more in-depth survey obtained information about other employment, their feelings about their community, and their role

in the community. Only project cultivators were selected because they were members of a spatially defined community and I was hoping to obtain data related to the impact of urban agriculture on the overall community.

Mr. Njenga and Mr. Nyore, the project facilitators, (Mr. Njenga is the project facilitator for both the KPP and Kibera project), completed a written questionnaire (Appendix 3). The questions they answered were designed to obtain information on the rationale behind developing urban agriculture projects and to obtain details about the logistics and requirements for running their projects. Informal discussions also provided general information about the projects and the cultivators. During my time in Kitui Village I was also able to discuss general development issues with the social workers and health care workers. The information obtained from these informal discussions helped to provide me with a clearer and more well-rounded view of the workings of a small NGO and the conditions and lifestyle of Nairobi's low-income residents.

Informal interviews were conducted with three government officials. These interviews were conducted in order to gain information about government perceptions of urban agriculture and the official impediments toward this activity. Conducting interviews with government officials proved to be one of my greatest frustrations while completing this project. Never was I able to conduct my interviews at the originally scheduled time. Meetings were inevitably postponed or would start anywhere from 30 to 60 minutes late. One official evaded three appointments and I never did get to meet with him. Finally, an

informal meeting with Ms. Diana Lee-Smith of the Mazingira Institute gave me a great deal of insight to the evolution of urban agriculture in Nairobi.

CHAPTER 4

Survey Findings

4.0 Data Assessment

The survey questionnaire was designed to obtain both qualitative and quantitative data. Quantitative data are necessary for statistical and demographic analysis of the significance of urban agriculture. The qualitative data are more subjective. Open interviews allow the cultivators to voice their feelings providing more latitude for expression and interpretation.

The demographic information are analysed first to answer basic questions about who is cultivating what in Nairobi. These quantitative data show the economic value of cultivation and the financial contribution it is making to the cultivators households. Second, the qualitative data are examined to determine if and how urban agriculture is contributing to sustainable urbanization. Qualitative data provide a better measure of the extent of the social and ecological benefits of urban cultivation. Comparing data from project cultivators with the non-project data can help identify the most important considerations for the promotion of urban agriculture as a development project.

4.1 Personal Characteristics of the Farmers

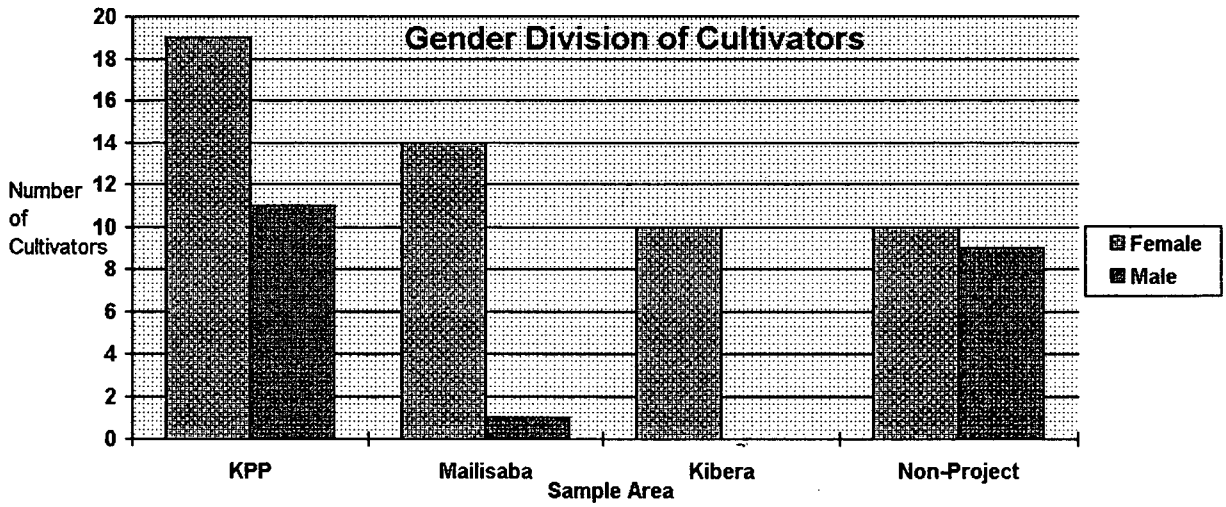
An overview of the personal characteristics of cultivators determines who is cultivating in Nairobi. Graph 4.1 shows the majority of cultivators in the areas studied were women. The Mazingira Institute and Freeman's studies of 10 years ago show a pattern similar to the overall gender division found in this study. Women predominate among the project cultivators due to the high ratio of female-headed households in low-income settlements and because the NGO's built on existing women's networks to develop their projects. In the KPP project women were solely the original participants. However, as the project became increasingly successful, men elected to join and cultivate their own plots.(Njenga, personal conversation) In Kibera, only women cultivate in the USK project. Mr. Njenga, of the USK suggested that this was in part due to the project specifically targeting women and, as the project was small and still fairly new, women remained the target group.

The almost equal gender division among non-project cultivators shows that men are equally likely to see urban agriculture as a 'self-help' strategy as women are when not encouraged by an outside organization. Looking solely at the non-project cultivators does however show a significant change between the gender division in this study and other earlier studies. Freeman's study found 35.8 percent of the cultivators were male and 64.2 percent female. That such a change has occurred is likely indicative of the increasingly difficult economic situation in Nairobi. Traditionally males were absorbed into the urban labour market and it was women who found themselves undertaking employment outside the formal labour markets. Today, more and more, men are having to participate in informal

sector activities due to increasing urban growth and declining economic growth. The trend toward more men participating in urban agriculture likely shows that fewer formal employment opportunities are available. This theory is supported by 71 percent of the male cultivators citing joblessness or self-help as their motivation for cultivation.

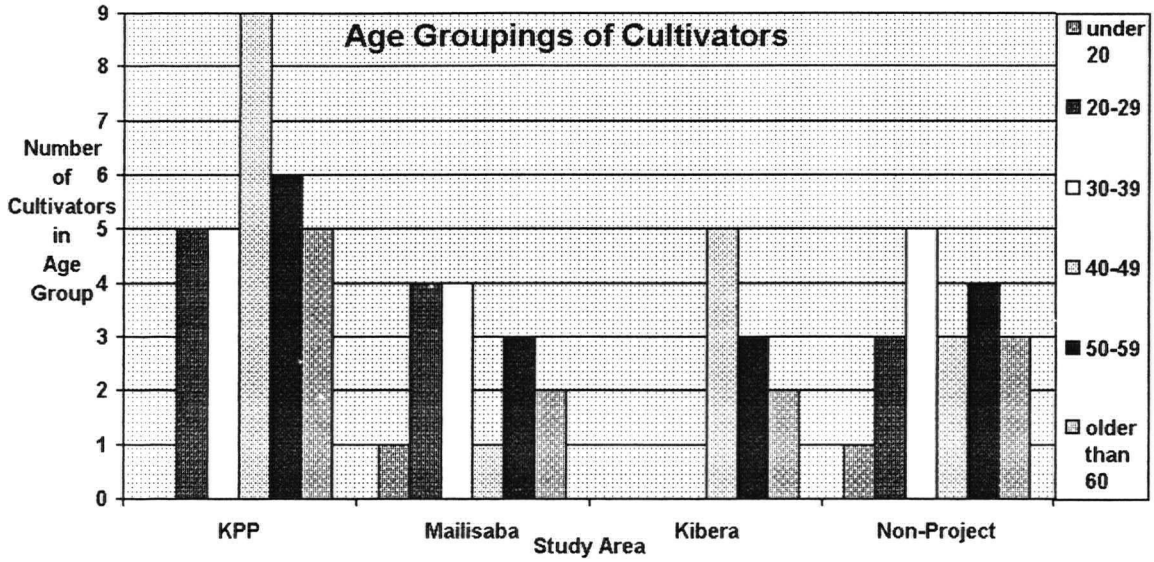
The participation of men in small-scale agricultural activities is made all the more significant when traditional gender roles are considered. Kenyan society is traditionally rural and agrarian. Cultivation was a job for women and men responsible for animal husbandry. That men are now engaging in cultivation shows that poverty and unemployment have shifted these long held roles, and changed traditional labour patterns.

Graph 4.1



The age of the total sample shows that the majority of cultivators are over the age of 40 (Graph 4.2). KPP and Kibera cultivators are mainly in their 40's, and those in Mailisaba and the non-project cultivators in their 30's.

Graph 4.2



Overall the cultivators are spread fairly equally throughout the age groupings with the exception of the under 20 age group. This distribution is similar to that found by Freeman's 1988 study. The 20-29 and 30-39 age groupings in this 1996 study have decreased by approximately 6 percent while the age groupings above 40 increased by approximately 5 percent. The increase in the age of cultivators could be attributed to economic hardship and changing social patterns. The rising costs of living in Nairobi have created a greater need for all family members to make a contribution to the household economy. Furthermore, the traditional pattern of rural-urban migration was that young people, especially males, migrated to the city temporarily to find work, returning to the rural areas in their old age. As economic conditions have worsened this social pattern has changed and entire families now migrate to the cities and remain permanently.

The highest level of education attained shows a nodal distribution with the largest grouping of cultivators having only completed primary education (Table 4.1). The next largest grouping is made up of those having no formal education. Freeman's findings again reflect a similar pattern which he explains as being in part, a result of many of the cultivators having reached working age before free primary education was introduced in the 1970's. [2](Freeman, 1988).

Table 4.1

Level of Education

Highest Level of Education	KPP	Mailisaba	Kibera	Non-Project	Total
None	10	3	5	5	23(31%)
Primary	11	9	4	8	32(43%)
Secondary	9	2	0	5	16(22%)
Adult	0	1	1	1	3(4%)
Total	30	15	10	19	74

The education data reveal information about the gender division of cultivators with respect to their level of education. Almost 40 percent of the female cultivators have no formal education whereas only 9 percent of the male cultivators have no formal education. Of the male cultivators 48 percent have some secondary or adult education as compared with just 17 percent of the female cultivators. These data show that urban agriculture is being undertaken by females who lack a formal education and have little or no formal skills training. This could lead to a negative perception of urban agriculture if it is viewed as a 'trap' for unskilled workers who, due to a lack of education or training, have no other option. The fact that urban agriculture can be accessed with a low level of education can

[2] This policy has again changed and families are again required to pay for education.

however be seen positively. It provides a point at which people, especially women without formal education can enter into the urban economy. And, as will be discussed later, women do not view urban cultivation as a job which is exploitative of their disadvantaged circumstances.

The household data show that the majority of Nairobi's cultivators are married with children: 57% (68% if widows are included) are married and all but 9% have 1 or more children with 55% having 5 or more children (Table 4.3)

Table 4.2

Marital Status

Marital Status	KPP	Mailisaba	Kibera	Non-Project	Total
single	14	3	0	4	21(28%)
married	8	9	10	15	42(57%)
divorced	2	1	0	0	3(4%)
widowed	6	2	0	0	8(11%)
Total	30	15	10	19	74

However, this survey did not ask cultivators if they were the head of household. Other surveys completed in the KPP project area indicate that 80% of all households are headed by women, in Mailisaba, 85%, and in Kibera 60%. While women may indicate that they are married, they are often separated from their husbands and the sole provider for the entire household (Njenga, Nyore, personal conversation). Cultivators were asked to indicate their number of children (Table 4.3).

Table 4.3

Number of Children

# of Children	KPP	Mailisaba	Kibera	Non-Project	Total
none	5	1	0	1	7(9%)
1-2	5	1	2	5	13(18%)
3-4	5	2	1	5	13(18%)
5-6	8	9	1	2	20(27%)
more than 6	7	2	6	6	21(28%)
total	30	15	10	19	74

Nearly all of the cultivators have children with the majority having 5 or more. Of those who are childless 71 percent are male and 29 percent female. The childless cultivators who are males reported selling the majority of their crop to supplement their cash income, whereas the childless females reported using their crop primarily for domestic consumption. This shows that females are more likely motivated by the need to feed their families whereas men are motivated by the ability to generate a cash income. This difference is likely attributable to the roles that males and females play in the household. Females have traditionally been the providers of food and males the providers of wage income. This pattern appears to be continuing.

Furthermore, of the 21 cultivators who are single, 71 percent are women and 29 percent men. 93 percent of these women also have children as opposed to just 16 percent of the men. Of the 15 single cultivators with children 13 use 50% or more of their produce to feed their families, with fully one-third using all of their produce to feed the family. This again indicates that women engage in cultivation for the purpose of feeding their families, rather than as a means of income generation.

The surveyed cultivators are relatively long term residents of Nairobi (Table 4.4). It has been suggested that urban cultivators are newly arrived rural migrants who have taken up cultivation until formal employment is found (Freeman, 19988, Sanyal, 1987). The sample data refute this as fully 73% of all cultivators have resided in Nairobi for 10 or more years, and 84% of the cultivators have resided in the city for more than 7 years (Table 4.4). The recent migrants, those residing in Nairobi for less than 3 years make up the smallest group just 7%.

Table 4.4

Years of Residence in Nairobi

Years in Nairobi	KPP	Mailisaba	Kibera	Non-Project	Total
1-3	0	3	0	2	5(7%)
4-6	4	1	0	2	7(9%)
7-9	3	4	0	1	8(11%)
more than 10	23	7	10	14	54(73%)
Total	30	15	10	19	74

Combined with the average number of years cultivating, 8.7 in KPP, 4.2 in Mailisaba, 3.5 in Kibera, and 9 amongst non-project shows that urban agriculture is not a temporary activity. It is interesting to note that the KPP urban agriculture project has been ongoing for 8 years, Mailisaba, 4 and Kibera 3. This shows that many of the project farmers were growing crops before they were introduced to the projects. Urban agriculture is apparently an activity that has been undertaken by many residents through their own initiative.

This demographic data gives a profile of the urban cultivator as being typically a female, over the age of 20 having no higher than a primary education. They have lived in Nairobi

for more than 7 years and are married with children. The number of children generally increases with age as women by the time they are in their 30's have 4 or more children. This profile concurs with the findings of Freeman and the Mazingira Institute in their surveys of Nairobi completed eight years ago. The unchanging demographic profiles indicates that low-income residents of Nairobi continue to be in need of alternative self-help strategies, and will continue to do so until the overall socio-economic situation in Kenya improves.

Table 4.5

Cultivators Uses of Their Harvest
(Number of Cultivators Indicating Given Use)

	KPP	Mailisaba	Kibera	Non-Project
Total # in Sample	30	15	10	19
Domestic Consumption	29	15	10	19
Gift to Friends and Relatives	2	8	2	6
Sold Locally or to Buyer	18	15	2	14
More than 50% of total harvest sold.	16	11	1	6
Average income from sale of garden produce Ksh/month (% of total income)	707 (32%)	2053 (55%)	200 (5%)	1274 (44%)

Demographic data combined with household characteristics paint a picture of the lifestyle and livelihood of Nairobi's urban cultivators. Household's ranged in size from 3.4 in KPP, 4.5 amongst the non-project households, 5.7 in Mailisaba, and 6.6 in Kibera which likely includes members of the extended and nuclear family. The survey data shows that, of the total household income, between 60% and 84% is spent on food, or Ksh 382 to 495 per

person per month (Table 4.6). The average amount it takes to feed each member of the household monthly and the amount of income earned from the sale of garden produce shows the importance of the income earned to the household. The exception is Kibera where only two of the cultivators sold any of their produce which contributed just 5 percent of the total household income (Table 4.5).

This corresponds with the fact that Kibera cultivators reported that their motivation for cultivation was to provide more food for the family rather than income generation. It follows that the amount of the harvest sold by the Non-project cultivators is low, (only 6 of the 19 cultivators sold more than 50% of the total harvest) as the most stated motivation for cultivation was again to provide the family with more food. The higher percentage of food sold by the KPP farmers stems from the fact that most of the farmers cultivate as a means of self-help, providing them with a job and income. In Mailisaba, farmers stated they were equally motivated by income generation and the need for food. This accounts for the higher food sales amongst this group.

In Mailisaba village urban agriculture provides the cultivators with 55 percent of their total income and gives them the highest average income from the sale of their produce (Table 4.5). That Mailisaba has the second highest total household income is likely attributable to the success of urban agriculture. Only 25 percent of the Mailisaba cultivators have any other source of income, (Graph 4.3) and the remote location of Mailisaba village offers few opportunities for formal employment making cultivators more dependent on urban agriculture to provide them with cash income.

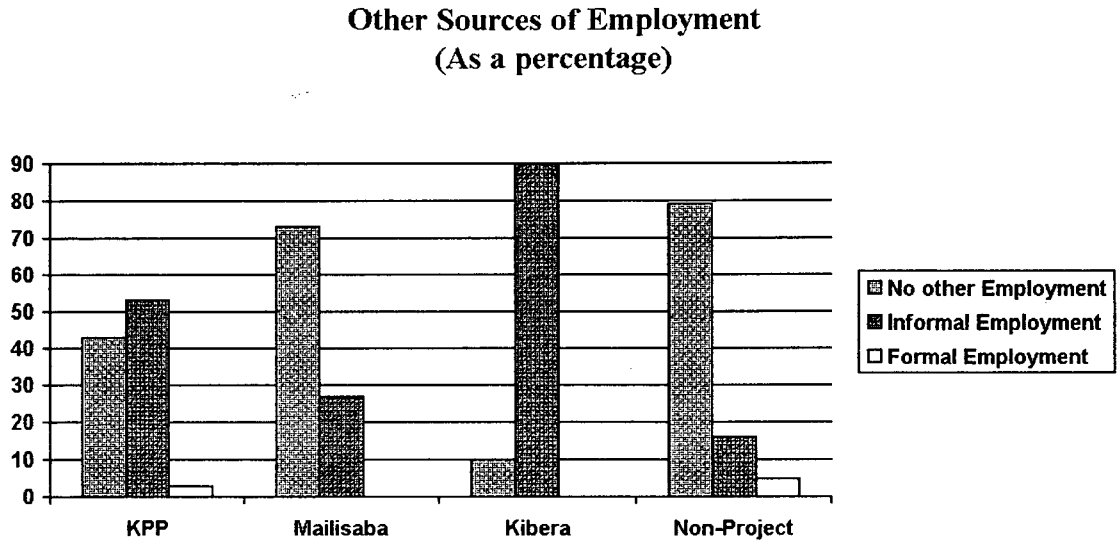
Table 4.6

Comparison of Household Statistics

		KPP		Mailisaba		Kibera		Non-Project	
Average number of persons in HH		3.4		5.7		6.6		4.5	
Total HH income /month	**Total HH income /person /month**	2227	655	3764	660	3920	594	2883	640
Amount spent on food/month		1530		2559		3270		1721	
Average spent on food/person		450		449		495		382	
Percentage of total HH income spent on food/month		68.7%		68.0%		83.4%		59.7%	
Average income from sale of garden produce Ksh/month (% of total income)		707 (32%)		2053 (55%)		200 (5%)		1274 (44%)	

That the farmers of Kibera have the highest household income and yet the smallest plots can be attributed to the higher number of people per household (Table 4.5) and the fact that 90% of the Kibera farmers receive income from other informal sector employment (Graph 4.3). Location of the settlement may also have some impact on the higher household incomes: Kibera settlement is located near the industrial areas of Nairobi, and the high income residential areas of Karen and Langata which may provide opportunities for formal employment.

Graph 4.3



The size of the individual plots has an important significance in urban agriculture. Table 4.6 above shows the average income from the sale of produce and also the percentage of household income spent on food. If these are compared with plot size a relationship can be seen in that the greater the plot size, the lesser the percent of total income spent on food. As Table 4.6 illustrates the non-project cultivators have access to the largest shambas and they spent the lowest percentage of their total income on. The Kibera farmers have the smallest plots, earn the least income and spend the highest percentage for food.

However, when income and plot size are compared it is seen that an inverse relationship is occurring (Table 4.7). The Kibera cultivators with their small plots are earning the highest amount of money per square meter cultivated, and the Non-Project farmers with their large plots earn the least per square meter. This relationship could be explained by several factors, the first being that the Kibera farmers and the other project farmers are cultivating

their land more intensively as a result of the assistance they are receiving. The higher incomes of the project cultivators may result from their utilizing their land better due to it being in short supply. Or, it may be a result of what crops are sold and which are saved. Generally, perishables such as bananas and tomatoes will fetch a higher price than beans or corn which would boost the cultivators overall earnings. To fully test the relationship between plot size and income, further sampling and monitoring of the cultivators would be necessary.

Table 4.7

Comparison of Income, Plot Size and Food Expenditures

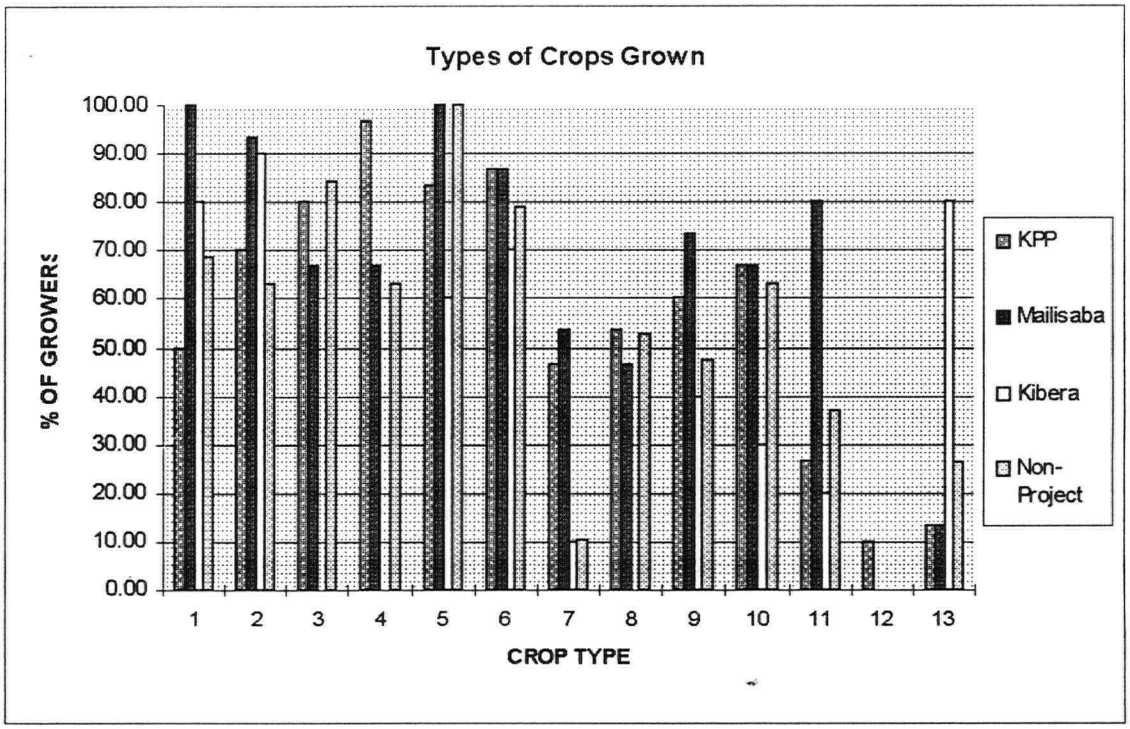
	KPP	Mailisaba	Kibera	Non-Project
Percentage of total HH income spent on food/month	68.7%	68.0%	83.4%	59.7%
Average income from sale of garden produce Ksh/month	707	2053	200	1274
Average Plot Size (in square meters)	165	2591	7.6	3070
Income(Ksh)/ square meter cultivated	4.3	.79	26	.41

The sale of produce occurs for primarily six months of the year, or the harvest period of each of the two growing seasons. This must be considered when estimating the economic significance of urban agriculture. Direct income from vegetable production may only occur during certain months. Yet, the money saved by not having to purchase vegetables during these months can be used to support the family during the dry season.

Furthermore, staple crops such as beans, potatoes, peas and onions are dried and stored to be used during the dry season.

The Kibera farmers grow the fewest crop varieties, and of the crops grown, staples that can either be sold or stored predominate (Graph 4.4). As shown earlier, the Kibera cultivators sell the smallest percent of their total crop, consuming the majority of it domestically. This may be the reason for favouring staples that can be stored.

Graph 4.4



1=kale	5=maize	9=onions	13=potato
2=sukuma wiki	6=beans	10=tomatoes	
3=sugar cane	7=amarunthus	11=peas	
4=bananas	8=arrowroots	12=cabbage	

Non-project farmers appear to obtain the greatest economic benefit from urban cultivation despite the lack of assistance. This indicates that project farming is severely constrained by a lack of access to land. Land is in short supply around the dense urban squatter

settlements, which are the areas that NGO's usually target with development projects. Farmers who reside in the inner city will likely never be able to access more land. Development projects that include small plot farmers need to look for the crops that can survive at the greatest density and for ways to maximize available space. The HSHC is currently looking at ways to introduce pot gardens in areas where there is no land available for cultivation.

It is with ideas and innovations that the role of the NGO's may be the most significant. Based on the quantitative data analysed thus far, there appears to be little difference between the activities of project and non-project farmers. The noticeable differences are in the gender division of cultivators and in the amount of money earned per square meter cultivated. The almost equal number of male and female non-project cultivators shows that men are farming without encouragement. Further testing could be utilized to determine if, outside the project areas, the increase in male cultivators is at the expense of females. If men are in fact denying women the opportunity to cultivate then the efforts of NGO's to target women are all the more significant. With respect to income earned per square meter the project coordinators are teaching the cultivators to use homemade inorganic fertilizers and pesticides, to make compost and giving information on crop rotation, all of which may be boosting their overall yields. The demographic and household data largely represents the quantitative benefits of urban agriculture while other economic, social and ecological benefits are better indicated with qualitative data. The role of NGO's and the incorporation of urban agriculture into development projects is further discussed in the examination of the qualitative data.

4.2 Economics

It was stated earlier that the goals of economic development are to create employment and increase the purchasing power of the household. It was found that two of the three most commonly stated motivations for cultivation were economic. A need for inexpensive food, and a desire to increase household income. Because of the high cost of food in Nairobi growing food for the family is an indirect economic benefit in the amount of money saved.

Cultivation is an economic activity that requires low capital inputs making it accessible to low -income residents. The inputs for cultivation - mainly seed and tools are relatively inexpensive: seed costs averaged between 340 Ksh and 691 Ksh for each of the two planting seasons. The cultivators tools are simple - usually a panga, a jembe and a fork jembe, a total cost of approximately 550 Ksh. Furthermore, the HSHC project is run on approximately US$ 22,000 per year, including direct and indirect costs.

The survey data show that 49 of the 74 cultivators sold some of their harvest to directly increase the household income (Table 4.6). Of the 66 percent who sold some of their produce, 23 percent gave increased household income as their primary motivation for cultivation. Half of the surveyed cultivators reported that they had more disposal income because they were not purchasing vegetables - fungibility. Increasing the amount of disposable income is as economically significant as directly increasing income for people who spend up to 70% of their total income on food. Cultivators reported that with higher incomes and more disposable income they are able to pay school fees and buy a better and

greater variety of foods. Some cultivators are also using the money saved to participate in savings groups and to purchase of land with other farmers outside of the city.

Photo 4.1

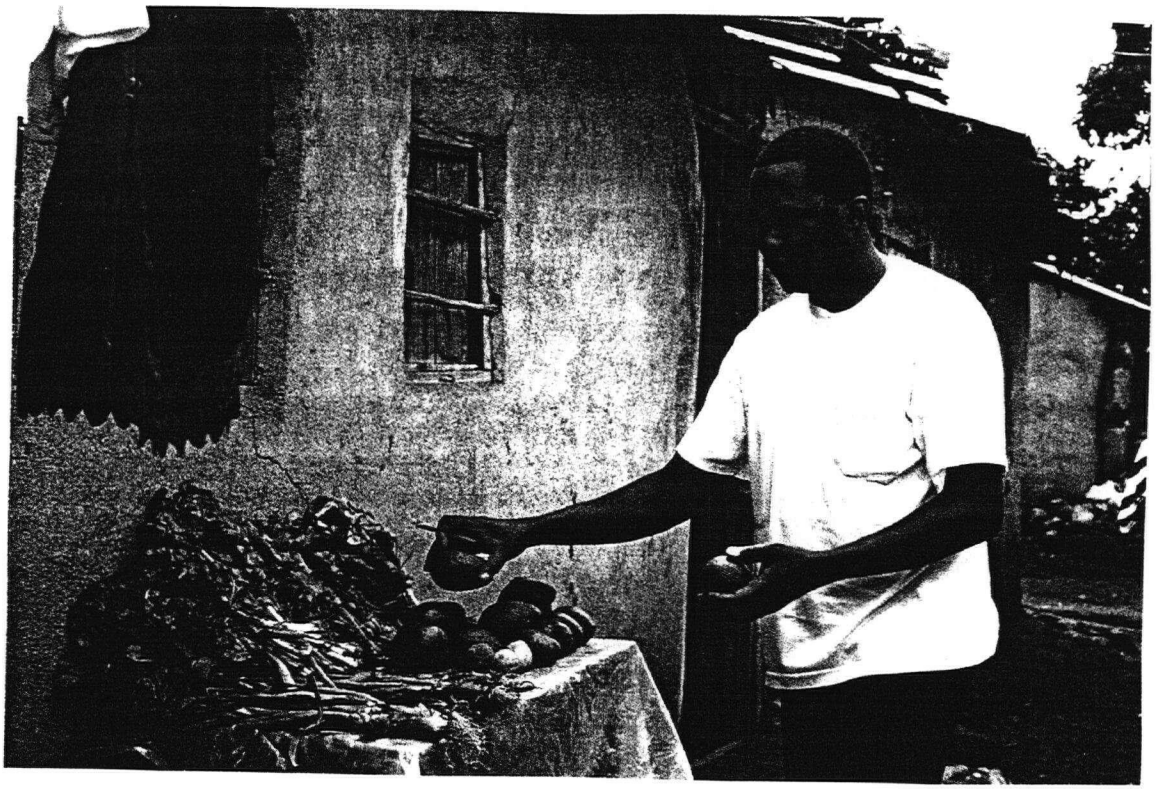
KPP Cultivator with her Farming Tools, a Jembe and Fork Jembe

Given the current cultivation practices it is reasonable to assume that urban agriculture will continue to provide low-income residents with means of economic development. However, there is potential for this activity to be expanded and the benefits increased. Problems encountered by cultivators such as theft and spoilage due to human activities constrain agricultural production. This represents an economic loss and a decreases in the return on time and money invested. There are ways to prevent crop loss - construct

fences, hire security and build toilets close to the gardens. Problems of theft and human waste disposal in the plot areas were most prevalent in the KPP area which is a densely populated settlement abutting the shambas. Kibera is also densely populated but the shambas are located at least 500 meters from housing and the plots are fenced. In Mailisaba, the cultivators each pay a small amount to hire a watchman to guard against theft. In future, development organizations interested in urban agriculture projects may consider including fencing as an initial start up cost.

Photo 4.2

Produce for Sale in Kitui Pumwani village
The Sukuma Wiki (Spinach) and Onions were grown in the Cultivators Shamba



Many of the income generating strategies undertaken by low-income urban residents have been classified economically as 'informal sector'[3] activities. The informal sector, according to a study by the International Labour Organization (ILO) is characterized by:

1. ease of entry;
2. reliance on indigenous resources;
3. family ownership of enterprises;
4. small scale of operation;
5. labour-intensive and adapted technology;
6. skills acquired outside the formal school system; and
7. unregulated and competitive markets. (Peattie), 1987

Early studies of the informal sector included only 'non-farm' activities to the exclusion of urban agriculture (Freeman, 1991) in spite of urban cultivation clearly meeting all of the above mentioned characteristics. However, recent studies (Lee-Smith and Memon, 1993, Freeman, 1991, Rakodi, 1988) have classified urban agriculture as an informal sector activity. Not only does urban agriculture have all the characteristics of an informal sector activity it also fulfills the same purpose as any other informal sector activity: to help families meet their basic needs where wage labour fails to. Many informal sector activities are also perceived as 'transitional' providing temporary economic support to those unable to find 'formal' employment. However, urban agriculture has been shown in this study and others (UNDP, 1996, Sawio, 1994, Freeman, 1991) to be a long term activity for most cultivators and one they would not give up, even if formal sector employment were obtained.

[3] The term 'informal sector' was introduced in 1973 by Keith Hart and popularized by an ILO study of Kenya in 1972. Bromley, 1979 covers informal sector theory extensively and provides practical examples.

It would be my observation that it is only the perception of urban agriculture that causes it to be classified as an informal economic activity. Small-scale urban cultivation differs very little from small-scale rural cultivation. Urban cultivators may even obtain greater benefit from their activity as they use it for both food and income. Many small-scale rural cultivators only grow for subsistence and are unable to access markets (Odinga, personal communication). As there is little difference between rural and urban cultivation, why does society differentiate between the two?

Urban agriculture is contributing to the economic development of low-income households in Nairobi and this research shows it has even greater potential to target more households. Given the low start up and maintenance cost urban can target households in the lowest income percentiles. Many projects are unable to do this because of the need for expensive inputs and skilled or semi-skilled labour. Economically land tenure poses one of the greatest threats to the continued success of urban agriculture. All of the cultivators surveyed are farming on land belonging to the Nairobi City Council without paying rent. If farmers were forced to pay rent their profits would be greatly diminished. The Nairobi City Council should allow this usufruct tenure to continue and allow the urban poor to cultivate vacant land throughout the city. The benefits - increased health, nutrition and opportunities for income generation are promoting development in a manner that is sustainable.

It can be argued that allowing farmers to cultivate land for free is in effect providing them with a 100% subsidy and is not economically efficient nor the best use of urban land.

However, to counter this, I would argue that the land that is at present being cultivated is vacant or underutilized and was not providing the city with any economic rent prior to it being cultivated. Furthermore, the KPP and Kibera farmers are cultivating land that is sandwiched between their informal settlements and either the Nairobi River or Dam. This is land that while the settlements remain will have little appeal to outside developers. The arguement that the farmers are being subsidized by not having to pay rent may be valid if we are to measure development solely in terms of overall economic growth (GDP) and market competition. Such an approach to development has in many countries allowed some citizens to 'get ahead' but many have been left behind. If instead development is measured using social parameters then urban cultivation is a sound and sustainable development initiative, even without charging rent. Urban cultivation is allowing some of the poorest citizens to utilize available resources, and make steps toward self improvement and a better way of life.

4.3 Social

Many of the social benefits of cultivation are derived from economic benefits. For example, the economic benefits of fungibility give cultivators more disposable income which is often used to pay school fees. In the follow-up survey - 80% of the respondents indicated that school fees were either the first or second economic priority of the household, and having a greater disposable income ensured that school fees can be paid. Investing in a child's education is a major long term social benefit to the individual and the household.

Cultivators social development is also enhanced through better health and nutrition. 30% of the cultivators indicated that the most significant contribution of urban agriculture to the household is better nutrition and health. 43% indicated that having more food available and a lack of food shortages was the most significant contribution of urban agriculture. Improved health should be a priority amongst the social goals of development. The urban poor have much greater exposure to infectious and parasitic diseases as a result of inadequate housing, sewerage and water supply. Continuous exposure and infection leads to higher infant mortality rates and is a source of financial strain if the family member is unable to work or if there are medical bills to be paid. Higher disposable incomes allow families access to resources that can greatly improve and maintain their health.

For example, potable water in Kibera and KPP is bought from a water vendor at a standpipe for the cost of 1 Ksh per 20 litres. While this may appear inexpensive the cost

represents a significant portion of the household budget. If money is not available residents may be forced to obtain water from other sources making them susceptible to a number of water-borne diseases. If water can be boiled some disease causing organisms can be eliminated. However, fuel to boil water is expensive - 20 Ksh for a gallon of charcoal or 18 Ksh for a litre of paraffin. Raw food may also be a source of disease, which proper cooking can control. Low-income residents often cannot afford to purchase the fuels needed to control these sources of disease causing organisms. To detail all the relationships between income and health is beyond the scope of this paper.[4] However, it can be stated that small increases in disposal income can make a significant improvement to the health of low-income urban residents. Urban agriculture in some households is the only source of income, in others, it supplements the income of other family members. In contributing to the household economy urban agriculture helps to improve the lives of low-income urban residents with improved health and access to education.

Central to a community's social development is direct participation by the residents. As mentioned in section 2.0, social development is necessary to give the urban poor the ability to participate and take some control of the development process. The majority of cultivators surveyed were involved in an urban agriculture project. These projects, funded by the USK and HSHC, were jointly initiated by the NGO's and the community. The NGO's were looking for ways to improve food security and nutrition and also create employment generating opportunities. Ideas were discussed with the community and the agricultural project agreed upon. The cultivators were involved in the project throughout

[4] For detailed studies see World Resources, 1996, Hardoy et al., 1991, and Harpham et al., 1988.

the planning and implementation. They continue to meet weekly to monitor, evaluate and modify the project. These meetings are also used to discuss and resolve problems as they arise.

The USK project in KPP has been running for eight years and the cultivators are now assuming full responsibility for the project, the project officers provide technical advice and other assistance only if required. Mr. Peter Njenga of the USK project in Kitui-Pumwani previously provided the cultivators with planting programmes, suggesting crop varieties and patterns for rotation. Today, he says, the cultivators can design their own planting programmes utilizing the ideas he put forth earlier: "the cultivators control the project: it is they who are entirely responsible for the continued success of the project."(Njenga, personal conversation) The urban agriculture projects surveyed do not need constant inputs, maintenance or facilitation from an external source. Once adopted, the participants are fully capable of running and maintaining the project. An external agricultural advisor can assist with solving problems related to pests, diseases, irrigation, and fertilizers, but the cultivators continue to maintain control of their project.

The need for participation in social development is particularly relevant to the role of women in development. Caroline Moser has written extensively on the effect of development projects upon the lives of women. She suggests that the participation of women in development projects must not just be a means to accomplish something, but an end, a method of empowerment. The need to study the affect of development on women is particularly relevant in Nairobi where on average 80% of the residents of Nairobi's low-

income settlements are women.(Njenga, personal conversation.) The urban agriculture projects studied did not target women specifically; however, 78% of the project cultivators I surveyed were women.

In the case of urban agriculture, it is a project that is both a means and an end. It is a means by which food security, nutrition and income can be improved. These benefits of urban agriculture accrue directly to the individual cultivators and their households. Urban agriculture projects also serve as a means of empowerment, or an end in the development process. The cultivators are empowered by increasing their incomes, improving the livelihood of their households and by partaking in an activity that provides them with a gainful source of employment. With the assistance of the NGO's they are learning new skills and acquiring knowledge. 10 women in the KPP project have now made composting into a small business, selling their product to other urban cultivators. They hope to expand their sales and market their compost within the greater Nairobi region. Participation in this development project is not simply a means by which a certain task is being accomplished - i.e. building houses, or infrastructure requiring resident participation. Participation in these urban agriculture projects is raising the status of the women: they are making and they control their participation in the project. These changes in the women's roles is a positive step toward bringing about fundamental change in this society.

Urban agriculture is a project that allows for choice: cultivators can choose the amount of time and effort they wish to devote to the project. This corroborates to Moser's theories on the triple role of women mentioned earlier in this paper. (section 3.1) Women are

responsible for the productive and reproductive work in the household, and the management of their communities: the former is often the only work recognized; the latter two are seen as 'natural' and thereby not valued. (Moser, 1993) As mentioned earlier the undervaluing of women's work leads to the perception that women have' free time' which can be used to 'participate' in a development project. Participation in this form is termed 'sweat equity' requiring residents to devote a set number of hours to a project in order to benefit from it. For women, this is particularly difficult as their time is usually fully occupied with their productive and reproductive duties and in their role as community managers. Development projects that involve women should be flexible and allow women to choose their level of commitment as their schedules allow.

In the secondary survey women were questioned regarding other community management activities they were involved in. Cultivators, who on average spend 3.5 hours per day in their shamba are also : community health workers; traditional birth attendants; and AIDS counselors. They belong to weaving cooperatives, committees to maintain the village infrastructure, groups that make charcoal, soap and candles for sale in the village. Women participate in 'merry-go-rounds', farewell groups[5], and groups that visit the sick in hospital or at home. The women surveyed in this follow-up interview have on average 6 children, a household size of 5, and 70% are head of household. These women cultivators do not have a great deal of 'free time'. Urban agriculture is often one of two informal jobs women are engaged in: if approximately 3.5 hours per day is spent at their other informal

[5] Merry go rounds are revolving credit schemes and farewell groups maintain a small savings fund to assist with costs of funerals.

sector job, they are essentially working full time. They also run their households without 'modern conveniences': they need time to walk and collect water, to use the lavatories and showers, and to purchase food for nearly every meal, as homes have little or no storage room.

The perception that women have 'free-time' is misguided. Urban agriculture as a development project does not try to exploit this perception of free time. It is an opportunity for underemployed low-income residents to 'help-themselves'. People can choose whether or not to participate and then choose their level of involvement. None of the cultivators interviewed would give up their shambas if they obtained a formal sector job. As one cultivator stated:

> I would not give up my shamba because while I am farming I know I will always have food for my family or something to sell to earn some income. And, even if I had a new job that is well paying I would still find even one hour a day to farm. Food in Nairobi is expensive and my shamba gives me cheap food.

Urban agriculture to these women is not a 'trap' for unskilled labour but a reliable source of support for the family. It does not place an additional burden upon them, but contributes to the productive work that must be performed to ensure survival of the household. Urban cultivation is an opportunity for women to effect better control of their lives, it provides them with a means of income generation and an opportunity to help themselves.

Urban agriculture also has social benefits for the entire community, particularly when it is a component of a development project. In the projects studied, urban agriculture was one

aspect of an integrated development project. Cultivators have access to low cost housing projects, community health projects, credit, and business training seminars. Follow-up interviews showed that all the cultivators felt the urban agriculture project has helped to bring the community together. The cultivators are usually involved in a group savings scheme, they share information about gardening and as a group maintain drainage systems and assist with the general maintenance of the garden area.

Cultivators feel that the entire community benefits from the gardens with access to a cheap and convenient supply of vegetables. They also indicated that composting organic wastes is helping to clean up the community and reduce the volume of rubbish. Land that was formerly vacant and used for garbage disposal is now planted with trees and crops making the community more aesthetically pleasing. Also, in the Mailisaba project cultivators use sewage water for crop irrigation. This water previously formed stagnant ponds which were ideal breeding areas for mosquitoes. Urban agriculture has many benefits for community development that extend to cultivators and non-cultivators alike. The benefits could be extended if more community members were able to become cultivators and those presently cultivating were able to expand their shambas.

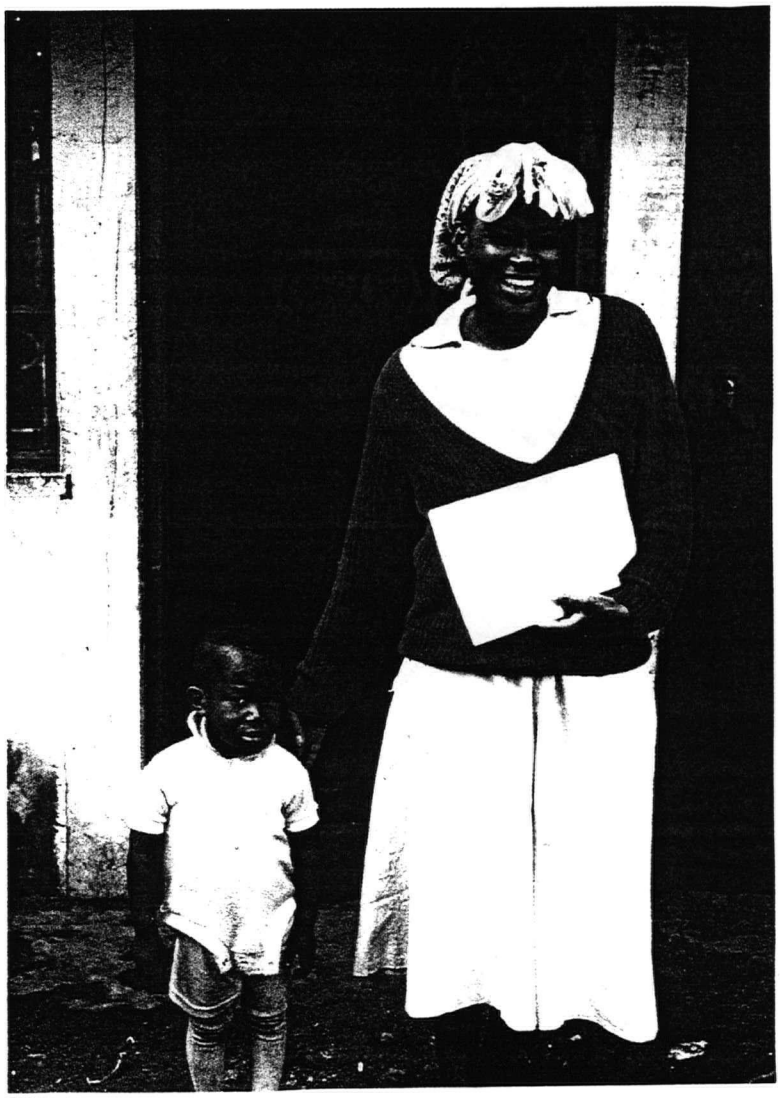
Urban agriculture contributes to social development on many fronts. It improves health and nutrition, alleviates food shortages, provides income, and improves community socially and physically. As a development project, it is comprehensive and integrated meeting many different needs but most of all allows for a large degree of participation and continued control. Women or men who engage in urban cultivation accrue the benefits

directly to themselves and their families, from which there are many spin-offs that benefit the community, and the greater urban environment.

Photo 4.3

KPP Cultivator with Her Son

This woman is typical of many female cultivators: she is single, has two children and undertakes many different activities as a community manager.



4.4 Ecological

Ecological goals of development need to consider ecosystem integrity, carrying capacity, minimizing the use of non-renewable resources and the sustainable use of renewable resources and the need to minimize the size of a cities ecological footprint. Urban agriculture as it is practiced today has a minimal impact upon the ecological integrity of the urban ecosystem. This is in part because of the small scale and in part because of the low levels of inputs such a chemical fertilizers and pesticides. In Mailisaba, the project coordinators are encouraging terracing of crops to retain water and soil on the sloping lands. With greater technical assistance urban agriculture has the potential to make a contribution to ecologically sustainable development.

With respect to carrying capacity urban agriculture helps to strike a balance among production, consumption and waste discharge. Typically vegetables for urban consumption are grown in a rural area and transported into the urban areas for consumption leaving the waste to be disposed of in the urban area. This open loop system upsets the balance of the urban ecosystem, to create balance the loop must be closed. Urban agriculture helps by contributing to local production. This reduces the amount of outside inputs coming into the urban system and allows organic wastes to be recycled back into the loop as inputs for production. Vegetables are produced and consumed locally eliminating the need for transport, which minimizes the use of non-renewable resources in the cycle.

Presently, 42% of the cultivators surveyed are utilizing food wastes for compost, turning their cycle of production and consumption into a closed loop. Of this 42% however, 90% are cultivating within a project. This indicates that with access to information and encouragement as to the benefits of composting, cultivators will routinely recycle food wastes. Agriculture extension officers could be utilized to bring information about composting to non-project cultivators. Composting aids in soil renewal, nutrient recycling and solid waste management, all of which helps to maintain the integrity of the urban ecosystem.

The use of organic fertilizers and pesticides is an area in need of further research and development. The survey data shows that 34% of cultivators use organic fertilizers, and 7% use inorganic fertilizers. 18% use organic pesticides and 23% use inorganic pesticides. The use of organic fertilizers and pesticides is almost entirely by project farmers. Due to the small size of the plots the use of organic fertilizers and pesticides is more feasible than it is on large farms. The materials used are mostly household products or household wastes such as ashes and are low-cost inputs. Preparation of organic pesticides is time consuming and may account for the relatively low usage. Many of the cultivators do not have time available to make these products and expose their crops to disease and pests. A small-scale production facility for organic pesticides and fertilizers could be established from which cultivators could purchase what they require. Costs could be minimized by having cultivators provide the necessary organic materials and the finished product sold just above cost. Agriculture extension officers could introduce the required techniques to non-project farmers. The use of organic as opposed to inorganic fertilizers and pesticides is another

benefit for the urban environment. Chemical fertilizers and pesticides can leach into soil and contaminate urban water supplies and surface runoff from plots can also increase pollution levels in water bodies. Organic fertilizers and pesticides have little harmful effect on the environment and when utilizing wastes are helping to maintain a closed loop urban ecosystem.

Some of the benefits of urban agriculture toward environmental health have been mentioned previously as social benefits. Cleaning up the community and rendering it more aesthetically pleasing makes urban agriculture both a social and environmental benefit for development. Planting crops also contributes to the 'greening' of the urban ecosystem by reducing dust, absorbing carbon dioxide, a contribution to minimizing global warming. Fruit tree cultivation also helps in cooling and increasing humidity in arid climates.(UNDP, 1996) In Kitui-Pumwani, where the settlement is low lying on the banks of the Nairobi River, the cultivators planted banana trees and napier grass to reduce the effects of flooding. The bananas are consumed or sold and the grass cut and sold as livestock feed. Environmental management is combined with an initiative for socioeconomic development. This integrated approach to development is necessary if urban development is to be ecologically sustainable. Urban agriculture is a practical means of combining the socio-economic goals of development with ecologically sound development.

At present the economic and social benefits of urban agriculture appear more extensive than the ecological. The ecological benefits are less obvious than the others and need to be sustained to effect long-term change in the urban environment. The social and economic

benefits are also easier to procure without assistance. For cultivators to become more aware of, and willing to implement ecologically sound practices, education needs to be prioritized. This needs to be the responsibility of government programmes and NGO projects that will see the ecological benefits of urban cultivation maximized.

Photo 4.4

Napier Grass and Bananas Planted Alongside the Nairobi River.
This has been done by the KPP cultivators to reduce the effects of flooding. Water from the river is not used for irrigation because of the high pollution content.

4.5 Project vs. Non-Project Cultivation

The data collected shows that there are some significant differences in the methods of cultivation and the benefits attained between the project and non-project cultivators. The survey data shows that the greatest differences between project and non-project cultivators are found in the social and ecological implications of urban cultivation. While economic differences are limited, they do exist. The following chart provides a summary of the main differences between the two groups.

Table 4.8

Highlights of Project/Non-Project Comparison

	Project Cultivators	Non-Project Cultivators
Economic The main differences in economic data appear to result from individual choice. Some cultivators utilize their crops for home consumption whereas others use it as a source of income generation. Projects could attempt to improve the cultivators markets.	• Assistance can enable cultivators to utilize information to boost crop yields and generate higher income • Plot sizes are often small due to regulated area - size of harvest is smaller, but more intensive as a result • Group atmosphere facilitates savings groups and joint purchases	• Unregulated plot size allows cultivators to grow greater amounts of produce, but, less intensively • Lack access to information on how to improve crop yields. This problem could be overcome by the Kenyan government extending extension services to urban as well as rural cultivators
Social Many of the social benefits extend to both project and non-project cultivators. However, the incorporation of urban agriculture into a development project can allow for the development of networks and greater emphasis on the attainment of knowledge and skills. All of these are vital to the empowerment of women and all members of low-income communities.	• Projects can specifically target women, who are often in greatest need of development assistance. • The project is incorporating other activities and bringing community members together. • Seeing the efforts of other cultivators helps to 'legitimize' this activity and make it more acceptable as an occupation. • Incorporation into a project has a legalizing effect that helps to establish defacto tenure on the land being cultivated.	• Inability to target specific groups may lead to an imbalance between the number of men and women cultivating. • Cultivators receive no outside support or encouragement for their activities. • Cultivators are farming on land that they do not own, lack of organization and representation means their tenure is constantly under threat.

Ecological The cultivation projects are helping to close the loop of urban consumption. However, there is still much expansion that can be done to further enhance the ecological benefits of urban cultivation. Greater attention to composting, wastewater recycling, more efficient use of land and greater utilization of urban land for cultivation will further expand its benefits.	• Assisting cultivators allows for the ecological benefits of cultivation to be greatly expanded. • Introducing the cultivators to the benefits of composting is helping to reduce solid waste and provide another means of income generation. • Cultivators are making use of inorganic fertilizers and pesticides, reducing the use of chemical compounds. • Terracing and flood control are reducing the amount of soil erosion.	• The ecological benefits of non-project cultivation is largely limited to the 'greening' of the urban environment.

Many development projects simply focus on one aspect of development, such as income generation or infrastructure development. What this study has shown is that urban agriculture in itself encompasses many different aspects of development. Cultivators economic situation has improved, they are achieving social development and their efforts are helping to improve the ecological conditions of the urban environment. These benefits result, to some degree, regardless of whether or not the cultivators are being assisted by an outside organization. However, the study has shown that the efforts of NGOs helps to enhance the benefits of urban cultivation. Urban agriculture is an activity that meets all the goals of sustainable development. As funding for development projects continues to decrease planners need to focus on finding initiatives that encompass the greatest range of benefits. This study has shown that urban agriculture can easily be incorporated into existing development projects. Or, when cultivators are already farming on their own initiative, their activities can be improved with minimal assistance.

4.6 The Kenyan Context

Section 3.1 outlined the list of development 'imperatives' established by the Government of Kenya as essential to their seventh national development plan - Resource Mobilization for Sustainable Development. The survey data shows that urban cultivation is compatible with many aspects of this National Development Plan. Making the links between urban agriculture and the National Development Plan may help the government recognize this activity and promote it as part of an integrated plan for sustainable development.

If urban agriculture is placed within the context of the 'imperatives' of the national development plan it becomes clear that it is compatible with the government plans. The following table shows the links between urban cultivation and the goals of the seventh national development plan.

Table 4.9

Urban Agriculture and Kenyan Development

Development Imperatives: Criteria for Assessing the Value of Urban Agriculture	Contribution of Urban Agriculture
1. ensure an equitable and sustainable pattern of development	To ensure that development is equitable and sustainable it must target low-income groups. They have access to few resources and in their quest for housing, employment, food and fuel they can unintentionally harm the natural and built environment. Targeting the urban poor with development programmes and policy can help reverse this trend.

2. sustain growth to meet the needs and aspirations of the majority	Within the next fifteen years the majority of Kenyans will be living in urban areas, with the greatest numbers concentrated in low-income areas. Development projects and programmes need to reflect this pattern. New and innovative ways for urban residents to meet their needs must be promoted: urban agriculture can help.
3. reduce widespread rural and urban poverty	As mentioned above, urban cultivation is accessible to low-income residents. Initiatives that target the urban poor with income generating opportunities can potentially help to reduce urban poverty.
4. modify the rate and spatial distribution of population growth	The majority of cultivators are women. Empowerment of women has been shown to contribute to a reduction in the population growth rate. When women take control of their lives they often choose to have smaller families and offer their children better education. By supporting urban agriculture the government can help to empower women - a move that can help modify the population growth rate.
5. ensure sustainable agriculture and increase food security	Lack of government recognition suggests that the significance of urban agriculture to urban food security is going unnoticed. Urban agriculture is relied upon by many low-income households for food security. Government can heighten food security by promoting urban agriculture.
6. improve human and environmental health	Urban agriculture contributes to the improved health of low-income residents by increasing their food supply and providing a better diet. The 'greening' of the city with urban cultivation contributes to improvement of the urban environment.

7. provide adequate shelter and services, especially for the poor	Surplus produce grown by cultivators is sold for cash income. More disposable income is available when not required to purchase vegetables. Higher incomes allow the urban poor to spend more on improving housing and purchasing urban services.
8. conserve and enhance the environment and natural resource base	Urban cultivation can help to conserve land in rural areas. As demand for food increases more land will have to be cultivated. If vacant urban land can be utilized rural areas can be preserved. The 'greening' effect of urban cultivation improves the health of the urban environment.
9. make efficient use of energy and expand the use of new and renewable resources	Growing food within the city makes good use of idle land. Energy consumption is reduced when transportation is not required.
10. ensure sustainable industrial production and use of environmentally sound technologies	Urban agriculture has proven to be ecologically sound and environmentally friendly. The small scale of this activity means organic fertilizers, pesticides and compost can be utilized effectively. Low-cost and appropriate technology is necessary for low-income cultivators.
11. improve national and local capacities for sustainable development planning and management	Capacity building can help make city planners more aware of the needs of the urban poor. Capacity building amongst the urban poor will ensure they are involved in planning and management of their local environment.
12. strengthen international cooperation and programmes in support of sustainable development.	Urban agriculture has been shown to contribute to sustainable development. Government could support it by initiating programmes that link cultivators locally, nationally and globally. This would allow for a sharing of ideas and 'best practices'.

This shows that urban agriculture meets or contributes to the goals of all twelve of the governments development imperatives and is compatible with the governments overall development plan. Imperatives three and five, reducing urban poverty and increasing food security, would be the clearest places for the government to recognize urban agriculture. This analysis of urban agriculture would suggest that it is "development *of* the people *for* the people and *by* the people". The Government needs to see urban agriculture as a sound urban development initiative that can assist the lowest income groups in improving their standard of living. Urban agriculture is an integrated and comprehensive strategy for development: promotion of this activity for one reason would contribute to meeting the needs of all stated development imperatives. The Government currently does not recognize the small-scale urban cultivators, limiting their extension services in Nairobi District to large scale commercial farmers. Policies for urban agriculture cannot be formulated because of this lack of recognition (Mrs. N. Odinga, personal conversation).[6] A new way of thinking about the urban area is needed to overcome outdated ideas that farming does not belong in a city. City planners and officials must recognize this creative and productive approach to urban development and respond to local initiative with policy and programmes that will see urban farmers efforts recognized and encouraged.

As discussed in Chapter 2 sustainable urban development is about exploring initiatives that will contribute to the attainment of basic needs in a manner that is empowering, equitable and that does not undermine existing ecological and social systems. This study of Nairobi,

[6] This government officials' name has been changed at her request.

Kenya demonstrates that urban agriculture is an initiative toward sustainable urban development. Yet, in Nairobi, urban agriculture continues to be promoted exclusively by NGO's and through self-motivation. By breaking urban agriculture down into the components of development - economic, social and ecological it is apparent that this activity is a means of development that is comprehensive and integrated. Why urban agriculture continues to go unrecognized by planning officials is a question no one appears to have the answer to.

The only apparent answer lies in the perception of what a 'modern' city should look like. Cities in the developed world have largely contained agriculture to rural areas, leaving urban centers to be the location of manufacturing and service industries. This is a pattern that has been imposed on cities of the 'developing' world. In the quest to modernize and 'develop' the governments of Third World cities have also sought to restrict agriculture to rural areas.

More recently though, as the UNDP reports, there has been a 'resurgence' of cultivation within the cities of North America and Europe (UNDP, 1996). Perhaps this will help to change the perception that agriculture belongs as a rural activity. If urban agriculture is seen as an acceptable activity in 'developed' countries, then perhaps the same will occur in 'developing' countries. Such recognition is a much greater imperative in developing countries where urban agriculture plays a vital role in the ability of people to meet their basic needs. Continued study, documentation of and policy recommendations may also assist in obtaining urban agriculture the recognition it is worthy of. It may also serve in

prompting governments and planners in developing countries to incorporate urban agriculture into their strategies for sustainable development.

CHAPTER 5

Conclusions & Recommendations

There continues to be a lack of recognition of urban agriculture as a viable means of income generation for low-income households despite the findings of this an other studies on the subject. This study has shown that urban agriculture is a viable activity for sustainable urban development. By meeting social, economic and ecological development goals it presents a balanced approach to development. However, as discussed previously, to fully support urban agriculture there is a need for a shift in thinking and the recognition of social development and ecological preservation as being as important as economic development. Planners, development experts, government officials and others need to recognize that mainstream economic thinking will not affect all people nor will it affect social development. Prioritizing development goals and attempting to meet the needs of all groups within society may also help to shift current thinking away from the present emphasis on economic growth. This research has shown that urban agriculture is contributing to sustainable urban development, but, there is still a need to promote and encourage this activity if it is to make an even greater contribution. The survey findings point to many areas in which recommendations can be made to achieve this end.

Recent studies of income generating activities in low-income areas usually fail to include urban agriculture (Freeman, 1993, Lado, 1990). This is combined with the failure of government officials and city planners to recognize the importance of this activity for its

contribution to sustainable urbanization. To this end the lack of recognition appears to de-value the significance of urban agriculture even amongst cultivators: they are reluctant to accept urban farming as a legitimate occupation. Of the cultivators surveyed 92% would prefer to have employment in the 'formal sector'[7] and many see urban agriculture only as a means of survival rather than as a viable source of employment. This perception exists despite 54% of the cultivators having no other source of employment and nearly 40% stating that they were motivated to cultivate by unemployment and no other job prospects. My research shows there is a need to change this perception and raise the value of urban agriculture so the cultivators can feel that they are gainfully employed in a legitimate occupation. This is an important step in the process of social development.

1. **Recommendation:** This study has shown that urban agriculture is contributing to meeting all of these development goals and thereby sustainable urban development. Urban agriculture still needs greater recognition for its contribution to sustainable urban development. Governments, NGOs and communities should work together to formulate and implement policies that will actively promote urban cultivation. Making people aware of the importance of urban cultivation to economic and social development and its benefits for the urban environment is an important first step toward legitimizing this activity.

There is still a perception that urban cultivation is in fact illegal. To this end the Kenyan Local Government Act Cap. 265, Section 154(c) states that local authorities "have the power to prohibit cultivation by unauthorized persons of any unenclosed and unoccupied

[7] However, inspite of a preference for a formal sector job - all of the cultivators stated they would still continue to maintain their plots if they secured formal employment.

land in private ownership and of any Government land..." (Mazingira, 1989). Thus, unless the Local Government has expressly prohibited the cultivation of a piece of land, urban agriculture is not an illegal activity. Section 155(c) of the same Act allows local authorities to order planting of crops during times of food shortage:

> the local authority may let, or grant to any person a license to occupy, any land which it may possess to require the planting of any specified crops by persons for the support of themselves and their families in areas which...are suffering from or likely to suffer from a shortage of foodstuffs. (Mazingira, 1989)

Of the residents surveyed 54% indicated that they had taken up farming as a means of averting hunger within their household. Their shambas provide them with an invaluable supply of foodstuffs without which many of the respondents would face food shortages. The current reasons for cultivation are in keeping with official policy. However, city officials appear indifferent to the need for urban cultivation among many low-income households. At present the District of Nairobi is struggling to maintain its agricultural division. Members of the provincial government have moved to eliminate the agricultural division on the grounds that Nairobi is an urban area and therefore does not need agricultural assistance (Odinga, personal conversation). The policies that are currently in place are for large-scale commercial farmers who cultivate primarily for export markets. Small-scale urban cultivators utilize organic methods for which the government has no policies. Mrs. Odinga, an agricultural officer for the district of Nairobi also expressed that the government policy makers are reluctant to accept new farming methods, especially ones related to organic farming. This may be due largely to the fact that many of the agricultural policy makers are the also the makers and distributors of chemical pesticides and fertilizers (Odinga, personal conversation).

2. **Recommendation:** The Nairobi City Council could greatly assist low-income residents by developing policies that would support their initiatives. The study has shown that urban agriculture is compatible with the development imperatives set out by the Kenyan government in the Seventh National Development Plan. Planning and policy should reflect this to include urban agriculture in official urban development projects. To do so would assist in helping government, NGOs and communities to work together as suggested in recommendation 1. Furthermore, City Council needs to develop guidelines for organic farming practices that reflect that the majority of farmers in Nairobi City are small-scale and non-commercial. To do so would assist

Following on these two recommendations and the need for greater support and networking lies the fact that small-scale urban farmers lack access to information and agricultural education. At present this information is being provided by NGO's as a part of their urban agriculture projects; cultivators that are not involved in formal projects are unable to access this valuable information. In Kenya agricultural extension workers provide rural and large-scale commercial farmers with information on crop management, use of fertilizers and pesticides, irrigation, crop varieties, planting techniques and others: extension workers could provide the same service to urban counterparts. Mrs. Odinga informed me that at the present time it is only the large-scale farmers in Nairobi district who receive support from agricultural extension workers.

Female extension workers could be recruited and trained to provide cultivating expertise and their acquired skills could be shared to develop support within the farming

communities. To do so would enhance the social development benefits of cultivation through the development of knowledge and skills. One problem that may exists would be that of timing: government workers usually work from 9 o'clock until 5 o'clock, whereas many cultivators hold another job and farm before or after this other job. Agricultural extension officers would need to be aware of this and the scheduling of their work could reflect this pattern. If however, members of the community were trained as extension workers they could develop flexible hours that would reflect the communities needs

3. **Recommendation:** introduce urban agricultural extension workers to provide small-scale urban cultivators the same access to information that their rural counterparts receive. However, the incorporation of urban agriculture into development projects would also help in providing extension services. The study has shown that farmers in the project areas are farming more intensively and using homemade fertilizers and pesticides and making compost, thereby enhancing the benefits of cultivation. Extension workers could not only work with non-project farmers but also assist the NGOs by providing information and in the training of community based extension workers.

An aspect of urban cultivation that is in need of government attention is that of tenure. All the cultivators surveyed are farming on land owned by the Nairobi City Council. Eleven percent of the farmers , all non-project farmers, had been threatened with eviction from their plots by the local authorities. However, many more of the cultivators expressed concern over their lack of tenure and the ability of the NCC to claim the land at any time for development purposes. The farmers in Mailisaba appear to be under the greatest threat of eviction as their land is located on the undeveloped urban periphery, and occupies the greatest area. The Kibera and KPP farmers have less threat of eviction due to the location

of their plots on land that is virtually cannot be developed because of its marginal location between the informal settlement and a highly polluted water body. The lack of land titles or assured tenure is a concern for the majority of cultivators. Farmers are less likely to expand their plots or make improvements when they are aware that their efforts will be wasted if they are evicted.

4. **Recommendation:** Policy should be formulated that would grant a form of de-facto tenure that ensures the cultivators access to the plot for a fixed number of years. The local authorities could also choose to develop a system of leasing land for a fixed term: the lease would guarantee the farmers right to cultivate for the duration of the lease. The lack of title or insecurity of tenure threatens low-income residents with respect to their housing. Nairobi's low-income settlements exist on government owned vacant land: while many of the settlements are not under threat of eviction, the lack of title deeds leaves low-income residents feeling insecure. The lack of tenure and land titles for housing and urban cultivation illustrate that the problems facing the urban poor do not exist in isolation. This points to a need for integrated policies that will address the multiplicity of problems in a manner that is comprehensive.

Further to the issue of land tenure is the desire on the part of cultivators to access a greater amount of land. All the cultivators surveyed expressed a desire for larger plots and cited lack of availability as the reason they failed to cultivate larger plots. In some cases, such as the densely populated areas of Kibera and Kitui-Pumwani, there may not be any vacant land available. However, on the urban periphery around the area of Mailisaba, vast areas of land remain undeveloped, but having been fenced, cultivators are denied access to the

land. Furthermore, the government must be careful not to introduce policy that will adversely affect the cultivators. Legalizing the growing of crops in urban areas where proper tenure has not been established could result in some cultivators being pushed off of their land. The legalization of cultivation in Tanzanian cities caused many small farmers - especially women - to be forced off their plots by men. Entrepreneurs started taking up this newly legalized activity on a large scale for commercial purposes (Lee-Smith. personal conversation).

4b. Recommendation: Allow farmers to cultivate vacant land on the condition that cultivation does not establish permanent or legal ownership, but does grant usufruct rights. To protect the cultivators efforts the city needs to establish regulations that do not permit the development of land before crops have been harvested. Landowners would have to notify the cultivators of their intent to develop, at which time the cultivators would have to cease planting, but would be ensured enough time to harvest. Government policy could allow cultivation of any vacant land as long as the cultivation does not detract from the original reason for leaving the land undeveloped.

A final consideration with respect to land is that of location and proximity to the cultivators residence. The cultivators surveyed travel, on average, fifteen minutes from their homes to their garden plots. The proximity of household to garden is an important consideration for planners if they are considering upgrading of informal settlement or attempting to introduce urban agriculture. Having plots close to the cultivators residence saves time. As the majority of cultivators are women, allocation of time is an important consideration for them. Increasing the amount of time a woman must travel from home to plot or to

construct plots too far from the home could comprise the ability of women to cultivate and the amount of time available to perform their productive and community management tasks.

Nearly one-third of the cultivators expressed that access to credit would assist their efforts. Seeds are relatively inexpensive, but if planting season coincides with a period of financial difficulty in the household, the cultivator may not be able to plant crops that season. Ten percent of cultivators indicated that they sold their garden produce as prepared food at a kiosk, or used the profits from their gardens exclusively to fund another business. In the first case giving cultivators access to credit would ensure that crops are always planted and may also allow farmers to expand their production by planting a greater amount. In the later case access to credit could again allow for the expansion of production. A greater surplus may encourage cultivators to attempt a secondary business activity as a spin-off economic benefit. If production is only enough for household consumption then potential for urban agriculture as an income generating activity is severely constrained.

5. **Recommendation:** Making credit available to farmers would allow them to expand their agricultural business. In many developing countries, small banks have developed that target women and lend small sums without collateral. These banks, such as the Grameen Bank in Bangladesh, have been very successful and have established repayment rates as high as 97%. A similar banking system could be started to assist urban farmers. Moreover, if urban agriculture were incorporated into a government-led development programme, a credit scheme could be included as a part of the project.

With respect to regulation of inputs - many cultivators use wastewater to irrigate their crops. In the Mailisaba project wastewater from a nearby industrial and housing complex has been diverted and is used to provide year round irrigation for the crops. In Kitui-Pumwani, bore holes dug along side the Nairobi River provide water for irrigation. In both cases the project officers - Mr. Nyore and Mr. Njenga had the water tested for trace chemicals. Copper, lead, zinc, cadmium and nickel are amongst some of the heavy metals that are present in the water and have been taken up in the vegetables. Trace amounts of these metals are not likely to have a negative impact on human health (UNDP, 1996). There have not been any studies done on the project participants to determine whether or not they are being affected by these heavy metals. The use of solid waste for irrigation can be carried out in a manner that presents little health risk, however, education and the use of appropriate technology are necessary to ensure that vegetables do not become a sources of diseases such as cholera and typhoid. The Undugu Project discourages the planting of lettuce and other leaf crops to help reduce the transmission of pathogens. With respect to government regulation of the sources of irrigation, care must be taken not to over-regulate and thus put the cultivators out of business. In most cases wastewater is the sole source of continuous irrigation - to prohibit its use would drastically reduce production levels. Mr. Nyore of the HSHC project expressed that the cultivators are aware that they are using contaminated water on their crops, but "they would rather die a slow death from poisoning than a rapid one from hunger" (Nyore, personal conversation).

6. **Recommendation:** Government programmes are needed to allow for the continued use of wastewater, but in a manner that presents the lowest threat to human health. Any projects or programmes that include urban agriculture need to consider the

environmental health risks and the need to balance the risk against the benefit. The government can also take steps to reduce pollution at its source and enact regulations to control the dumping of industrial wastes into water sources.

Urban cultivation in Nairobi is having small but positive impact on the urban ecological system. The non-project farmers contribution to ecological sustainability is at present limited to 'greening' the urban environment and preventing soil erosion and compaction. The project cultivators efforts demonstrate that this contribution can be improved when included with composting, and wastewater recycling. To prevent further degradation of the urban environment the government must recognize the larger problems, mainly those of air and water pollution from industry and improper disposal of household and commercial wastes. If the Government of Kenya and the City of Nairobi wish to improve the health of their cities, integrated and comprehensive strategies must be developed. Policies and programmes to educate and inform citizens of their roles need to be combined with enforceable regulations. recognizing independent and innovative ideas, such as urban agriculture, will encourage others to seek ways to improve their urban environment.

A general observation that I have made throughout the development of this research and while undertaking the study is that there is a need for greater access to information about urban cultivation practices. While government policy in this area would assist, NGO's, community organizations could also play a role in information sharing. Cultivators would also benefit by networking and sharing their successes, knowledge, expertise and methods of overcoming problems. Bringing urban cultivators together would assist in obtaining

recognition from government officials and planners for their efforts. This is another means by which they could gain support for their activities. A global recognition of urban agriculture could do much to encourage governments to recognize their own urban cultivators and their valuable contribution to food supply and employment. NGO's and community groups should attempt to build networks amongst cultivators to promote information sharing. The various NGO's involved in urban cultivation can aid cultivators by sharing information, sharing new and successful techniques and overcoming problems together. Linking with organizations in developed countries would also help to bring recognition to scope and need for urban agriculture in developing countries.

The research questions that: one, urban agriculture is a socially, ecologically, and economically viable activity; two, urban agriculture is making a contribution to sustainable urban development; and three urban agriculture can best be promoted as a component of integrated development projects have been answered positively. Urban agriculture is a socially, economically and ecologically viable and makes a significant contribution to sustainable development. Through its ease of entry and without placing additional burden upon women, urban agriculture is providing women with development opportunities. Because it addresses social, economic and ecological concerns urban agriculture contributes to all facets of sustainable development. The integrated and comprehensive nature of this activity makes urban agriculture an example of what urban development projects should aim to accomplish.

Referring to Rees' definition of sustainable development, urban agriculture *is* "affecting positive socio-economic change" and it "does not undermine the ecological and social systems upon which (the) communities and societies are dependent." However, for sustainable development to be successfully implemented there "requires integrated policy, planning and social learning processes; its political viability depends on the full support of the people it affects through their governments, social institutions and their private activities."(Rees, 1988). It is in the implementation stages and in obtaining recognition that urban agriculture is failing to meet its full potential: urban agriculture can best be promoted as a component of integrated development projects and programmes; but, a lack of integrated policy and support is limiting its potential. If urban agriculture is to make the greatest possible contribution to sustainable development it needs to be supported with integrated policy and planning and incorporated into educational programmes. This strategy will allow citizens to become more aware of the local, regional and global benefits of practicing urban agriculture.

Urban agriculture is a response to systemic problems within Kenyan society and within many other developing countries. Urban agriculture is essentially, a survival strategy despite the contribution it makes to sustainable urban development. As it is presently carried out, urban agriculture is a solution that has grown to cope with the problems of underemployment, poverty and malnourishment. What needs to be addressed are the roots of these problems: economic stagnation, mismanagement, corruption and overpopulation. Africa, unlike Asia or Latin America has experienced little real economic growth and in many countries real GDP has fallen. Fragile democracies allow huge bureaucracies to

develop and senior politicians place their needs and those of their home regions ahead of the overall well being of the nation. African countries continue to have some of the highest population growth rates in the world. Kenya recently had one of the highest population growth rates in the world. Some progress in family planning has been made and today population growth has decreased. These issues generate greater problems for society, ones that force people to find innovative and create ways to meet their basic needs. More and more national and local governments are losing their ability to provide basic services to the burgeoning urban populations most of whom reside in squatter or 'informal settlements. The residents of these settlements are finding it necessary to become more self-reliant in order to provision their basic needs. Urban agriculture is an effort to create self-reliance. It needs very little support from government and has demonstrated in many countries that it is worthy of official recognition and encouragement.

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Appendix 1

Questionnaire # 1
For Urban Cultivators

Personal Characteristics

What is your gender M F

What is your age under 19 20-29 30-39 40-49 50-59 over 60

What is your marital status single married divorced widowed

Number of Children none 1-2 3-4 5-6 more than 6

What is the highest level of education you have completed?
primary secondary adult education none

How many years have you lived in Nairobi? 1 - 3 4 - 6 7 - 10 more than 10

Where do you currently live? 1. Kanuku Village 2. Kinyago Village
3. Kitui Village 4. Mailisaba
5. Kibera 6. Other

Do you own or rent this property? Own Rent

Do you own land elsewhere? Yes No

What is the total number of people in your household?

Do you have any other occupation beside gardening? If yes, what is this occupation:

What is the total household income?

How much of your total income is spent on food?

About Urban Cultivation

Does the plot border a river a road.

For how many years have you been doing urban agriculture?

In what months are you tending this garden?

Were you tending this garden last year? Yes No
If no, were you tending a garden elsewhere, and where was it located?

Why did you change locations?

How long does it take you to travel from your home to your garden?
5 minutes 10 minutes 20 minutes 30 minutes 45 minutes 1 hour or more

Do you have another plot elsewhere? If yes where:

How big is your garden in square meters?

Would you like to increase the size of your garden? If yes, by how much?

List the different types of crops you have growing in this garden:

1. kale	5. maize	9. onions	13. potato
2. spinach	6. beans	10. tomatoes	
3. sugar cane	7. amarunthus	11. peas	
4. bananas	8. arrow roots	12. cabbage	

Economic Aspects

Do you own this garden? yes no

If no, who does and how much rent do you pay?

How many hours per day do you spend working in this garden?

Does anyone help you tend this garden? yes no

If yes, do you pay for this labour and how much do you pay?

Where do you get your seedlings from?

How much do your seedlings cost?

What tools do you use and how much did they cost?

What quantity of vegetables do you produce each season?

What amount is used for: domestic consumption
gifts for relatives and friends
sell to other community members
sell to hawkers
other uses

How much money do you make from the selling of your produce?

What do you spend your garden income on?
1. school fees
2. clothing
3. food
4. housing
5. other

Is this your only source of income? yes no

If no, what are your other sources of income?

Social Aspects

Why did you start urban farming?

Do you have any previous experience or formal training in agriculture? yes no

If yes, where did you gain this experience?

Does anyone give you advise on how to raise your crops? yes no

If yes, who and what advise do they give you?

Are there any problems that affect your ability to grow crops, please list them:

1.

2.

3.
4.

What do you do to prevent these problems?
a.
b.
c.
d.

Are you aware of any city regulations that affect your growing of vegetables and what are they?
a.
b.
c.
d.

Does your household experience food shortages and during what months do they occur?

Has your households living standard improved since you started urban agriculture?
If yes, name how it has improved:
1.
2.
3.
4.
5.

Ecological Aspects
Before you planted crops on this land what was it being used for?

Do you use any fertilizers in your shamba? yes no
If yes, what type and where do you get them from?
1.
2.
3.

Do you use any pesticides in your shamba? yes no
If yes, what type and where do you get them from?
1.
2.
3.

Do you irrigate your crops? yes no
If yes, where do you get the water from?

Do you utilize any of your household food wastes for compost? yes no
If yes, how do you make the waste into compost?

Do you get compost from any other sources?

How do you transport your produce?

Have you experienced flooding in your plot? yes no
If yes, has anything been done to prevent this?

Appendix 2

Questionairre #2
For Female Cultivators

- What other community activities are you involved in?
- Has gardening helped to bring your community together?
- Would you prefer another occupation to urban farming?
- What are your households economic priorities?
- Does gardening have a positive or negative effect on your local environment?
- In what ways could government policy help to improve your ability to garden?
- What prevents you from expanding your garden?
- Do you have any concerns about the location of your garden or the source of water for irrigation?

Appendix 3

Questionairre # 3
For the Urban Agriculture Project Managers: USK & HSHC

- Who inititiated this urban agriculture project?
- Who is the target group of this urban agriculture project?
- What percentage of people in your project are males and what percentage female? Why do you think this is?
- What are the goals of the project?
- What are the yearly operating costs of the project?
- What have been the greatest strengths and the greatest weaknesses?
- In what areas would you like to see the project improved upon or expanded?
- How does the urban agriculture project benefit the entire community?
- What are the ecological benefits of the project and how can they be expanded upon?
- How do you define sustainable development?
- Do you feel this urban agriculture project is contributing to sustainable development?
- Is urban agriculture and integrated development project? Why?
- What are the greatest constraints to the promotion of urban agriculture?
- In what ways or areas could government policy assist in the promotion of urban agriuclture?