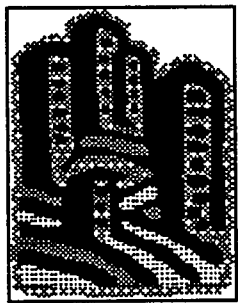


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Urban Agriculture Research in  
East & Central Africa:  
Record, Capacities and  
Opportunities

by  
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*University of Dar es Salaam*  
1993



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# **URBAN AGRICULTURE RESEARCH IN East and Central Africa: RECORD, CAPACITIES AND OPPORTUNITIES**

Many city people dream about living off the land in some gentle rural haven where urban noise, and pressures are far away. But for everyone who actually makes the move toward such a self-sufficient life style, hundreds more remain town-tied ... Sadly, only a few urbanites use the resources for growing their own food that are at their disposal (Wickers, 1977:1).

## **INTRODUCTION**

Urban agriculture (UA) —the cultivation of food crops and keeping of small livestock in open spaces in and around cities— in Eastern and Central Africa and in other third-world regions convey a diametrically different message from the quote above on Western city living. As the world becomes increasingly urbanized, the pressures of rapid urbanization are undermining rural resource bases. Although global rural population may stabilize between 2020 and 2025 (UNDP, 1991:9, 19), still the majority of the world's poor will be living in the cities.

Several problems intensify as a result. Feeding these people and maintaining livable environments is a challenge of immense proportions to governments, researchers, planners, decision makers and funding agents the world over. However, recent research shows that UA is being perceived as a potential partial solution to this problem. This review of UA research in Eastern and Central Africa attests to this.

### **General perception of urban agriculture**

Attitudes towards UA are mixed. Although UA is emerging, in both industrialized and developing countries, as an important economic activity within the urban informal sector, few planners and decision makers assume that UA in and of itself is a worthwhile legitimate activity (Sawio, 1993 forthcoming). To mainstream urban economists and planners, urban agricultural activities in cities are a contradiction of the common image of the city. Thus, to the traditional urban

planner, the architect, the politician and other decision makers, UA detracts from the images of the "ideal, planned and modern western city." As a result many people perceive UA negatively. To many it is a remnant of an outmoded, transitory activity typical of rural living where people handle dirt.

Yet UA studies are showing that UA is becoming almost a permanent feature (Sanyal, 1984, 1986; Smit and Nasr, 1992) in the Third World as well as in developed countries.<sup>1</sup> It is a concrete reality in that it occurs in cities and surrounding bio-regions about which more must be known because it is potentially a socioeconomic survival and livelihood-enhancing strategy for the urban poor. It is an innovative response of urban dwellers to the deteriorating national political economy and it has been fostered by the availability of unused open space<sup>2</sup> (Moshia, 1991; Maxwell and Zziwa, 1992) and it makes use of resources in urban ecosystems which would otherwise go to waste (Sawio, 1993).

### **Focus of the paper**

This paper has three parts. In Part 1, I describe the record of UA research in Eastern and Central Africa. (Countries included here are: Zaire, Congo, Cameroon, Zambia, Zimbabwe, Mozambique, Kenya, Uganda and Tanzania). Also, I outline the strengths and weaknesses of these researches, list their relevance to science and technology, briefly relate these to water, wastes and disasters in view of the URB Program's specific objectives and I list areas of further research. In Part 2, I present a list of possible research institutions and persons in the region likely to carry out the suggested research areas. In Part 3, I sketch out two possible UA research projects in Eastern and Central Africa in the foreseeable future.

### **1. REGIONAL RESEARCH RECORD: STRENGTHS AND WEAKNESSES**

Field studies of UA are relatively few in number, yet available studies in East and Central Africa give us a picture of its widespread practice. Current research shows that urban farming in the eastern and central African region is not new; it began many years ago (Winters, 1983; O'Connor, 1983; Sanyal, 1984, 1986; Rakodi, 1987; Freeman, 1991; Maxwell and Zziwa, 1992).

### **1.1. Strengths**

In view of the URB Program's aspects and specific objectives, before I describe some of the UA research experiences, I outline what I think are the best researched aspects of UA in the region so far. These include: (a) Identification of the major impediments or constraints of UA. Emphasis is placed on access to land for the urban poor, crop security and availability of credit; (b) there is ample documentation of the various foods farmers grow and the animals they rear where they live in the urban and peri-urban areas. Emphasis in these studies has been given to the contribution to household food and incomes; (c) there is good documentation of the social and economic benefits of UA which include reuniting migrant families, fostering recreation, creating employment, and reducing hunger and malnutrition.

### **1.2. Weak areas**

It appears, however, that little research has been done to: (a) Develop small scale appropriate technologies suited to the non-commercial farmer to select the best crops for the types of sites farmed (for example, what crops are suited to roadside farms as opposed to open public spaces or factories or schools? Which crops are suited for flood plain agriculture, roadside farming, container growing, etc.); (b) examine multi-food production systems in intra-urban and peri-urban areas; (c) Legal and policy aspects to make UA an acceptable reality in cities are still ambivalent. Most activities are tolerated and much UA could be banned at will; (d) study thoroughly and design organic recycling systems to reuse waste —solid and liquid; (e) find solutions to health hazards/risks connected with UA. Although some of these aspects are reflected in some form in UA studies in the region, more research is needed.

### **1.3. Examples of urban agriculture studies**

#### **CENTRAL AFRICA**

A number of UA studies have been carried in this area since the late 1960s and early 1970s. For example, Streiffeler (1987:8-13, 1991:267-273, writing on "*Improving Food Security through Urban Agriculture in Africa: A Social Perspective*" cites several studies of UA. She cites Lassere (1958) who reports

that in Libreville (Congo) in 1957, 80 percent of the women who were interviewed cultivated a field. Skinner (1962) found that 36 percent of those questioned in Ouagadougou called themselves cultivators. Adrien-Rongier (1980), Streiffeler reports, showed in a study during the dictatorship of Bokassa in Bangui, that many prisoners and residents in the city survived on the gardening efforts of local women. Land in Brazzaville was put under agriculture (Vennetier, 1963) with emphasis on the growing of vegetables and condiments.

In 1986, Streiffeler conducted a survey of 426 households in Kisangani, Zaire as a project to improve UA. It is not known whether the sample was drawn randomly or not. The method of choosing each respondent is not described either. She reported from the findings that "urban agriculture has favourably influenced the urban ecosystem through use of such factors as waste, the maintenance of water tables through high absorption levels ... and the beneficial effects on the micro-climate and the saving of fuel" (p.268). In this Kisangani survey, 32.6 percent of the respondents practice UA for own consumption, 0.3 percent for sale, and 63.4 percent for both personal consumption and sale. She also showed that urban farming is a reaction to price increases which did not match with rise in income.

Mbuyi (1989) writing on the management problems of Kinshasa, observed that with the expanded population of the city, provision of food has been critical and peri-urban agriculture has increased as a possible solution. He notes that the use of land for building has encroached on agricultural land (1989).

In Cameroon, Ngwa Nebasina (1987) studied Buea Town Gardeners and argues that "urban dwellers, including civil servants and their dependents have discovered the small-scale agricultural potentials that urban lands provide" (p.77). In a sample comprising 115 household heads, and using an open-ended questionnaire instrument and field observations, Ngwa Nebasina identified two types of opposing land ownership: (a) land used by full-time farmers, and (b) that used by part-time farmers. His field observations showed that Buea town and a heterogenous population carried out urban farming and because of availability of continuous out-of-office hours planned farm activities could be realized. His analysis showed that people did urban farming: (a) because of the desire to increase family urban food supply, and (b) as a recreational, out-of-routine activity with no serious commercial motivation (Ngwa Nebasina, 1987:80). The choice of

crops was based on personal decision. Farmers used chemical fertilizers, but also composted waste and animal dung. Pesticides were also used in leisure time.

In Zambia, studies by Sanyal (1984) and Rakodi (1987, 1988) on UA have shown that the practice is officially recognized but attempts to ban it surface from time to time. Available data indicate that community food production in the city and especially by squatter dwellers is very extensive. In a survey of 250 low-income households in Lusaka, Zambia, Sanyal (1984, 1987:198) found that 45 percent of the low-income households cultivated food in their backyards or front yards or in the urban periphery. An additional 15 percent cultivated both.

Rakodi (1988) reported from several surveys she carried out in squatter settlements of Lusaka in 1970s and 1980s that urban gardening was widespread and even encouraged among Africans in the colonial period. In the households she surveyed, over 50 percent of the residents cultivated home and distant gardens and the majority of urban food producers were women.

Drakakis-Smith (1991) writing on urban food distribution systems in the Third World with reference to Zimbabwe includes subsistence production –urban farming. He observes that household members who engage in urban food production undertake several other roles in relation both to production and reproduction. In showing the nature of urban food production, Drakakis-Smith (1990:104-105) presented results of his study of three areas in Harare, Glen View (a government service site), Mabelreigh (mixed-middle class) and Epworth (squatter settlement) where about 80 percent of those interviewed grew crops in their gardens, and nearly all food was consumed by the growers.

## EASTERN AFRICA

Several UA studies have been done in eastern Africa, mostly in the late 1980s. Outstanding studies have taken place in Kenya, Uganda and Tanzania.

Kenya: A major study in Kenya was undertaken in 1985 in six towns selected from a list of ten towns by an NGO, the Mazingira Institute. This research sampled 1576 randomly chosen households. In great detail it documented a variety of urban agricultural activities which included crop growing, livestock keeping and fuelwood production. The study employed a household questionnaire which was

tested several times and comprised 295 questions. A random procedure was used to select sublocations to include in the sample. Randomly selected households were visited by a team of interviewers and leaders who had extensive experience in field surveys. The results show (Lee-Smith et al., 1987:xv) that 62 percent of the households surveyed grew part of their food, 29 percent grew it in the urban areas where they lived, and 17 percent kept livestock within the city. 63 percent of the households carried out agriculture outside the cities.

The Mazingira study documented that the majority of operators were women (56 percent). Only 31 percent of farmers had legal access to urban land and about 29 percent grew crops on land which was not theirs. Generally (Lee-Smith, et al., 1987:86), the poorer households used land they never owned, which they farmed as squatters. Most of the food crops and livestock was consumed in the households. The researchers estimated that the crops produced amounted to about 25.2 million Kg, valued at US \$ 4 million (Stren, 1992:545). The Mazingira study suggested that municipalities should promote UA rather than harass the operators.

A follow up study to the Mazingira project is Freeman's 1987 study (Freeman, 1991) based on a sample of 618 urban cultivators in the open spaces in Nairobi. Instead of using households, Freeman used randomly selected areas and interviewed farmers on their farms. Freeman observed that urban agricultural activities in Nairobi were prevalent (Freeman, 1991:54). His findings show that 64 percent of the farmers are women, the majority of whom are migrants into the city and had lived there for over 20 years. Of the 618 urban farmers, 28 percent had primary education, and 6 percent secondary education. The bulk of the produce is used for subsistence. Freeman considers that urban farming in Nairobi reunites families, provides employment, helps to keep food costs down and generates income. Because the advantages of urban farming outweigh perceived disadvantages, Freeman advocates promotion of UA (pp.121-122).

Interestingly, Freeman developed a useful typology of urban farmers based on the type of land use and the location of plots (Table 1, in appendix): (1) backyard farmers who use private residential land, (2) riverside farmers who use land on river flood plains, (3) roadside farmers, and (4) squatter farmers who use public land e.g. railway and park land. This is important because it gives us an idea of where some of the idle resources in the city may be located. It also helps to see how through UA these resources can be put into "use values" (Sachs, 1986).



According to Freeman, the main constraints facing urban farmers in Nairobi are environmental, i.e. natural disasters such as: drought, land degradation (particularly soil erosion) and flooding, as well as crop loss due to pests.

Another UA study in Kenya is by Obara (1988) with reference to Nairobi. Obara, applying a von Thunen model, describes UA around Nairobi. He summarizes the experience thus:

"Agricultural production in Nairobi City and its environs consists of subsistence and cash crop cultivation and livestock raising to provide milk, meat, pork, etc. In the Central Business District (CBD) there is haphazard gardens of vegetables belonging to institutions, such as schools. From the CBD to a distance of about 10 kilometers, institutions and individual residents in different estates own gardens and grazing land. Although some of these gardens may be illegal, they produce food for the residents. Within the radius of about 10 kilometers from the CBD, there is diversification of agriculture which includes vegetables, fruits, grains (maize), bananas, flowers, poultry, goats, cattle, etc. Beyond this zone and in the suburbs, commercial ranging is carried out for the production of milk, meat, pork, etc. to be consumed by the City residents. The zone also specializes in cash crop production (e.g. coffee). However, subsistence crops including horticultural crops are grown under intensive agriculture. These crops are sold in the city to be consumed by the residents. Nairobi District recently produced 1200 metric tones of maize under 700 hectares. There is no doubt that given the proper planning, encouragement and extension services, Nairobi City is capable of becoming self-sufficient and self-reliant in food production." (Obara, 1998:863-864).

Obara's account is very optimistic that UA can contribute substantially to food security in cities. No doubt UA is here defined broadly to include all types of peri-urban activities. It is possible that Obara overstated the fact that a city like Nairobi could become self-sufficient and self-reliant in producing all the food it needs from within its boundaries.

Uganda: On UA practice in Uganda, Maxwell and Zziwa (1992) reported on their survey of 150 producer households in Kampala that nearly two thirds of

urban farmer respondents (71.3 percent), were women (Maxwell and Zziwa, 1992:27). Other findings based on observations of household factors such as nutritional status of children, possession of certain household amenities, as well as income showed that only about 3 percent of those doing UA were high-income earners, 27 percent middle-income and the bulk of them (about 73 percent) were low-income people. Their study reveals also that urban farming in Kampala tends to be a livelihood strategy of the urban poor to supplement their inadequate incomes by producing food on any available land (op. cit., p.28). Maxwell and Zziwa also cited references to reports that mention UA in their studies of the informal sector in Kampala, Mwesigwa (1987) and Oloya (1988). While Mwesigwa includes urban farming as one of four urban informal sector activities in his discussions, analysis of the sector is lacking; but Oloya, according to Maxwell and Zziwa (op. cit., p.15) attributes participation in UA in Kampala to cultural and economic causes and to the lack of enforcement of zoning regulations and municipal by-laws. The researchers observed that there was little use of urban waste, which was still a major problem.

Tanzania: A number of studies have mentioned UA in Tanzania, especially Dar es Salaam. Tripp (1990:65) cited a 1950 Survey of African laborers in Dar es Salaam which noted that 14 percent of households in the sample had farms on the outskirts of the city growing mainly rice. Several others have shown fluctuations in the practice of UA. In the 1980s it appears that a number of workers left formal employment to involve themselves in secondary income generating activities including agriculture. Tripp's (1989:11-24; 1990:67-73) survey, mainly in Buguruni and Manzese Wards, shows that about 40 percent of those who left formal employment went into urban farming. In her samples, almost half of all workers farmed and 59 percent of all residents had farms in 1987/88. According to Tripp, women (72 percent) are more likely than men (44 percent) to be involved in urban farming.

While there are several other studies which mention UA, In Tanzania, three major UA studies are on record to date. The first major UA study was conducted by three researchers at the Sokoine University of Agriculture (SUA), Morogoro, and it covered six cities like the Mazingira study. A Draft report has been submitted to IDRC entitled: *Urban Agriculture in Tanzania: A Study of Six Towns*. The study sampled 1800 farmers by using a disproportional stratified sampling. How each farmer was picked for inclusion in the sample is not described. The results show

that UA constitutes economic enterprises with lucrative returns. These activities provide for more than subsistence needs. The SUA study showed that the wealthier urban dwellers were benefitting more than the poor. While crop growing is done by nearly all, livestock keeping is a preserve of the elites. The SUA researchers observed that UA as practiced is not sustainable, especially livestock raising which seems to conflict with several other land uses especially housing and is threatening to spread health hazards because of the accumulated wastes. However, the general conclusion is that UA should be encouraged and planned for.

The second is my own study entitled: *Feeding the Urban Masses?: Towards an Understanding of the Dynamics of Urban Agriculture and Land Use Change in Dar es Salaam, Tanzania*. My study's focus echoes that of Freeman in the open spaces in Nairobi. It is also complementary to the SUA study but slightly different. The results of my study are contained in a report soon to be submitted to IDRC, and has also produced a Ph.D Dissertation which I am submitting to the Graduate School of Geography at Clark University. I did not draw a completely random sample, Mine is a nonrandom sample of 260 urban farmers from three urban wards in Kinondoni district. Though not random the sample is nonetheless representative of the range of urban farmers I intended to interview. I used, in part, a progressive contextual approach to analyze the historical contexts underlying UA practice in Dar es Salaam. I also used aerial photo interpretation to explain land use changes in three contiguous wards.

The overall results of the study show that UA is not a marginal social activity because it is practiced by people from all social classes. Economically UA makes contribution to the social well-being of many urban dwellers, produces appreciable amounts of food for household use and generates employment and supplementary incomes. The analysis of the constraints was placed within a possible typology of impediments (Appendix 1) and I believe that the major challenge to UA and its future in Dar es Salaam as a viable, efficient long-term source of food and wealth is the problem of land tenure which is uncertain in unplanned areas and inhibited by city regulations. I concluded noting that for UA to prosper and for urbanites to enjoy the acclaimed benefits, the city government and planners need to demonstrate the will to include UA as an integral part of the built-up environment.

The third study on UA in Tanzania was carried out by Mr. Davis Mwamfupe, an assistant lecturer in the Department of Geography at the University of Dar es Salaam. The title of his study is *Land use in the Peri-urban Zone of an African City: A Case Study of Dar es Salaam and Mbeya, Tanzania*. Mr. Mwamfupe notes that there has been little research undertaken on the peri-urban zones of African cities as suppliers of food. Underscoring the fact that land in the peri-urban zones around Tanzania's cities must be studied in the context of changes in the country's political economy, Mr. Mwamfupe observes that the sudden upsurge of peri-urban agriculture raises important questions about its effects on land use. So he sets out to explore —among other objectives— the way people adapt to urban pressures and the extent to which the farmers in the peri-urban zones have taken the opportunities of expanded urban market and the changing political economy. This study will also map land use changes in the peri-urban zones of Dar es Salaam and Mbeya and will also culminate into a Ph.D Dissertation at the University of Glasgow. The results are yet to be known.

Segal (1988) has observed that one important feature of urban squatting in Dar es Salaam is "squatter farming" or UA which occurs on unoccupied land (p.164). Unoccupied means that there is no inhabited building on the site. Segal argues that this "squatter farming" has a 'hit-or-miss' quality. That is, if the land is open, someone will clear and use it. Often, however, in the planned areas, the particular piece of land is formally designated as a house site. When a person comes to build that house, someone else's non-market source of food is destroyed. However, Segal (1988) argues that:

"the pervasiveness of agricultural squatting suggests that areas will probably be perceived as more livable if they contain vacant land. Unoccupied land in both planned and unplanned areas has additional uses. Some is used as a source of raw materials for basketry or for firewood. Some is used for grazing a few goats or raising a few chickens" (Segal, 1988:164).

Maputo: UA is taking place in the peri-urban areas of Maputo, Mozambique. The government has recognized its social and economic value, therefore, it is supporting it. Graham, et al., (1991) conducted a baseline survey of 330 households consisting of 2,675 respondents in peri-urban Maputo, which was designed to investigate characteristics of labor, land and financial markets serving

those households, with one of the views being food security (p.i). The area of focus was Districts II to VIII in the Greater Maputo area including Matola Gare but excluding the central city area and other peri-urban areas.

The results show that 37 percent of their sample households engaged in urban food production. Many households grew multiple crops, the most popular being yellow corn. Other crops included "manteiga" beans, vegetables, —lettuce, onions and cabbages. The findings also show that livestock was raised in 29 percent of the sample households. Ducks and chickens are the most common animals reared. Results of this survey also show that important agricultural land use occurred "in the more outlying areas in all the districts where use rights were less expensive and more easily secured," and a permanent source of water in two districts explains the "intensive cultivation of high value vegetable crops" in Districts V and VI (p. vii). Since under Mozambique law all land belongs to the state, one finding from the survey results is that about half of the households' occupancy was associated with concessions or rentals from various government authorities. Only about 10 percent did not know their user rights. Of the remaining 40 percent, 25 percent got use rights and occupancy through inheritance; 15 percent from purchase and 5 percent from private individuals (Ibid. p. vii).

#### **1.4. The contributions of these studies for science, technology and policy making**

The general contributions of these studies so far may be summarized as follows. First, most UA studies have shown that social scientists are beginning to realize that urban farming is a potential research topic. That UA is prevalent challenges the application of existing science of urban planning and management. It is becoming increasingly clear that there are considerable underutilized resources —physical and human— in cities and these must be put to efficient and rational use.

Relevant for science and technology is Ngwa Nebasina's observation that urban space, as a natural resource, when made to operate with other elements as time, leisure or daily food requirements, could generate quite other series of utility values. For Nebasina, what matters is not the physical expanse by itself, but the requisite inputs and technology invested on that urban small-size land that transforms everything economically and adds more to its value. The demand and rational use of urban space for short cycle cropping, market gardening or intensive

small livestock development may transform the outlook of some African towns (Ngwa Nebasina, 1987). The question is, should small-scale intensive agriculture which uses land that cannot be built on be promoted or not?

Second, it is becoming increasingly more acceptable that the informal sector is vital for the survival of rapidly urbanizing countries. In this context, UA should not be perceived as a socially marginal economic activity as operators cut across broad social groups. There is need therefore for urban planners and local authorities to recognize it and to legislate that it becomes an integral part of the urban economy and physical landscape.

Third, it is the duty of educators, curriculum developers and urban designers to promote the awareness that UA is a potential economic activity that can make cities efficient, self-reliant and sustainable. Along with this must be developed small-scale intensive technologies to: (a) utilize arable open spaces, (b) recycle household garbage and other biodegradable wastes to make compost as an alternative resource to chemical fertilizers, (c) make efficient use of water and create means of recycling used water, (d) design simple technologies to process food and to preserve it (e.g. canning and bottling).

Fourth, there is need to develop community networks, e.g. community urban farming or urban market gardening on a cooperative basis. This will help to realize economies of scale. Community networks will facilitate the sharing of knowledge, promote participatory problem solving, and may help to diminish neighborhood conflicts.

Fifth, UA may result in health hazards, especially when food is grown in contaminated soils and polluted water is used for irrigation and washing of vegetables. Failure to remove wastes in time and efficiently may render UA unsustainable. Techniques should be developed to address potential health problems, control sanitation and maintain working sewerage systems; and removal of unwanted noisy and socially or religiously unwelcome animals. Where necessary, some quiet animals such as rabbits could be promoted more than others if communities agree to do so.

### **1.5. Areas where more research is needed**

As it can be observed from the foregoing in virtually all studies of UA in Eastern and Central Africa, broad areas have been covered, but still the following areas need more research:

- Intensive use of waste in UA. Composting is done on a small scale and there are no demonstration projects on-site or on-farm to show farmers how this can be done at low cost. Techniques must be developed to enable farmers to do this by themselves.
- Urban governments have concentrated on landfill as the major means of waste disposal. It is time city governments recycle waste by composting and integrating this with UA. More research is needed to design programs which will help citizens to safely separate waste into compostable and noncompostable materials. Studies must be carried out to find out how to design simple systems for home use to help household members separate toxic from nontoxic waste so that it is easy to compost the nonpolluted ones.
- The use of wastewater for irrigation in urban and peri-urban areas is virtually untouched in East and Central Africa. Most urban farmers use the same treated water for domestic and industrial use. Use of waste water for agriculture is done in Latin America and elsewhere. In East Africa and Central Africa we are yet to learn how to do this economically and safely.
- Methods of selecting crops and livestock to suit particular urban environments need to be developed. Animals are kept haphazardly. It is possible to legislate such that certain animals or crops may be grown in certain areas depending on soil characteristics as well as local agreements. Along with these are techniques of safe marketing, processing perishable foods and handling dairy products.
- In the peri-urban areas where more agriculture is expected to occur in the future, research is needed to design appropriate infrastructure: water distribution, well digging and maintenance, road construction as well as mini-shopping centers to enable farmers preserve and market their products in clean environments.

## **1.6. Interrelation with water, waste and disaster**

The interrelations are implied in the foregoing discussion. Freeman, as well as Maxwell and Zziwa have referred to this. Major obstacles involve conflicts in water usage, scarcity and pollution. Waste is equally an important input in UA but methods of handling it are lacking. As far as disaster is concerned, many urban farmers farm in flood plains which are prone to flooding. This entails loss of crops and energy should whole crops disappear with flooding. Disasters may also be connected with food contamination. Crops grown on dumps and along roadside may be polluted. Other disasters that may affect UA include: droughts and land degradation as well as crop pests. As for pests, it is possible to promote integrated pest management techniques and this is yet another area of research to be considered.

## **2. APPRAISAL OF RESEARCH CAPACITY**

### **2.1. Institutions potentially interested**

On the regional basis the following institutions are potential research centers which may develop networks to share and collaborate in UA studies:

#### **KENYA**

In Kenya, the Geography Department at Moi University is a potential partner.<sup>3</sup> The reason for mentioning Moi University is because in the department of Geography is Dr. Cleophas Lado who has interest in UA and is perhaps a potential researcher.

The Department of Geography, University of Nairobi is another potential research institution that might collaborate. In this department is Dr. Dustan Obara who has done some studies on UA.

An important research center is the Mazingira Institute whose motto is to support low-income groups and has experience in field research. More connections with the Mazingira Institute are needed and perhaps plans may be made to help in publishing since this NGO is well established and has personnel. Another NGO



organization is ACTS Press, which published Maxwell and Zziwa's monograph. This is a resourceful institution with the capacity to assess research, evaluate manuscripts and publish at low cost.

## TANZANIA

In Tanzania, a number of institutions are possible candidates for research in UA. One is the Department of Geography at the University of Dar es Salaam. In the Geography Department, there will be two Ph.D holders with interests in UA: Davis Mwamfupe and myself. Also interested is Mr. Cosmas H. Sokoni, a lecturer in geography with research interests in the informal sector.

The Geography Department has full-time cartographers and conducts field work each year with second and third-year students and this is a opportunity to involve some projects with UA. In addition, adjacent to the Geography Department is the Institute of Resource Assessment (IRA) with considerable experience in resource evaluation. The institute has vehicles for fieldwork, cartographic laboratory, remote sensing equipment and other mapping facilities which are useful in conducting certain technical assessments of soils, forest, water and the like. Besides, IRA has wide international readership of research monographs and this is a plus regarding dissemination of research findings. Also, the Director, Dr. Idris Kikula, is the Chairman of the National Environmental Council (an NGO) who undoubtedly would welcome research agendas which deal with the urban environment such as UA.

The Departments of Sociology and Economics may also be interested because UA research has economic and social elements which interest researchers in these fields. Apart from the University of Dar es Salaam, there is the Sokoine University of Agriculture where a major UA project was conducted. Since SUA specializes in agricultural sciences, there is no doubt that expertise will be forthcoming when networking in research facilities and personnel is called for. Two more institutions of interest are the Ardhi Institute in Dar es Salaam which specializes in urban planning in all aspects, and the Tengeru Agricultural Center in Arusha which has a long history of research in crops, yields, diseases and numerous other avenues.

## UGANDA

In Uganda, clearly the University of Makerere and the Makerere Institute of Social Research (MISR) are the two institutions that come to mind. The MISR has indicated that UA research should be taken seriously because of its potential to offer alternative, often invisible contributions to development.

### 2.2. Expertise potentially available

The list is not given in any order of priority. More information is needed to outline the research interests better:

- Dr. Cleophas Lado, Senior Lecturer, Geography Department, Moi University, P. O. 3900, Eldoret, Kenya.
- Dr. Ruth Onian'go, Urban Center for Research, P. O. Box 74165, Nairobi, Kenya.
- Professor Dunstan O. Obara, Dept. of Geography, University of Nairobi, P.O. Box 30197, Nairobi, Kenya.
- Dr. I. J. Lupanga, Senior Lecturer, Dept. of Agricultural Education and Extension, Sokoine University of Agriculture (SUA) Morogoro, Tanzania.
- Dr. Z. K. S. Mvena, Senior Lecturer, Dept. of Agricultural Education and Extension, Sokoine University of Agriculture.
- Mr. R. R. Mlozi, Lecturer, Dept. of Agricultural Education and Extension, SUA.
- Dr. Camillus J. Sawio, Lecturer, Dept. of Geography, University of Dar es Salaam, P.O Box 35049, Dar es Salaam, Tanzania.
- Mr. Davis Mwamfupe, Lecturer, Dept. of Geography, University of Dar es Salaam, P.O. Box 35049, Dar es Salaam, Tanzania.
- Mr. Cosmas H. Sokoni, Lecturer, Dept. of Geography, University of Dar es Salaam.
- Dr. Hussain Sosovele, Researcher, IRA, University of Dar es Salaam.
- Dr. Samuel Zziwa, Lecturer, Dept. of Agricultural Economics, Makerere, University.
- Mr. Daniel G. Maxwell, Ph.D Candidate, Development Studies Program, Land Tenure Center, University of Madison, Madison, Wisconsin, USA.
- Mr. Asaf Anyamba (from Kenya), doctoral student at the Graduate School of Geography, Clark University. Mr. Asaf has considerable knowledge in GIS

analysis and applications. He is a potential tutor in GIS and urban systems as well as a researcher in UA and urban management systems at the regional level.

### **3. FUTURE RESEARCH OPPORTUNITIES**

I suggest two research initiatives/projects that could be planned for a period of two to three years and to be carried out collaboratively among two or three institutions. I am only listing the potential aspects of the research projects I envisage, and hopeful more focused research proposal will be prepared:

#### **3.1. Title: Integrating waste and urban agriculture through on-site composting**

##### **Research problem:**

To date little has been done to link UA and waste management. In cities of Eastern and Central Africa, for example Dar es Salaam, the garbage collection facilities of the city council are congested but citizens have not been awakened to recycle domestic waste, market waste, farm waste by composting on the farm for own use or even for sale.

##### **Perceived benefits:**

- On-site composting will save time in trucking waste to landfills, will relieve the pressure on communal landfills, and will create incentives to sort garbage.
- Composted materials can be collected from lawns, hedge clippings from homes, from farms and market squares. This contributes to city cleanliness.
- Compost applied to farms saves money that would have bought chemical fertilizers.

##### **Project aspects/planning:**

- Institutions will urge farmers and urban communities to form several cooperatives interested in on-site composting.
- Educate people of the value and use of compost. This was done once in

- Tanzania, but it was never seriously implemented.
- Researchers will prepare booklets or seminars to inform users on the uses of compost (a) on individual farms (b) on communal farms if any, or (c) for sale to other farmers and to public for horticultural purposes.
  - In cities care will be taken to choose suitable sites away from houses to avoid odor and complaints.
  - Design composting equipment and strategies: bins, rotating drums, boxes on farm, use of tanks or other means as research will direct —techniques must be easy to manage and use by low-income farmers.
  - Researchers must indicate the sources of inputs and methods of turning them into compost to link with waste reduction in the city.
  - Estimate costs of composting per farm/individual/cooperative unit.
  - Trucks and loading equipment for small-scale composting on-site.
  - Dissemination of information from research centers and to farmers —design of newsletters, posters and other means of communication to help farmers benefit from the findings.
  - Assess the benefits to the principal beneficiaries (the urban farmers) of on-site composting.
  - Replicability of techniques (evaluation of technology transfer and planning issues).

### **3.2. Title: Evaluating types of urban agricultural systems.**

#### **Research problem:**

Within the emerging sector of UA, several farming systems can be identified, including: residential house farming in backyard or front yards also referred to as plot gardening; market gardening; peri-urban farming; roadside farming; flood plain or river valley farming; power rights-of-way farming; basement gardening, aquaculture; horticulture; livestock keeping - poultry farming, dairy farming, pig farming; container farming; hydroponic and so on. These systems, within the urban ecosystem approach have not been evaluated.

#### **Research approach:**

Because of lack of any evaluation criteria vis-a-vis these systems research will be designed to assess (a) the potential productivity level of each; (b) the

appropriate location of such activities within the urban environment; (c) impacts of such systems on overall social, economic and livability of the urban habitat; and (d) how to support and integrate these systems in urban planning and management policies.

**Objectives:**

(a) list and document for specific cities/towns the urban farming system in practice;

(b) assess the connection between these systems and environmental problems, nutritional improvement, and location of other land uses in the city;

(c) document the direct beneficiaries of the systems;

(d) monitor production capacities of each systems per unit of land used or costs involved, including time spent in farming;

(e) assess social and economic aspects of the system: e.g. what is the relative importance of container gardening to roadside farming? Or how good is backyard farming compared with valley farming or peri-urban farming?

NB. I hope somewhere it is possible to design research projects to evaluate these systems collectively and learn from what citizens do, much of which is undocumented and goes unnoticed.

## NOTES

1. In developed countries see for example: Lockeretz, 1987, 1988; Bryant, 1986; Furusest and Pierce, 1982; Lawrence, 1988; Deelstra, 1987. In the developing countries, examples abound: Thaman, 1977; Sanyal, 1984; Wade, 1986, 1987; Lee-Smith et al., 1987; O'Connor, 1983; Yeung, 1987; Rakodi, 1988; Mazambani, 1982; Drakakis-Smith, 1990; Briggs, 1991; Ngwa Nebasina, 1987; Mosha, 1991; Mvena et al., 1991; Freeman, 1991; Maxwell and Zziwa, 1992 to mention a few.
2. Often it is believed that there is not enough land in cities to carry out urban farming. But available data indicates that many cities in the world—in both advanced and developing countries— have large amounts of vacant and underutilized land. Some of the evidence is as follows: Greater Bombay has some 200 Km<sup>2</sup> of vacant land (McAustin, 1985); Bangkok, Thailand has 338Km<sup>2</sup> of vacant land (Tanphiphat, 1981); Metro Manila has an estimated 203 Km<sup>2</sup> of vacant urban land (Mendiola, 1981); in Sao Paulo, Brazil vacant land has been recorded at 600Km<sup>2</sup> (Sachs, 1984); in Karachi, it was reported that in the Development Plan for the period 1974-85 "over [sic] 12,000 acres of land (about 4.850 ha) sufficient to accommodate 1.2 million people at the current residential density of 100 persons per acre (around 250 persons per ha) lie unutilized at the heart of the city and in other parts of the built-up area, with public utilities and roads still being extended expensively into outlying areas in response to pressures that are primarily speculative" (Van de Linden Jan "Squatting by organized invasion — a new reply to failing housing policy" *Third World Planning Review*, No. 4, Nov. 1982, cited by J. E. Hardoy and D. Satterthwaite, 1989, *Squatter Citizen*, p. 101.
3. Address: Moi University, P. O. 3900, Eldoret, Kenya

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### **Appendix I Location Types of sampled Plots**

<b>Type of Location</b>	<b>No. Interviewed</b>	<b>Per Centage (%)</b>
Roadside	176	28.5
Riverside	100	16.2
Park	8	1.3
Other public land	90	14.6
Private residential	195	31.6
Industrial	9	1.5
Railside	20	3.2
Other	20	3.2

Source: Freeman, 1991:132, Table 8.

## Appendix II A TYPOLOGY OF UA IMPEDIMENTS

