

**FARMING IN THE CITY: PARTICIPATORY APPRAISAL
OF URBAN AND PERI-URBAN AGRICULTURE IN KAMPALA, UGANDA**

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ACRONYMS

BAGACO	-	Banda Garbage Collectors
BUCADEF	-	Buganda Cultural and Development Foundation
CBO	-	Community Based Organisation
CGIAR	-	Consultative Group for International Agricultural Research
CIAT	-	International Centre for Tropical Agriculture
CIDA	-	Canadian International Development Agency
CIP	-	International Potato Centre
ECABREN	-	Eastern and Central Africa Bean Research Network
ICRAF	-	International Centre for Research on Agroforestry
IITA	-	International Institute for Tropical Agriculture
INIBAP	-	International Network for the Improvement of Banana and Plantain
KCC	-	Kampala City Council
LC	-	Local Council
NARO	-	National Agricultural Research Organisation
NGO	-	Non Governmental Organisation
NWSC	-	National Water and Sewerage Corporation
PABRA	-	Pan-Africa Bean Research Alliance
PUA	-	Participatory Urban Appraisal
SABRN	-	Southern Africa Bean Research Network
SADC	-	Southern Africa Development Conference
SDC	-	Swiss Development Cooperation
SIUPA	-	Strategic Initiative on Urban and Peri-Urban Agriculture
TSBF	-	Tropical Soil Biology and Fertility
UNFA	-	Uganda National Farmers' Association
UPA	-	Urban and Peri-urban Agriculture
UPE	-	Universal Primary Education
USAID	-	United States Agency for International Development
USAIP	-	Urban Schools Agricultural Initiative Project
WOTODEV	-	Women Together for Development

PREFACE

This report, the product of many people and institutions working together under the umbrella of the CGIAR's Urban Harvest (formerly SIUPA), which is coordinated globally by our sister institution the International Potato Centre (CIP). Here we document a series of participatory appraisals of agriculture in and around one of East Africa's main cities. Information is disaggregated according to the city's prevailing four categories of urban and peri-urban agricultural system as well as – most importantly -- by wealth rank of respondents and to some extent for gender issues. Much indigenous knowledge is evident in the ways in which perceived production and marketing problems are addressed by some -- as well as the apparent isolation of these urban and peri-urban farmers from the knowledge and seeds now widely available from the formal research and extension sector to their rural counterparts in the same country. These participatory appraisals led into a subsequent series of in-depth studies that will be reported separately.

This Occasional Papers series includes bibliographies, research reports and network discussion papers. These publications are complemented by two associated series: Workshop Proceedings and Reprints. This series of publications serves to disseminate research information from activities in which CIAT and its partners are involved in Africa, including the work of two sub-regional networks of national programs: the Eastern and Central Africa Bean Research Network (ECABREN) and the Southern Africa Bean Research Network (SABRN) for southern Africa.

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1. INTRODUCTION

Urban agriculture is widely practiced both within the municipal boundaries and peri-urban areas of Kampala, Uganda's capital city. To assist local authorities, policy makers, NGOs and researchers to promote and make informed decisions and interventions in this sector, there is need to systematically document all aspects of urban and peri-urban agriculture (UPA). The Urban Harvest (formerly SIUPA), a system-wide initiative of the Future Harvest Centers of the CGIAR, convened by the International Potato Center (CIP) since 1999, supports research and development activities on UPA in three African cities: Kampala (Uganda), Yaounde (Cameroon) and Nairobi (Kenya). The Uganda project, entitled "Urban Harvest in Kampala" (formerly SIUPA-K), focuses on two broad themes: characterization and diagnosis of urban farming systems and technical interventions to support UPA implemented through the following sub-projects:

- Investigation of livelihoods and production systems in urban and peri-urban agriculture in Kampala;
- Assessment of market opportunities for urban farmers;
- Dissemination of technical interventions to support UPA through schools (henceforth referred to as USAIP – the Urban Schools Agricultural Initiative Project).

Urban Harvest in Kampala (formerly SIUPA-K) brings together 9 institutions and the team consists of research and development professionals representing various disciplines (see appendix 4). The institutions involved include:

Governmental organisations:

- Kampala City Council (KCC)
- Makerere University (Department of Agricultural Extension/Education)
- National Agricultural Research Organization (NARO)

Four Future Harvest Centers:

- International Center for Tropical Agriculture (CIAT) – coordinator of Urban Harvest in Kampala (formerly SIUPA-K)
- International Network for the Improvement of Banana and Plantain (INIBAP)
- International Potato Center (CIP)
- International Institute for Tropical Agriculture (IITA)

Non-governmental organizations:

- Environmental Alert
- Plan International.

Urban Harvest (formerly SIUPA)-Kampala is closely affiliated with another project, "An investigation into the impact of urban agriculture on health". The health project operates in some Urban Harvest in Kampala (formerly SIUPA-K) sites but has additional sites.

A two stage methodology was used in all three sub-projects. This involved a participatory urban appraisal (PUA) followed by more detailed studies using both qualitative and quantitative methods. The PUA had three objectives: to introduce study communities and local authorities to the Urban Harvest in Kampala (formerly SIUPA-K) Project, collect information on the situation of UPA and, in the case of the schools project, identify what

technologies the communities are interested in. This report presents the results of PUA conducted in 4 sites where the production systems, livelihoods and market opportunity studies operate and in 3 sites where USAIP operates.

1.1 Methodology

1.1.1 Site selection

The main criterion used to select sites for the production systems, livelihoods and market opportunities studies was farming style, as defined by the history of UPA, population density and land availability. Kampala City Council (KCC) uses a classification of farming styles which identifies 4 categories: urban old, urban new, peri-urban to urban transition and peri-urban (Table 1).

Table 1: Description of KCC urban agriculture classification system

Criteria	Urban, old	Urban, new	Peri-urban to urban transition	Peri-urban
Average population density (persons/km ²)	124	49	11	8
Prevalence of crop production	Low	Low	Medium	High
Prevalence of local livestock	Low	Low	Low	High
Prevalence of improved livestock	Medium	High	High	Low
Land availability	Limited	Limited	Moderate	Very good

To get a broad overview of UPA activities in Kampala, it was important to include a site from the four UPA categories of KCC. The unit of analysis is the parish, a large area consisting typically of several villages (LC 1). Seven criteria were used to select study parishes for the production systems, livelihoods and market opportunities studies: presence of crop/livestock production, presence of (or proximity to) a school participating in USAIP, presence of market oriented farmers, proximity to a farmers' market, previous studies conducted, interest of local authorities and presence of health and environmental hazards. The four parishes selected were: Bukesa, Banda, Buziga and Komamboga. Rubaga was the only division excluded. Table 2 shows a description of the study areas and the rationale for their selection. Banda replaced the original site of Naguru, which was dropped due to lack of interest on the part of local authorities.

Table 2. Description of study sites

	Bukesa Parish	Banda Parish	Buziga Parish	Komamboga
Division	Central	Nakawa	Makindye	Kawempe
Classification	Urban, old	Urban, new	Peri-urban to urban transition	Peri-urban
Population (2000 projection)	11,180	14,420	8,710	4,450
Access to land	Limited	Moderate	Good	Very good
Rationale for selection	Inner city, not suitable for UPA	An area undergoing rapid urbanization	USAIP site, presence of collaborating NGO	Near USAIP site, many market oriented farmers, organized women's groups, site for health project
Date of PUA	24 Oct 2002	19 Nov 2002	22 Oct 2002	2 Nov 2002
Number of PUA respondents (women/men)	74 (32/42)	51 (26/25)	40 (25/15)	26 (11/15)

1.1.2 Methods employed

In each site, PUAs were conducted over a 2-3 hour period with farmers drawn from all over the parish and mobilized by local officials. A plenary session to introduce the project and generate general information on the community was followed by group sessions. Specialist team members facilitated group sessions, and covered the following topics in relation to urban agriculture: livelihoods, crop production systems, livestock production, market opportunities and health and environment. Group members reported back to a final plenary session. Besides brainstorming and discussion, participatory tools included identification of wealth indicators using the "bean game", problem tree analysis, diagramming, simple ranking and pairwise ranking. All PUAs were conducted in Luganda, the dominant language in Kampala.

1.2 Report outline

The report is organized to reflect the specificity of each study location and to emphasize cross-site comparisons. The following section provides an overview of urban agriculture and its contribution to livelihoods by examining farmers' assessment of wealth and wellbeing and analysing the causes of poverty in their communities. Sections 2-5 report on results from each parish. The major topics reported are ethnicity, social interaction and mobility, agricultural activities, marketing and the health and environmental impacts of urban agriculture. Section 6 provides cross-site comparisons and suggestions for more detail investigations. Section 7 reports community needs assessments conducted by schools and investigations of seed demand.

1.3 Urban agriculture and livelihoods

People in the study parishes engage in urban agriculture for various reasons, including:

- Provision of food for household use, which contributes to better nutrition (all parishes)
- Provision of income (all parishes)
- Saves money that would have been used to buy food (Bukesa)
- Maintains cleanliness by clearing bush (Banda)
- Provides access to local herbs (Banda and Bukesa)
- If done properly, UPA helps to conserve the soil and protect the environment (Banda)

Crop production is carried out in such locations as backyards and home compounds (Buziga, Bukesa and Banda), small gardens in plots near homes (Buziga, Bukesa and Banda), plots in the wetlands (all parishes), large plots of land (*bibanja*) near or at a distance from farmers' homes (Buziga and Komamboga), or on roadsides and in tins, sacks or polythene bags (Bukesa and Banda). Livestock production systems include zero grazing and tethering in home compounds, and keeping poultry in cages on verandas, poultry units and free range.

There was clear gender and wealth differentiation in UPA activities in the study parishes. In Buziga, women are mainly involved in farming, while men engage in various forms of employment. In that parish, relatively few youth are involved in farming, preferring to do casual work such as brick making, stone quarrying or fishing. PUA participants in Bukesa noted that due to land scarcity, commercial urban farming is dominated by the very rich and rich who have sufficient land and space for raising exotic cattle and poultry for commercial purposes and growing crops such as *matoke* (highland cooking banana, a staple food in Uganda). In this parish, poor farmers mainly cultivate cocoyams, maize, and cassava along roadsides, in back yards, swamps and anywhere they can find land to rent. Farmers in Bukesa disagreed over whether women were the main poultry producers. In Komamboga, women are the main farmers, while men are mostly involved in the marketing of farm produce. In Banda, women are more involved in UPA than men. Better off households are mainly involved in livestock rearing for income and grow crops for home consumption. By contrast, poor farmers grow food for consumption but are often forced to sell it.

1.4 Local assessment of wealth and well-being

Participants in the four PUA exercises identified the following wealth indicators:

- Occupation
- Income level
- Educational level
- Type of housing arrangement (own, rented)
- Assets, e.g. cars, land, businesses
- Type of school that children attend
- Health status
- Type of health care system used
- Quality of meals/nutritional status
- UPA enterprises and objectives

Farmers in all four parishes identified four wealth groups which were referred to in Luganda as: very rich (*abagaga enyo*), rich (*abagaga*), poor (*abaavu*), and very poor (*abaavu enyo*). The indicators associated with each wealth group are indicated in Appendix 1.

Wealth classification conducted during the PUA exercise suggests the virtual absence of a middle class. In all parishes except Banda (where the very poor were the majority), the poor constitute the largest group, followed by the rich, which suggests that these two groups can be further subdivided (Table 3). During the next phase of the livelihoods study more detailed attention will be paid to wealth classification. Bukesa and Buziga have a significant number of wealthy households, some of whom are expatriates or non-local people.

Table 3. Relative size of wealth groups by parish

Parish	Very rich	Rich	Poor	Very poor
Bukesa	3	2	1	4
Banda	4	3	2	1
Buziga	3	2	1	4
Komamboga	4	2	1	3

Note: 1=the largest group; 4=the smallest group

Causes of poverty in the study areas are many and varied in nature. Factors mentioned in all four parishes, in order of importance, were; unemployment, diseases and illness, general ignorance, alcoholism, low levels of education and laziness. Other factors mentioned in one or two parishes include: low income which inhibits savings, large family size and a high dependency ratio, high educational costs, low prices for farm produce, spending money in non-productive avenues and at a high rate, peer pressure to behave in a non productive or creative way, loss of property or money through theft, embezzlement or wars, non-payment of salaries/wages, low capital or static businesses, sale of assets like land/household property and the absence of small scale industries which could offer employment and markets for UPA products. Poverty results in numerous societal problems including the proliferation of theft, promiscuity and prostitution, alcoholism, marital dissolution, illness, malnutrition, high school attrition rates, and poor quality of life especially for the youth.

2. BUKESA PARISH – “URBAN OLD”

2.1 Ethnicity, social interaction and mobility

At least 16 ethnic groups were represented in Bukesa Parish. The major groups in order of predominance were; Baganda, Batooro, Banyankole, Bafumbira and Banyarwanda (Rwandese).

People from different wealth groups interact on the basis of employment (of the poor by the rich), socially e.g. at church and through trade (e.g. rich buy commodities from kiosks owned by the poor). Downward mobility is a common experience across wealth groups. People from the very rich group drop to the poor group mainly because of business failure caused by mismanagement, theft of funds and illness of the owner (often HIV/AIDS) or of family

members, which means the owner has to take care of the sick person. Another major cause for downward mobility by this group is job loss.

Major factors contributing to upward mobility by the poor and very poor are hard work and change of life style e.g by becoming born again Christians. Upward social mobility is common in this parish particularly among drug users, many of who are educated, who decide to change their lifestyle.

2.2 Agricultural activities

Farmers in Bukesa were engaged in 21 major agricultural enterprises, namely:

- Crops: Maize, beans, sweetpotato, fruits, mushrooms, bananas (*matoke* and dessert), cassava, cocoyam, indigenous and exotic vegetables and coffee.
- Livestock: chickens, goats, cattle, rabbits, ducks and pigs.
- Others: medicinal herbs, flowers and trees.

Poultry rearing was the most widely practiced agricultural activity in Bukesa Parish and was also the most important source of agricultural income (Table 4). A large number of farmers grow *matoke*, maize and beans for home consumption. Flowers (roses, carnation, etc) are grown as an income generating activity and for home use. Although the main income earning agricultural activities are poultry, cattle rearing and growing mushrooms, with the exception of chickens relatively few farmers are involved in these enterprises. Cocoyam and fruits are the only enterprises that are important for both food security and income generation.

Table 4. Ranking of agricultural enterprises by number of people involved and importance for food security and income in Bukesa Parish

Enterprise	Number of households	Food security	Income generation
Chickens	1		1
Cattle			2
Mushroom			3
Banana ^a	2	2	
Maize	4	3	
Beans	4	3	
Cocoyam ^b		5	5
Flowers	3		
Fruits	6	1	4

1=most important 6= least important

^a Highland cooking banana (*matoke*); ^b *Colocasia esculenta* and *Xanthosoma spp.* (*mayuni* in Luganda).

Farmers identified six institutions that support UPA activities and promote environmental education: UNFA, Ugachick, Kadicoba, Bukesa Urban Farmers, BUCADEF and Nsalo Zone Women Development Association.

2.3 Crop and livestock production, constraints and management strategies

(i) *Matoke*

The major constraints mentioned in *matoke* production are pests and diseases, soil pollution and insufficient land. Farmers attempt to control pests by using botanicals (hot pepper, ash, tobacco) and to reduce soil pollution by hand picking up of polythene bags and other garbage. Other constraints include wind damage, soil erosion and air pollution from waste dumping sites which farmers believe scorch banana leaves.

Farmers harvest *matoke* at maturity or just before maturity. Depending on family size, a bunch of about 15 kg is consumed in 1-3 days. The major post harvest problems are theft and, for *matoke*, simultaneous ripening during bumper harvests which results in loss as *matoke* is eaten green.

(ii) *Flowers*

Lack of knowledge about production methods, pests and diseases and insufficient land are the top three constraints affecting flower production. Minor problems include lack of capital to purchase inputs, lack of water and insufficient markets. Farmers cope with land shortage by planting the flowers in pots, polythene bags, sacks, and old plastic containers.

At maturity, open flowers are cut from mother plants using knives. These are put in vessels and sold or brought to churches. Some farmers store flowers in the containers of water for 5 to 30 days. Farmers complained about the lack of storage facilities and short shelf life of flowers.

(iii) *Beans*

Farmers face three major production constraints in order of importance: pests and diseases (no specific information was obtained), lack of knowledge about agronomic practices (e.g. proper spacing and planting methods) and poor soil fertility. Farmers did not mention any post-harvest problems. [Note: Bean production in Kampala is the subject of a separate and more detailed study¹]

(iv) *Maize*

The three main production constraints, in order of importance, were pests (e.g. maize stem borer, armyworms, birds), lack of knowledge generally about maize production and low soil fertility. Others include weeds, drought and lodging caused by wind. To control pests, enhance quick establishment and vigour, farmers pre-soak seed, apply ash or use pesticide. Some farmers use manure to improve soil fertility. Farmers mainly harvest the maize green. Theft was a major problem.

¹ S. David (2003), Growing beans in the city: a case study of Kampala, Uganda. CIAT Africa Occasional Publications Series, No 39. CIAT.

(v) Poultry production

Farmers keep both local and exotic chickens in numbers ranging between about 10 and 12 for locals and 100 to 200 for the exotic strains. Farmers purchase exotic breeds as day old chicks from poultry companies (Ugachick, Pakwach and Kalisizo). Common feeds include maize bran, weeds and food leftovers. Local birds, especially when kept in small numbers, are fed by free ranging in the compounds, while other farmers use a semi-intensive system in which birds are kept indoors but allowed to free range for a limited period. Some farmers keep their chickens in coops, while others keep them indoors.

The major production constraints reported are: unavailability of feeds, excessive water run-off, lack of market, rats, kites which prey on chicks, cannibalism, limited space which reduces the number kept and theft. Farmers mentioned three main diseases and pests: Newcastle disease, which affects both locals and exotic breeds, mites (*bulolo*) in local types, and influenza or cough. Farmers use hot pepper, tobacco and aspirin for disease control.

(vii) Dairy production

Cattle owners have local, cross and exotic breeds. Farmers keep only 2-3 cows obtained locally from other farmers. Cows are fed with elephant grass, banana peelings, sweetpotato vines, banana pseudo-stems and maize bran. Some cows are tethered, while others are left to feed as they roam around along the roadsides. Some farmers keep their cows in zero grazing units.

The major dairy production constraints are poor veterinary services, expensive drugs, shortage and high cost of feeds, especially during the dry season.

2.4 Marketing

The enterprises discussed in Bukesa Parish were: poultry, dairy cattle, mushrooms, fruits and leafy green vegetables.

(i) Poultry

Farmers sell broilers at 6-8 weeks; beyond 8 weeks, the farmer begins to register losses. Average weight is 1.5 kg per carcass. Most birds are sold live. Occasionally birds are dressed upon request; however, this service is offered at no additional cost. A lucky farmer is able to sell all his/her stock at once. The price for broilers ranges between Ush². 2,500 – 3,500.. The main sales problem experienced by farmers is the inconsistent market.

Hens are sold mainly to street food vendors who roast chicken at the roadside and in bars, and occasionally to market vendors and restaurants. Some buyers are retailers who sell elsewhere. Farmers sometimes source for buyers who come to purchase chickens at the farm gate. A few farmers take chickens to major markets like Nakasero Market. The most common means of transporting chicken is by motorbikes and bicycles.

² The exchange rate at the time of the PUA was approximately US\$ 1.00 = Ush 1950 (Oct. & Nov.) 2002 dollar rate

Farmers in Bukesa expressed the need for more knowledge and skills in poultry management, access to credit for increasing their scale of operation and organize themselves into marketing groups.

(ii) Milk

Information on this enterprise was scanty as only one dairy farmer was present. Fresh milk is sold locally. A ready market exists for milk -- all that is produced is sold. A litre of milk sells for Ush. 600.

(iii) Mushrooms

Mushroom growing is very popular with women who attach importance to the nutritive value and healing power of mushrooms. This enterprise is seen as a viable income generating activity for poor households. The women mushroom producers in Bukesa are organized in groups by two NGOs (BUCADEF and UNFA). Through the groups, farmers acquire knowledge and skills and share information; however, marketing is not done through the groups.

Mushrooms take one month to mature and, on average, farmers sell 50 kg of fresh mushrooms per harvest at Ush. 3,000 per kg. Mushrooms are sold fresh, right after harvest. They are only dried if the farmers fail to sell them fresh. A few farmers process mushrooms into soup.

Farmers sell mushrooms to neighbors, markets such as Nakasero, supermarkets and retailers who sell them to other people/firms. Mushrooms are transported by public transport (taxi) and *boda boda* (hired bicycles or motorcycles). A specific buyer/promoter from Nsambya was mentioned (probably the same lady mentioned by farmers in Buziga). This promoter at times assists farmers to acquire seed and knowledge, and purchases the produce from them. However, she was said not to be reliable in terms of making payments.

Suggestions for improving mushroom production include developing a market strategy for producers to market as a group, and encouraging the involvement of more farmers so as to increase marketable output.

(iv) Fruits

The common fruits in Bukesa are jackfruit, mango, papaya and avocado. The fruit trees were found in the area and none were planted by present residents. It was difficult to determine actual quantities sold as they vary from one farmer to another. Farmers typically sell 1 to 5 tins (of 10 kg each) of avocado or mango, depending on the season. They typically sell 5 to 15 whole papaya or jackfruit. Mangoes and avocado sell for Ush. 50-100 each, while jackfruit and papaya sell for Ush. 500-1,000 each. A jackfruit sold in pieces fetches Ush. 1,000–1,700. Fruits are sold fresh, without processing or value adding other than some retailers chopping and selling in small pieces. Farmers source for buyers, mainly roadside traders and retailers who sell elsewhere.

(v) Leafy green vegetables

A few farmers grew greens for sale, namely, *sukuma wiki* (kale), cabbage, amaranthus spp. (*dodo*) and *nakati* (an indigenous leafy green vegetable). The two farmers who grew greens

reported selling 200-500 bundles weekly at the price of Ush. 100-200 per bundle, depending on the place of sale. Farmers sell greens to neighbors, retailers and nearby schools. Neighbors and retailers buy directly from the farm, while farmers take the produce to schools. Farmers noted that greens are a viable enterprise if land is available, because there is always a ready market.

2.5 Health and environmental impacts

Most households in the parish have access to piped water provided by NWSC. Others obtained water from a protected well. A few people collected water from plastic pipes originating from a residential premise, which was suspected to be contaminated. The parish is supplied with KCC waste containers. Households collect household waste in dustbins and dispose of it in KCC containers. Some people sort their garbage, separating organic waste from plastics and polythene bags, which they burn. Farmers use organic wastes from vegetable matter, animal and poultry waste as manure. However, some cattle keepers who do not have gardens dispose of cow dung by burning it. There were no fishponds in Bukesa Parish.

Most households had latrines and only a few households (mainly the rich) were connected to the municipal sewage system. People in houses without latrines resort to using polythene bags as toilets; these are disposed of in the KCC's bulk containers.

Farmers identified three farming constraints that have negative health and environmental effects (Table 5). The one industry in the parish, a fish factory processing swim bladders of Nile perch for export, produced offensive odours that affect the community, and especially students of Kampala High School. The factory also releases wastewater into a wetland.

Table 5. Farming constraints, coping strategies and resulting health and environmental impacts in Bukesa Parish

Constraint	Coping strategies	Health and environmental impacts
Lack of space for farming activities	Farmers chose activities that require little space (e.g. zero grazing, poultry keeping, mushroom growing)	Poor families prone to malnutrition
Shortage of land for food crops	Farmers grow food crops in compounds and wetlands	Increased prevalence of malaria Risk of contamination of food crops grown in wetlands from pollutants discharged there
Rampant theft of crops and livestock	Farmers share accommodation with animals	Risk of contracting infectious diseases from livestock

As Bukesa Parish is mainly a residential area with almost no industries, people have no fear of exposure to environmental hazards. However, there is a high likelihood of exposure to pathogenic infections from human waste disposal and livestock infections.

3. BANDA PARISH – “URBAN NEW”

3.1 Ethnicity, social interaction and mobility

Banda’s population is ethnically highly heterogeneous, with at least 20 ethnic groups represented. The main ethnic groups are, in order of predominance, the Baganda, Luo (Acholi and Langi), Ateso, Bagisu and Banyakitara (i.e., Banyankole, Bakiga, Banyoro, and Batooro). Some foreigners (Congolese, Tanzanian and European/Americans) also live in the area.

Moving up from the very poor group to the very rich group is possible and occurs through inheritance of land, investing in business after selling land or using land as collateral for securing bank loans, and among domestic workers for the rich and very rich who are able to save and invest in small businesses. Sensitization seminars have played an important role in giving people ideas about household/individual development. Downward mobility among the very rich occurs as a result of failure to pay bank loans (leading to confiscation of property), men getting involved with many women lovers, alcoholism, failure to save money, and having unfaithful friends, or lacking someone able to guide them to develop themselves.

The poor and very poor interact with the rich and very rich as domestic workers and in casual jobs such as digging pit latrines and graves. People from the higher wealth groups also purchase food from market vendors and kiosk operators. Social interaction is limited to drinking places whereby the very rich easily mix with the poor and very poor when drinking local brew (*malwa*). Relations between the rich and very rich are closer, with the latter obtaining loans from the former.

3.2 Agricultural activities

At least 23 different agricultural activities were being carried out in Banda:

- Crops: Cocoyam, sweetpotato, cassava, beans, maize, indigneous vegetables (e.g. amaranthus spp, solanum spp.), sugar cane, matoke bananas , tomatoes, fruits (mango, jackfruits, avacado, etc.) mushrooms, groundnuts and sugar cane.
- Livestock: Poultry, cattle, pigs, goats, rabbits, ducks, fish, turkeys and pigeons.

High population density and the lack of land for farming are important determinants of the types of crops being cultivated. The majority of farmers grow cocoyams in the wetlands -- mainly for income, but also for food security (Table 6). Cassava, green vegetables and bananas are the other widely grown crops. Of these, only green vegetables and bananas have high importance for food security. Other major crops grown for food security are beans, maize and bananas in order of importance. Poultry ranks second as an income generating activity and is the second most common agricultural enterprise. Other main income earners are cattle, green vegetables and pigs. Cocoyams and green vegetables are the only enterprises which are widely practiced to meet both income and food security objectives.

Table 6. Ranking of agricultural activities by number of households involved, importance for food security and income in Banda Parish

Enterprise	Number of households	Food security	Income generation
Cocoyam	1	2	1
Cassava	3		
Green vegetables	4	1	4
Beans		3	
Maize		4	
Bananas	5	5	
Cattle			3
Pigs			5
Poultry	2		2

1=most important 6= least important

Five institutions provide support to UPA in Banda Parish: Living Earth, CEWEA, Banda Community Development Program, Banda Garbage Collectors and Banda Community Environment Initiative.

3.3 Crop and livestock production, constraints and management strategies

(i) Cocoyam

Farmers identified three types of cocoyams according to where they are grown and their taste. The first type is cocoyams produced in areas near sewage channels that taste terrible. The second type is cocoyams produced in areas where erosion water and its transported materials have sedimented. Most of this runoff passes through toilets in highly populated settlements in the area and carries a lot of toilet wastes into the wetlands. The cocoyams produced in these areas also taste bad, but not as bad as the first type. The third type is cocoyams produced in dark clay drained soils; these are tasty and floury/starchy when cooked.

Cocoyams are harvested using a *panga* to uproot the tuber. The lower section is cut off and kept as seed. When harvesting for home consumption, farmers only harvest enough for a meal, thereby avoiding the problem of post-harvest rotting. Cocoyams are seldom stored but, where they are, storage is for no longer than 2 days. Cocoyams are cleaned of soil immediately after harvest to avoid their developing a poor taste. Peeling or washing cocoyams causes skin itching which can be avoided by covering hands with petroleum jelly or by wearing a polythene bag. Cocoyams are mainly consumed fresh (steamed) as a substitute for bread or mixed with beans (*katogo*).

The major cocoyam production constraint is a highly destructive weevil-like pest that burrows through the tuber. In order to control this pest, farmers select seed from uninfected plants in the fields and store for at least two weeks -- because within that time the affected seed will have rotten or shown symptoms of infection. Timely harvesting is another practice used by farmers to reduce pest damage as they observe greater damage when harvesting is delayed (which allows the pest to multiply and infest the seed). The second constraint to cocoyam production is millipedes. Farmers appear to have no control methods. Another problem is the poor taste of cocoyams grown around sewage channels and areas with erosion sedimentation. Farmers have resorted to using these places for growing other crops (e.g. cassava and maize)

which do not develop a bad taste when grown in those areas. Farmers also complain of high theft incidence when the crop is still in the garden.

(ii) Cassava

Farmers harvest cassava piece meal. Harvested cassava roots are stored in a pit for 2-3 days. Preparation methods include boiling fresh tubers, fried chips and flour made into a paste.

African cassava mosaic virus is the most serious constraint, especially during the rain season. Farmers are doing nothing to avert the effects of this problem. The other main problems are poor quality varieties that produce bitter, fibrous tubers -- and insufficient land. Some farmers plant cassava on small patches left between developed plots, or rent land elsewhere.

(iii) Vegetables

The most commonly grown vegetables are cabbage, spinach, eggplant, garden eggs (*Solanum eathopicum* Lam.; *ntula*) and amaranthus spp (*dodo*). Leafy vegetables are harvested by plucking tender shoots and leaves. These are exposed to sunshine for a short time to allow field insects to escape and then are sorted by removing damaged and old leaves. The remaining leaves and shoots are then washed, sliced and cooked. Farmers find it difficult to store green vegetables. Theft of vegetables is another problem.

The main production constraints of local vegetables are insect pests which damage leaves and limited land for expansion (also related to poor soil fertility on available land). To control insect pests, farmers use biological concoctions (mixed ash, tobacco leaves, water, onion leaves). Due to lack of land, some farmers grow vegetables in empty sugar sacks. Farmers mix stones with the soil put into the bags to ensure good drainage and root aeration, and animal manure to improve soil fertility. Some farmers grow vegetables in areas where trash is burnt.

(iv) Poultry

Farmers keep both local and exotic chicken. Typically farmers keep small numbers (3 or 4) of local birds and large numbers of exotic birds (100-200). The exotic breeds are normally purchased as day-old chicks from hatcheries or their agents such as Butenga, farmers in Kireka or Ugachick Poultry breeders.

Farmers try several sources for feeding their flocks, especially those keeping many birds. Some mix feeds on their own, while others buy from supply shops. Farmers who own a few local birds often allow them to range freely. Typically, farmers build houses for broilers or keep their birds in their houses.

The main production constraints are expensive feeds and drugs, lack of market for broilers, spread of diseases by buyers because they enter the poultry house, theft, and malpractices by suppliers -- such as adulterated feeds or supplying cocks instead of broiler chicks. The major pests are Newcastle disease for both locals and exotics, and mites (*bulolo*) in locals. For these diseases, local birds are normally given marijuana (*enjaga*), panadol, tetracycline and hot pepper. For exotics, farmers purchase drugs from supply shops in town. They also get veterinary services from the same supply shops where they buy chicks.

(v) Dairy

More than 95 per cent of cows were estimated to be Friesian, while the rest are crossbreeds. Farmers typically keep few animals, normally around three or four, and acquire them locally from fellow progressive dairy farmers.

Farmers use various feeds but largely depend on locally available materials such as banana peelings, elephant grass, dairy meal and brewing residues. Farmers also provide their cattle with mineral licks. Cattle are kept in zero grazing constructed sheds.

The main production constraints are: expensive drugs, shortage of feed especially during the dry season, the high cost of feeding, the problem of waste disposal especially during the rainy season, and high exposure of dairy cattle to polythene which can cause death.

(vi) Pigs

Farmers mainly keep local breeds obtained locally from other farmers. On average, farmers have 10 pigs. Farmers keep pigs in pigsties and feed them on human food leftovers, barley from breweries, maize bran and sweetpotato vines.

The main production constraints are difficulties in keeping pigs clean (which causes air pollution) and unavailability of feeds. Pigs require high cleanliness standards in order to curb the stench. Waste disposal is also problematic and there are complaints of air pollution in the neighborhood. Lack of space is also a problem. The main pests and diseases in pigs are worms, swine fever and lice. Farmers use dewormers, and old engine oil to control lice.

3.4 Marketing

The enterprises discussed were cocoyam, poultry, dairy cattle, leafy vegetables and pigs.

(i) Cocoyam

Cocoyam production is the most lucrative business in this parish. The commodity is sold from farmers' homes to neighbors, but some sell the crop in local markets. A cocoyam tuber weighing about 2 kg fetches Ush. 1,000. The commodity is mostly consumed in the evening and is mainly purchased already cooked from food markets (commonly called "*toninyira*").

(ii) Poultry

Exotic birds are usually sold to roadside pub chicken roasters and to restaurants within the area. The price offered to the farmer ranges between Ush. 3,000-3,500 per bird, depending on its size. Local birds are sold for Ush. 6,000 -7,000 per mature male bird and Ush. 2,500-3,000 for mature females. The price of eggs ranges between Ush. 2,500-2,700 per tray of 25 eggs. Farmers expressed the need for training especially in the area of animal husbandry practices and proper feeds formulation. In addition, extension services need to be strengthened. There is a good market potential in the area because there is an educational institution nearby which consumes 500 birds per week.

(iii) Vegetables

Vegetables have a ready market and are important for food security.

(iv) Dairy

Milk is sold within the neighborhood to individual households. At times it is sold to bicycle traders who sell it locally. The price of milk is Ush. 600/litre. Farmers call for training on animal husbandry practices.

(v) Pigs

Households that rear pigs sell pork to butcheries and to neighbors for domestic consumption. The price of pork is Ush.1,500 per kilo when sold wholesale and Ush. 2,000 per kg when sold to a consumer.

3.5 Health and environmental impacts

The Kawooya Channel, originating from Kamuli District, creates the Banda wetland as it runs through the parish, eventually joining the Nakivuubo wastewater channel in the industrial area. Banda wetland is shallow as a result of silting caused by agricultural activities and waste disposal. Banda zones (B1, B2 and B4) are located near the lower part of the wetland while Zone B3 is situated along the Kawooya Channel.

The parish has access to piped water but the majority of households use water from protected springs located near the wetland – and these are suspected of contamination. Most households do not have access to the municipal sewage system and use pit latrines for disposal of human waste. Farmers living near the wetland release human waste into the channel when their pit latrines fill up. Some parish inhabitants do not own toilets and use the channel for that purpose especially during the night. The wetland is also used as a dumping site for animal waste (especially from cattle), as well as waste from beer brewing and distillation.

The parish does not have permanent access to the Kampala City Council garbage skips. Most household waste is collected by a local youth initiative known as Banda Garbage Collectors (BAGACO) at a fee of Ush. 200, payable once a month. BAGACO pack garbage in bags and collect it by the roadside using wheelbarrows. They then request a skip from Kampala City Council that is released once a month to collect the garbage from roadside collecting points. Some households, however, are unwilling to pay for garbage collection and dump their waste anywhere. Two fishponds are present in the parish; water for the fishponds comes from the wetland, and farmers fear that it is contaminated by wastewater from the channel.

The parish is home to a number of industries that have negative environmental and health effects (Table 7). The quality of food crops grown in the wetland is affected by the high level of pollutants discharged into the Kawooya Channel from industries in the area. In addition to the contamination of cocoyams mentioned earlier, sugar cane tastes salty and has low sugar content and the growth rate of fish is slowed. Farmers identified the health hazards and effects of farming in risky areas (Table 8).

Table 7. Effects of industrial activities on health and environment in Banda Parish

Industry	Activities	Effect on Environment	Health impact
Chemical industries situated upstream in Kamuli. District discharging waste.	Chemicals discharged into Kawooya water channel which runs through Banda Parish and empties into Banda wetland	Contamination of soil and food crops in Banda Wetland with heavy metals; water in the channel is coloured and contains yellow particles.	People exposed to heavy metals through eating crops and fish from the wetlands polluted with water from the channel People are at risk of occupational exposure to other unknown pollutants released into the water and the soil
Four petrol stations	Spilling of oil and petrol and repair of car tyres	Wastewater washes into Banda wetlands; surrounding agricultural soil and the wetlands contaminated with heavy metals from motor vehicle emissions, petrol and old tyres	Same as above
Brick making and sand mining	Pits that fill with water provide breeding sites for mosquitoes	Degradation of the wetland and loss of biodiversity as vegetation is removed to excavate sand and soil for making bricks.	Mosquitoes which cause malaria
An illegal abattoir	Disposal of blood and other animal remains and wastes into the wetland and the channel	The waste materials give off bad smells when they decompose, and also attract flies.	Farmers in the wetlands who use water from the channel and springs situated near the wetland are exposed to unknown infections such as worms and micro-organisms from decomposing animal remains.
A car washing bay	Soaps, detergents and other chemicals released in the wastewaters into the wetland.	Contamination of soils and water by the chemicals in wastewater released into the wetland. Contamination of the fish ponds with chemicals has affected the growth rates of fish grown in the ponds situated in the wetland in this parish.	Farmers are at risk of exposure to chemicals accumulated in the fish when they feed on it.

Table 8. Health problems experienced as a result of farming in or near the wetland

Farming activity	Health hazard	Health effect
Growing food crops and keeping livestock in the wetland	Accumulation of chemical pollutants in the food crops and animal feeds. Presence of stagnant water in the wetlands and in some crops provide breeding sites for mosquitoes.	Exposure of consumers to chemical pollutants through consumption of food crops and animal products. Occupational exposure during handling of contaminated food and soil. Prevalence of malaria and water borne diseases.
Fish farming	Flow of contaminated wastewater from the channel into the fish ponds.	Exposure of fish consumers to chemical pollutants.
Use of raw sewage in vegetable and fruit gardens in the wetlands	Eating unwashed fruits, vegetables and drinking contaminated water from springs in the wetland.	Water and food borne diseases: the parish has a history of a cholera outbreak in zone B1 located at the lower end of the swamp.

Farmers also pointed out the consequences and health risks of behavior related to waste disposal, livestock theft and housing, and poor sanitation (Table 9). Some farmers in the parish keep animals in their houses to prevent theft. Many cattle keepers dispose of animal waste in the wetlands in the absence of proper facilities. The BAGACO youth organization collects poultry waste and sells it as manure to local farmers.

Table 9. Constraints, consequences and health risks related to farming activities

Constraints	Consequences	Health risks
Lack of a public garbage collector such as KCC skips	Farmers are unable to pay for garbage collection and dump their garbage anywhere during the night including wetlands and roadsides.	Decomposing garbage attracts flies and also gives offensive smell. Possibility of transferring infections to humans through houseflies.
Stealing of livestock and poultry	Some farmers resort to sharing accommodation with animals.	Likelihood of contracting infections from animals.
Lack of public toilet facilities	People without latrines in the area use the wastewater channel and those living close to the wetland release human waste into the wetlands.	Risk of contracting waterborne diseases from drinking contaminated water from spring.
Shortage of space for livestock keeping	Animals left to roam and eat from garbage dumping areas.	Risk of humans contracting worms and other water and food borne infections from livestock.

4. BUZIGA PARISH– ‘PERI-URBAN TO URBAN TRANSITION’

4.1 Ethnicity, social interaction and mobility

The community is multi-ethnic, consisting of 11 Ugandan ethnic groups and a number of foreign nationals. The predominant groups, in order of significance, are the Baganda, Banyankole and Balugwala. While some Baganda households are indigenous to the area, all other groups are new settlers.

PUA participants felt that a big gap exists in the parish between the rich and the poor, a situation exacerbated by the presence of expatriates and newcomers. The very poor relate to the poor through trading and during times of bereavement and illness. The poor provide loans and employment as casual labour to the very poor. The relationship between the very poor/poor and the rich tends to be weak and limited to the social level, such as friendships in church and sexual relations between rich men and young girls from poor families. As the very rich and rich employ domestic workers from outside the parish, interaction between these group and the lower wealth groups is limited. Participants believed that the rich and very rich have strong interactions but could not explain this relationship clearly.

Downward mobility, more common than upward mobility, is experienced by rich and poor wealth groups. The rich may become poor but never drop into the very poor group; there was no recall of downward mobility from the very rich group. Upward mobility by the very poor is limited. Some people in this group may move up to the poor group, but mobility beyond that typically takes the form of inter-generational mobility achieved through education, better employment and contact with people in the rich group. The pattern differs for boys and girls born into very poor families. A typical pattern for boys is to work as domestic workers for the rich; some are eventually entrusted with assets such as public transport vehicles (called taxis in Uganda) which provide a regular source of income and enables boys to save and invest in small businesses. A typical pattern of social mobility for girls from both the poor and very poor groups is marriage into the rich group. Often socially mobile children of both sexes build houses for their parents, thus enabling them also to become socially mobile. Participants noted that opportunities for social mobility are often limited by the high number of expatriates or non-local people, who bring in their own domestic workers.

4.2 Agricultural activities

Farmers identified at least 16 agricultural enterprises carried out in Buziga Parish:

- Crops: Sweetpotato, beans, bananas (*matoke*), cassava, cocoyam (both *Colocasia esculenta* and *Xanthosoma* spp. but mainly the former), fruits (mango, jackfruit), groundnuts, sugar cane, vegetables, mushrooms and maize.
- Livestock: Chickens, sheep, goats, cattle and pigs.

Sweetpotato, cassava and poultry production are the predominant agricultural activities in the parish (Table 10). Together with bananas, the first two crops are also the main crops grown for food security -- which implies that most households farm to meet food security objectives. It is notable that, although bananas are important for food security, the majority of households do not grow this crop.

Table 10. Ranking of agricultural activities by number of households involved, importance for food security and income in Buziga Parish

Enterprise	Number of households	Food security	Income
Pigs			4
Poultry	3		1
Cattle (diary)			2
<i>Matoke</i> (banana)	5	3	
Cassava	2	2	
Sweetpotato	1	1	
Fruits	6	6	3
Sugar cane			6
Beans	4	4	
Maize		5	
Mushrooms			5

1=most important; 6=least important

Poultry keeping ranked as the highest income-generating activity, followed by dairy farming and fruits. With the exception of poultry, relatively few farmers are involved in the main activities that earn income. Other activities that fetch high income include pigs, mushrooms and sugar cane (in order of importance). Fruits (jackfruit and mango) are the only commodity important across all three ranking criteria: they are an important source of income due to the existence of a large and nearby market, and the area is known for fruit production. Farmers noted that most of the fruit trees were not planted but grew spontaneously.

4.3 Crop and livestock production, constraints and management strategies

(i) *Sweetpotato*

Leaf eating insects (most probably army worms) are the most important production constraint to sweetpotato production. To overcome the problem, farmers try various measures, including stripping off the affected plant parts, applying wood ash and, in rare cases, applying insecticides. The second most important constraint is low soil fertility, which farmers attempt to solve by burying trash during seed bed preparation and, in rare cases, applying manure obtained from other farmers. The third important constraint was use of low yielding varieties, a constraint to which farmers currently have no solution. Other problems mentioned included destruction by wild and domestic animals (monkeys and grazing cattle), shortage of land, rats and moles, weevils and rotting associated with weevils.

Farmers harvest sweetpotatoes piece-meal using a stick. This practice allows farmers flexibility to start harvesting the crop before total crop physiological maturity, and harvesting small quantities required for home use. During harvesting, farmers remove only mature roots. Farmers use hoes to harvest the roots after full maturity or when they are interested in selling large quantities; in rare cases, sweetpotatoes are stored in the kitchen for up to 3 days. Sweetpotatoes are normally cooked and eaten fresh.

Theft from the garden is a major problem. Another problem presented by farmers is the quick rotting of tubers, which makes sweetpotato difficult to store and explains why farmers have adopted the practice of field storage of the crop.

(ii) Fruits

The key fruits are mango, papaya, avocado, jack fruit and oranges. Most fruit trees in Buziga are wildlings, not planted by farmers. Farmers pick fruits when they are ripe: only quantities required for consumption or selling are harvested since fruits are not usually stored.

Insect pests were the most production constraint; an example was mango flies. Currently, farmers use the same coping strategies as those applied to sweetpotato insect pests. Theft is the second most important production constraint, which forces farmers to harvest prematurely. In a few cases, thieves have been prosecuted in local courts but these cases are rare as it is difficult to catch thieves. Wild animals such as monkeys are also a problem by picking the fruits; they are difficult to control although some farmers use scarecrows and dogs for this purpose.

(iii) Beans

Free grazing chickens are the most important production constraint to bean production: chickens eat the tender leaves as well as the flowers. Diseases (including *kugegengewala* or bean common mosaic virus and common bacterial blight) are also a major problem to which farmers appear to have no solution. The third production constraint was land shortage, which is associated with low soil fertility. Farmers manage these two related problems by practicing crop rotation and using cow dung or chicken manure.

Farmers harvest beans both at physiological maturity (i.e. to consume fresh) and after the crop has dried in the field. Theft of mature beans in the field is a major problem. Dry harvested beans are further dried by spreading the pods on the ground. Dry beans are threshed by beating them on the bare ground to split the pods, seeds are winnowed using trays and dried again before they are packaged in gunny bags for storage. For longer storage farmers normally mix wood ash with the grain.

(iv) Poultry

Farmers raise both local (typically 6-7 birds) and exotic birds (layers or broilers). On average, farmers have 100 layers and 100-200 broilers, as the latter give quick returns to investment. Farmers obtain exotic breeds as day-old chicks from companies or agents of hatcheries, namely, Ugachick, Musajawaza, Kijambu, Biyinzika, Soka, Nsambya and Kagodo.

Farmers use several sources of feed and feeding systems for their poultry. To reduce production costs, farmers commonly purchase feed ingredients and do the mixing themselves. Some farmers use locally available ingredients like cocoyam leaves, amaranthus, lablab and cornflex as supplementary feeds, while others buy feeds from feed companies like Ugachick, Formula Feeds, and Nuvida. Use of purchased feeds makes broilers less susceptible to the effects of poor feeds as a result of adulteration. However, sometimes a farmer may not be able to provide all the required ingredients. Extra care is taken to provide the right feed mix for chicks due to their vulnerability. Local birds are normally allowed to roam and search for food on their own.

Exotic birds are housed in various types of structures including garages and constructed poultry units from mud, wattle and wire mesh, with low-cost roofing materials such as papyrus mats, polythene sheets or iron sheets. Local birds, which are normally kept in low numbers, are usually kept in kitchens or stores.

The major poultry production constraints are diseases, high cost of feeds, theft and low price for poultry products (eggs and mature birds). The major pests and diseases are coccidiosis, Newcastle disease, infectious bursitis and influenza. The main control measures for pests and diseases were: maintaining cleanliness in the housing, using veterinary services and advice, consulting friends, using drugs (e.g. ampiciline and tetracycline to treat cough) and local herbs like marijuana, neem leaves, hot pepper and ash.

(v) *Diary*

Farmers in Buziga mainly have local and cross breeds; relatively few have exotic breeds. Numbers typically range between 2 to 4 animals. They mostly practice semi-intensive and zero grazing, and feed their animals on locally available materials (banana peelings, diary meal, lablab, jackfruit, elephant grass and other grasses) and occasionally on dairy meal, especially in early calving. Breeding is usually by bulls and very rarely with artificial insemination. Few farmers are involved in the dairy enterprise because of the perceived high cost of controlling diseases. Other major constraints to dairy production are limited land size holdings and capital.

The main production constraints mentioned by farmers are diseases, expensive drugs and veterinary services. Breeding through artificial insemination is very expensive and needs to be done several times before conception occurs. The unavailability of feeds and prevalence of disease are also major problems.

The main pests and diseases of cattle are ticks, worms and lumpy skin disease. The major control measures used are tsetse tick and deworming. Farmers seek veterinary advice and services from Bunga trading centre or Musajawaza Company in Kampala town.

(vi) *Pigs*

Farmers have local, cross and exotic breeds. On average, farmers keep 3 or 4 pigs, usually obtained from other farmers. Farmers feed their pigs on banana peelings, grass, sweetpotato vines, weeds, food leftovers, *mukene* (small fish) and maize bran. Some pigs are kept in pigsties, while some farmers tether them in the fields. The main production constraints mentioned by pig farmers are lack of feeding materials especially during the dry season and diseases/pests such as worms, ectoparasites (lice) and swine fever.

4.4 Marketing

Discussions focussed on six enterprises: poultry, dairy, fruits, pigs, mushrooms and sugar cane, each discussed separately below.

(i) Poultry

Farmers usually sell broilers to middlemen with motorcycles who in turn supply restaurants and roadside bars. In the absence of middlemen, farmers usually look for markets by approaching restaurants, hotels and major market vendors. Middlemen pay Ush. 2,800-3,500 per bird, depending on the size, and they usually purchase about 30 birds per round -- so that a farmer's entire stock could be sold in a week. At times, middlemen dress the chickens at the farmers' premises. Middlemen sell the birds to restaurants and roadside bars at Ush. 3,500-4,000; roasted chicken, when sold in standard pieces, fetch up to Ush. 5,500.

The major problems faced by poultry farmers are: inconsistent market, high cost of formally manufactured feeds, underpayment by middlemen, theft of live birds from poultry houses and diseases. Farmers' suggestions for improvement include increasing farmers' scale of production so as to lower the unit cost of production, improvement in animal husbandry practices, and availing training opportunities and exchange of ideas and knowledge on animal husbandry techniques. Other suggestions were to increase vertical integration -- for example, having farmers grow some of the raw materials used in the manufacture of feeds.

(ii) Dairy

Milk yields average about 9 litres per day per cow and there is considerable demand for milk in the area due to the few dairy cattle farmers in the area. However, producers consume much of the milk produced and the surplus sold to neighbours. Deficits are mainly filled by milk purchased from outside the parish.

(iii) Fruits

It was not possible to determine quantities produced and sold, as fruit trees are shared by several households/individuals. Fruits are sold fresh immediately after harvest, to neighbors, retailers in markets and at roadsides, and sometimes to traders who come to the farm.

During harvest periods when fruits are in abundance, large losses are experienced due to lack of storage facilities. The farmers felt the need to establish cold rooms to keep fruits fresh and to improve profitability.

(iv) Pigs

Farmers sell piglets at the following prices: Ush. 10,000–15,000 for a one-month old, Ush. 20,000–30,000 for a 6-months old and Ush. 40,000–60,000 for an 8-months old. Farmers sell mainly to butcheries.

(v) Mushrooms

The three farmers present who were mushroom growers produced quantities of 100-120 kg of fresh mushrooms per harvest. It takes a month from the time of planting to harvesting. Mushroom seed is purchased in small bottles for Ush. 1,000 each and each bottle yields on average 5 kg of fresh mushrooms. One kilogram of fresh mushrooms fetches Ush. 3,000.

Quantities sold varied among farmers, depending on availability of market. Some farmers have dropped out of the enterprise because of lack of or inadequate markets. Farmers reported difficulties with marketing of fresh produce because mushrooms are highly perishable: they consider themselves lucky to sell 3/4 of their produce fresh, consume about 1/8 and sell the rest dried. Farmers prefer to sell fresh mushrooms -- drying is only done as a last resort. They say dried mushrooms fetch a low price because large quantities are needed to make a reasonable weight and they need to be packaged, which is costly.

Most mushrooms are sold to upmarket hotels (e.g. the Sheraton, Grand Imperial, Hotel Equatoria), supermarkets (e.g. Shoprite), and neighbors. The produce is carried to buyers by taxi. Farmers mentioned an arrangement they have with a lady dealer in Nsambya who buys mushrooms but also promotes the enterprise: she accesses seed for farmers and is involved in marketing. The problem farmers reported having with her is that when she takes their produce on credit, she takes a long time to remit their payments and has the tendency of under paying them. One farmer described how she lost her market with Shoprite supermarket because she could not meet the quantity demanded.

Farmers noted that while mushroom prices are good, the market is unreliable. If they could find a better market, they would be willing to expand on the enterprise and increase production.

(vi) Sugar cane

There are a few small-scale sugar cane growers in Buziga and PUA participants saw sugar cane as a potentially viable enterprise. Sugar cane growing is limited to farmers who have access to the swamps. Sugar cane is sold directly to consumers, mainly neighbors but occasionally to roadside traders.

4.5 Health and environmental effects of UPA

The parish has access to piped water and most farmers use piped water from National Water and Sewerage Corporation (NWSC). Some households use piped water for drinking by humans and animals, while others get water from protected springs. All farmers have separate shelter for their animals. There were no fishponds in the area but the community expressed interest in starting one as soon as they secured a site.

The parish does not have access to KCC dumping containers and there is no public dumping site for household waste. Some households dump their garbage in other people's gardens, undeveloped plots and in the wetland, but most households burn their waste or use it as manure in their gardens.

People living in slums close to wetlands release raw sewage from shallow toilets into the wetlands. These shallow pit latrines need to be emptied regularly to create space for further use. The only factory in the parish, Victoria Fresh Foods, which handles fish exports, apparently did not create health or environmental hazards.

Wetlands and illegal dumping grounds were identified as risky areas for agricultural production. The major crops grown in wetlands were cocoyams, sugarcane, sweetpotato and green vegetables. Table 11 outlines the health hazards and effects identified by farmers. Wetlands were identified as riskier than garbage dumping sites because they are used as sinks

for human waste. Farmers identified three areas of environmental risk associated with farming and proposed possible solutions (Table 12).

Table 11. Health hazards from agriculture and their health effects in Buziga Parish

Site	Health hazard	Health effects
Wetland	Eating food and vegetables contaminated by human waste	Diarrhoea and intestinal worms
	Farmers are cut by sharp objects dumped in wetlands	Possibility of contracting tetanus
	Presence of stagnant water provides breeding sites for mosquitoes. Farmers exposed to mosquito bites	Increased incidence of malaria
	Some farmers obtained drinking water for their cattle from the wetlands	Possibility of livestock getting intestinal worms, micro-organisms and other disease vectors
Waste dumps	Illegal dumping of garbage (e.g. sanitary towels, dead animals and polythene bags) in gardens	Garbage attracts flies, gives off offensive smells and is a breeding site for disease vectors. Non-decomposing materials such as polythene are a threat when eaten by livestock, leading to intestinal obstruction and eventual death

Table 12. Environmental problems and possible solutions in Buziga Parish

Problem	Solution
Lack of waste disposal facilities such as KCC skips.	<ul style="list-style-type: none"> • Use organic waste as manure, burn polythene bags, encourage volunteers to collect and sell metallic waste such as used tins • Use cattle dung and some of the poultry waste as manure. Farmers without gardens dump their poultry waste in garbage dumps • Newcomers to the area, especially the wealthy, dump garbage on undeveloped land
Inaccessibility to the sewage network	Use septic tanks (high income group) and latrines (low income group)

Buziga Parish has only one industry, which does not pose significant environmental, or health risks. The main health risks in the area are attributed to disposal of human waste in wetlands and unplanned dumping of garbage which is not collected by KCC.

5. KOMAMBOGA PARISH – “PERI-URBAN”

5.1 Ethnicity, social interaction and mobility

At least 11 eleven ethnic groups were represented in Komamboga Parish. The main groups were, in order of predominance, Baganda, Banyankole, Balugwara, Basoga and Barundi.

Factors responsible for upward mobility include hard work, education of children and change in lifestyle brought about through sensitization sessions carried out in the parish by different organizations. Downward mobility was attributed to people having only one source of income (typically farming), alcoholism, retrenchment, extravagance and peer pressure.

5.2 Agricultural activities

PUA participants identified fourteen agricultural enterprises as categorised below:

- Crops: sweetpotato, cassava, maize, beans, fruits (jackfruit, mango, papaya, guava, pineapple, avocado), bananas), cocoyam, sugarcane, coffee, vegetables and yams.
- Livestock: poultry, pigs, fish farming, goats, cattle and rabbits.

The three most common agricultural activities were sweetpotato, cassava and poultry production. Sweetpotato and cassava were also the two most important food security crops, followed by beans, bananas, fruits and vegetables (Table 13). The most important fruit for food security was jackfruit; farmers noted that children prefer eating jackfruit instead of the traditional meal at lunch time, and that people commonly eat jackfruit as a snack with tea. The advantages of this fruit is its perennial nature and limited input needed for establishment.

Farmers in Komamboga made money primarily from livestock production (pigs, cattle and poultry), but fruits and cassava were also important sources of income. The most versatile crops were fruits and cassava that have both food security and income value -- and were therefore are produced by significant numbers of farmers. Relatively few farmers were involved in the most lucrative enterprises of pig and dairy production.

Table 13. Ranking of agricultural activities by number of households involved, importance for food security and income, Komamboga Parish

Enterprise	Number of households	Income generation	Food security
Cattle		2	
Chicken	3	3	
Banana	5		4
Sweetpotato	1		1
Cassava	2	5	2
Beans			3
Fruits	6	4	5
Pigs	4	1	
Vegetables			6

1=most important; 6=least important

5.3 Crop and livestock production, constraints and management strategies

(i) *Sweetpotato*

Insect pests (particularly those that damage the leaves), foliar diseases (mainly sweetpotato virus disease described locally as *Okugengawala*) and low yields, in that order, are the main production constraints. Farmers used various measures to control insect pests including manually killing insects, spraying with botanicals (mixtures of ash, tobacco, red pepper, paraffin, and water) or spraying with chemicals (e.g. Safisafi). To counteract foliar diseases, farmers rouge affected plants. Farmers attribute low yields to the use of low yielding varieties: they improve yields by selecting high yielding varieties as well as improving soil fertility by using chicken manure. Other constraints to sweetpotato production are weevils (associated with rotting of roots and drought), crop failure as a result of poor rainfall, limited land space and low soil fertility. No major post-harvest problems were identified for sweetpotato.

(ii) *Cassava*

Farmers ranked low yielding varieties as the major problem of cassava production. They observed that the existing varieties sometimes produce large stems with few or no tubers or produce poor quality (woody and bitter) tubers. Farmers have tried to obtain new varieties from other farmers and researchers. African cassava mosaic virus is the second most important problem, which farmers address by roguing affected plants.

Farmers avoid the problem of post-harvest discoloration by piecemeal harvesting. When the field is far from home, farmers store surplus tubers in a shallow pit, which is wetted to maintain tuber freshness. Cassava is eaten in various forms: fresh, processed into flour to make pancakes or a paste, and as fried chips. Some farmers extract starch from cassava for use in making tablecloths and belts for dresses.

(iii) *Bananas*

Lack of knowledge about agronomic practices ranked as the most important constraint to banana production, evidenced by the poorly maintained plantations in Komamboga. A few farmers present who had attended seminars on banana agronomy or received advice from extension personnel have realized improvement in production; other farmers have adopted agronomic practices from fellow farmers. Banana weevils ranked as the second most important constraint to banana production; however, farmers appear to have rich indigenous knowledge on how to control weevils including the application of botanicals made from ash, pepper, tobacco, soot, and cow urine around stools or on stumps. Some mix kiln ash with water and apply it on stools weekly, believing that this oily mixture kills weevils. Other farmers lay traps for weevils (by covering the stump with a leaf) or uproot affected plants/stools. Farmers are confident that some of these methods are effective. Low yields and poor soil were two interrelated production constraints which farmers address by applying manure and mulch.

Other banana production constraints identified are theft and wind damage. Farmers harvest premature bananas to prevent theft, and to reduce wind damage they prop with supporting poles, plant trees (bark tree or *Emituba*) and detrash.

5.4 Marketing

Five income generating enterprises were discussed: pigs, dairy cattle, poultry, fruits and green leafy vegetables.

(i) Pigs

Rearing pigs is a common activity in Komamboga, where nearly every household owns pigs. Average number kept per household is 5 pigs, while large farms in the area may have 50 to 100 animals. Pigs are fed on locally available materials e.g. banana peelings, kitchen leftovers, etc. Small-scale farmers sell 3 to 5 mature pigs and more than 6 piglets in a year, while large farms sell over 50 mature pigs in a year.

Three types of sale transactions are common:

- Traders come around looking for pigs and, if they offer a good price, farmers sell to them; farmers who have no time to look for market rely on these traders.
- Farmers sell pigs directly in the market or to hotels, restaurants, supermarkets and butcheries.
- Farmers who rear pigs operate their own butcheries.

Pigs are sold as mature pigs, piglets or dressed pork, at the following prices:

- Local one-month old piglet: Ush. 10,000
- Exotic one-month old piglet: Ush 15,000–20,000
- 20 kg pig (carcass weight): Ush 30,000
- 30 kg pig (carcass weight): Ush 45,000
- 1 kg of pork: Ush. 1500–1800, depending on location.

Producers' main problem is that buyers bid unfairly, sometimes offering very low prices. Farmers suggested the need to unite in order to market collectively, and proposed establishing a farmers' market for pig products in the area with fixed prices set by them.

(ii) Dairy

Farmers in this parish keep cross breeds (75% exotic) under intensive (zero-grazing) and semi-intensive systems. The average holding is two calving cows, with an average milk production of 10 litres per cow per day. There is one large dairy farm in the parish which supplies large quantities of milk. Not all the milk produced is sold.

Most of the milk produced is sold to neighbors on a monthly or daily basis at Ush. 500-600/litre. Farmers sell milk to bicycle and motorcycle vendors who collect it at farm gate price of Ush. 300-350/litre; the large dairy farm sells milk at Ush 500/litre. Vendors sell milk door-to-door and to institutions such as schools. Farmers sell to vendors either to save time for other activities or because they lack transport. Milk is sold fresh with no value added. Farmers suggested the need to promote milk consumption in the area in order to increase demand, and would also like to acquire preservative facilities to store unsold milk.

(iii) Poultry

Farmers rear both local and exotic birds, although layers and broilers are exotic types. On average, farmers have a batch of 100 broilers and 300 layers, and those with locals keep 10-15 birds. Farmers usually do not eat these birds except for deformed birds and those rejected by buyers. Broilers are sold to vendors who come on motorbikes/bicycles, but farmers also look for buyers and may advertise their birds when they are ready. Broilers sell for Ush. 3,000–3,500. Eggs are sold to vendors at a farm-gate price of Ush. 2,600 per tray and to shops and supermarkets for Ush 2,700-2,800 per tray.

The major problems experienced by poultry farmers are the high cost of feeds, the low price of birds/eggs and sometimes lack of a ready market. Farmers proposed forming a cartel of poultry farmers to control prices.

(iv) Fruits

The common fruits in Komamboga are avocado and jackfruit, with each household having 2 or 3 trees. One avocado tree yields 5-10 tins of avocado per season and there are two fruiting seasons in a year. Avocados fetch Ush. 50 per fruit or Ush. 1,500-2,000 per tin, while a single jackfruit fetches between Ush. 500-1,000. Bicycle vendors purchase fruits from individual households and take them to the major markets.

(v) Green leafy vegetables

Farmers sell greens to vendors who take them to the major produce markets. Farmers sell an average of 200 bundles of greens weekly and earn between Ush. 10,000-15,000 per week.

5.5 Health and environmental impacts of UPA

The main source of water in the parish is open wells, followed by protected springs; few households have access to piped water. Water for feeding animals is fetched from wells. Komamboga does not have access to KCC waste skips, there are no public dumping sites and each household manages its own waste disposal. Farmers use peelings and animal droppings as manure and animal feeds. They burn polythene bags and throw metallic waste, glass and batteries into latrines. Most homes use pit latrines for human waste disposal; a few have flush toilets, which are connected to septic tanks. There were no industries in the parish.

There were no unsafe places being used for farming and therefore few health problems related to farming activities were reported (Table 14). Farmers who keep poultry in their houses were not aware of any health related problems. Cattle-keeping was not considered hazardous except in cases of infection by worms. Cultivation was taking place in wetlands but this was viewed as posing no health risks. There was one fish pond in the area owned by a group of farmers, but it was not yet stocked.

Table 14. Health problems associated with livestock rearing, Komamboga

Farming activity	Health problem
Pig rearing	Farmers believe that certain health problems are associated with pig rearing such as worms from pig droppings and a fever contracted by humans if pig droppings are handled with unprotected hands and feet.
Cattle keeping	Infections by worms from infected animals

6. ACROSS SITE COMPARISONS AND SUGGESTIONS FOR FUTURE RESEARCH

6.1 Livelihoods and production systems

Although the PUA did not investigate how urban agriculture contributes to household livelihoods, it is evident from farmers' comments that UPA is important for food security and income of many households in Kampala. Across sites, farmers identified a number of general constraints to agricultural production related to land tenure, lack of capital to invest in agriculture, health and environment, and poor crop husbandry (Table 15).

Table 15. Problems associated with UPA

Category	Specific problem
Land tenure	Owners of rented plots often destroy food when they want their plots back, and do this without warning.
Economic	<ul style="list-style-type: none"> • Lack of capital to operate on a large scale. • No money to buy good quality seed. • Low price for some crops. • Some technologies known to farmers are not used because of financial constraints.
Health	<ul style="list-style-type: none"> • People who invest a lot of time in farming age quickly. • Pigs harbour jiggers that affect humans, and sometimes lead to formation of breeding sites for mosquitoes. • Livestock (poultry, pigs, cattle), if not well managed, make the home environment dirty and uncomfortable and produce offensive odours. • Gardens often harbour snakes and rats, posing danger to humans.
Agronomy	Improper farming methods destroy the soils.
Environment	<ul style="list-style-type: none"> • Farming in the swamps leads to environmental degradation. • Cutting down trees is not environmentally friendly. • Farming on road reserves leads to soil erosion and destroys the road drainage system.

The most commonly practiced agricultural activities in the four study sites were bananas, cocoyam, sweetpotato, cassava and poultry production. A clear relationship emerges between types of activities and level of urbanization (Table 16). In less urbanized areas (peri-urban to urban transition and peri-urban), the majority of farmers engaged in agricultural production to meet food security objectives. Relatively few farmers in these areas are involved in income generating activities. By contrast, the most common activities in more urbanized areas were market oriented. In general, across sites, livestock (poultry, dairy and pigs) production was the key market oriented enterprise -- with the exception of cocoyams in Banda. Fruits were widely grown in most sites for both food and income. Surprisingly, with the exception of Banda, vegetable production for the market was not widespread.

Table 16. Summary of major agricultural activities across study sites

Location	Classification as defined by KCC	Top two most important activities by:		
		Prevalence	Food security value	Income value
Bukesa	Urban, old	Poultry, bananas	Fruits, bananas	Poultry, dairy
Banda	Urban, new	Cocoyam, poultry	Indigenous vegetables, cocoyam	Cocoyam, poultry
Buziga	Peri-urban to urban transition	Sweetpotato, cassava	Sweetpotato, cassava	Poultry, dairy
Komamboga	Peri-urban	Sweetpotato, cassava	Sweetpotato, cassava	Pigs, dairy

6.2 Proposed tentative typology of “farming styles” in Kampala

Based on information collected during the PUA, observation and expert opinion, the following tentative typology of “farming styles” in Kampala is proposed:

(i) Smallholder mixed crop and livestock provisioning systems

Farmers in this category cultivate staple crops (sweetpotato, cassava, beans, *matooke*, maize, and vegetables) for meeting household needs and, less commonly, for income. This farming style is more widespread in peri-urban areas where there is ample land, and most farmers in this category are elderly women. Rarely few livestock (local, crossbreed and improved breeds of local poultry, goats, cattle, pigs) are kept by farmers as a form of security for income. Livestock husbandry consists of a mixture of traditional (free range, tethering and communal grazing) and improved methods. This appears to be the most widespread type of farming in Kampala where land is available around the homestead or elsewhere.

(ii) Off-plot provisioning/economic survival systems

Farmers engaged in this type of agriculture attempt to balance meeting their subsistence needs and making money. Although this type of farming is perceived as subsistence oriented, farmers in this category, most of whom are poor, landless women, have a strong commercial drive which often takes priority over food security needs. This farming style occurs in densely populated urban areas such as Banda and Bukesa Parishes, and is characterized by farming away from the farmer’s residence. Farming typically takes place along roadsides, in wetlands

or on public land. The emphasis tends to be on production of short cycle crops such as beans and cocoyam. Environmentalists and city authorities oppose this type of farming and occasional conflicts occur between city authorities and farmers.

(iii) Intensive mixed crop and livestock systems

Farmers in this category typically raise dairy cattle (exotic breeds and crosses), poultry and pigs for income, while growing crops (mainly mushroom, vegetables and fruits) for home consumption. Enterprises tend to be well organized. This farming style is common in peri-urban areas such as Komamboga Parish. Animal husbandry systems (zero grazing, tethering on public land, or a combination of systems) vary and are influenced by farmer membership in groups or affiliation to NGOs. The extent of nutrient re-cycling between livestock and crop systems varies.

(iv) Crop and livestock market gardens

Farmers in this category are involved in mixed crop farming of staple food crops together with small, market-oriented production of specialty crop or livestock. Examples are sugarcane, flowers, mushrooms or pigs. This type of farming, which is not very common, is practiced in both urban and peri-urban areas.

(v) Smallholder intensive poultry farmers

Two broad groups of farmers engage in poultry production. The first group is mainly middle-class farmers raising exotic layers and broilers commercially. Their businesses are characterized by varying degrees of specialization and size. The second group consists of farmers who engage in free-range poultry farming and others who are making crosses between locals and broilers. Poultry farming are found in all areas of Kampala.

Tables 17 and 18 summarize the major production constraints for crops and livestock encountered by Kampala farmers.

Table 17. Production constraints of major crops in urban and peri-urban areas of Kampala

Crop	Constraint
Sweetpotato	Foliar pests, weevils, rotting, sweet potato virus infection, low yields, limited land with low soil fertility.
Cassava	Cassava mosaic virus, poor quality varieties that give bitter or large fibrous roots, limited land.
Bananas	Pests, diseases, polythene bags, limited land for expansion, wind, soil erosion, air pollution.
Fruits	Insects, monkeys and bird pests, and theft.
Beans	Pests, diseases, lack of knowledge on proper spacing and planting methods, limited land with poor soil fertility.
Maize	Pests, lack of knowledge about crop management, low soil fertility, lodging.
Cocoyams	Rotting, millipedes, bad taste in yams grown near sewage or erosion deposits from toilets.

Table 18. Constraints to livestock production in urban and peri-urban areas of Kampala

Livestock	Constraints
Poultry	<p>Pests and diseases (e.g. coccidiosis, Newcastle disease, infectious bursitis and influenza).</p> <p>High cost of feeds</p> <p>Theft and low price of poultry products.</p>
Dairy	<p>Pests and diseases (e.g. ticks, worms and lumpy skin disease) compounded by expensive drugs and veterinary services</p> <p>Unavailability of feeds</p> <p>Breeding through artificial insemination is very costly.</p>
Pigs	<p>Lack of adequate space which makes it difficult for farmers to maintain proper hygiene, resulting in air pollution</p> <p>Feeds are unavailable especially during the dry season.</p> <p>Pests and diseases (e.g. worms, swine fever, lice)</p>

The study revealed minimal processing activities by urban farmers. Farmers experience a number of post-harvest constraints in crops. Theft was a common problem affecting crops such as beans, sweetpotato, leafy vegetables and bananas. Sweetpotato farmers experience rotting of harvested roots (resulting from weevil damage in the field), whereas cassava growers complain of flesh discolouration after harvest and bitterness in some varieties. Due to lack of storage facilities, farmers who grow fruits and vegetables experience huge losses due to rotting. Many banana growers harvest prematurely to avoid theft and wind damage.

The next phase of the study will further investigate agro-ecological systems in Kampala basing on the reported variations outlined in this report. Further study is needed to quantify and verify activities, resources, practices and constraints (biotic and abiotic) identified during the PUA. This information will guide researchers and policy makers in making informed decisions on policy and technological interventions.

6.3 Marketing of agricultural produce

Across the four parishes, seven income generating enterprises were identified and discussed: poultry, dairy cattle, fruits, pigs, mushrooms, cocoyam and leafy green vegetables. Poultry and dairy cattle were common to all study parishes, while fruits and pigs were present in three parishes. Production of poultry, fruits, leafy vegetables and cocoyams were widely practiced activities. Urban farmers in Kampala rarely store or add value to their produce, except for the limited processing of cassava into flour and chips.

Poultry is the most common enterprise. Both local and exotic birds are kept for meat and eggs. Despite the fact that local chicken and eggs fetch a higher price in the market, the scale of operation for local birds is much smaller than for exotic birds. Poultry products have a ready market but the enterprise is not well organized. Milk production is an important income

generating activity; however, the number of farmers involved is very small, largely due to the high initial capital requirement being beyond the reach of most small-scale farmers. Lack of land is another major limiting factor. Pigs have a ready market and farmers find it profitable because locally available materials are a good source of feed. However, farmers are often exploited by middlemen because the enterprise does not have a well organized market.

Commonly sold fruits include avocado, mango, papaya and jackfruit. Fruits have a ready market but production is still at a low scale. Typically, farmers do not plant fruit trees, but depend on those found in areas where they reside. Mushroom growing is very popular, especially among women. It is a non-labour intensive enterprise that fetches income within a short period, the most limiting factor is unreliable markets. Although cocoyam is a widely grown crop, production is limited to wetlands and contravenes wetland preservation laws. The bulkiness of the crop makes it suitable in urban production; also, cocoyams can remain in the field long after maturity and therefore can be harvested piecemeal.

Although vegetables have a ready market and fetch a good price, few farmers are involved in this enterprise for commercial purposes. Possible reasons could be ignorance of market potential, lack of skills/knowledge in vegetable growing and a tendency to associate vegetables with poverty.

6.4 Health and environmental impacts

In all study sites with the exception of Komamboga, farming in the wetlands stands out as a major health risk due to dumping of garbage and disposal of untreated sewage. Cocoyams, a common food and cash crop in Banda, are grown in the wetlands and their contamination constitutes a major threat to human health.

Bukesa Parish had fewer farming activities, and these take place mainly within home compound plots because the parish is mainly residential. Of all the study communities, Bukesa had the least exposure to contamination resulting from farming in unsafe areas. Banda Parish had more farming activities taking place, with a rich diversity of enterprises especially in the wetlands -- including rice growing and fish farming not recorded in other parishes. However, Banda Parish has the highest level of health risks associated with agricultural production, with a diversity of activities -- as well as of sources of contamination from industries, waste dumping, wastewater and untreated sewage use in agriculture.

Buziga Parish had fewer health risks associated with agriculture due to its location in the peri-urban setting with no major industries and sufficient farmland. Most of the household waste was sorted and used as manure in the gardens.

In Komamboga Parish some farming activities were taking place in the wetland, and this was the only site that did not have problems with human waste disposal. There were no industries present in the area and therefore no related environmental risks. Farmers have enough space for livestock keeping, and only a few kept poultry in their garages.

The levels of environmental and health risks are increasing with urbanization. Banda Parish ranks first in highest environmental and health risks due to presence of several industries and waste disposal problems. Bukesa Parish has the second highest level of risk, although it is mainly a residential area without major industries. Most of the health problems in Bukesa are associated with human waste disposal, shared accommodation with animals, and congestion

due to lack of space for livestock and poultry keeping. Buziga Parish has the third highest level of health and environmental risk. This parish has almost no industries and therefore no associated environmental risks; however, it is a growing urban area and faces health risks due to lack of KCC public waste disposal facilities. Buziga still has space for agricultural activities. Komamboga Parish has the lowest level of health and environmental risk, with no industries and garbage dumping sites. Most households have latrines for human waste disposal and there are no problems of human waste disposal in the wetlands.

Table 19. Summary of health and environmental issues associated with UPA

Issue	Bukesa	Banda	Buziga	Komamboga
Industries present	Fish processing and export of Nile perch swim bladders	Unknown number of industries in Kamuli, four petrol stations, car washing bay and an abattoir	Fish export industry	None
Risky sites	Wetland	Wetland	Wetland and dumpsites	None
Crops grown in risky sites	Cocoyams	Sugarcane, cocoyam, green vegetables and rice.	Cocoyam, sugar cane, sweetpotato, green vegetables	NA
Accessibility to facilities	<p>Have access to KCC waste skips</p> <p>Have access to NWSC piped water</p> <p>No access to the municipal sewage system.</p> <p>Local NGOs provides education to promote agriculture and the environment</p>	<p>No access to KCC waste containers or municipal sewage system.</p> <p>Have access to piped water</p> <p>Local associations exist.</p> <p>Youth association involved in garbage collection</p>	<p>Lack waste disposal containers</p> <p>No access to municipal sewage system or piped water</p>	<p>Have access to KCC waste skips</p> <p>Absence of local organisations dealing with environmental issues</p>
Complaints	<p>Lack of markets for their products</p> <p>Limited land for farming activities</p> <p>Theft of food crops</p>	<p>Need for a waste disposal container</p> <p>Need for health education for fear of an outbreak of cholera.</p>	<p>Need a KCC waste disposal skip</p> <p>Shortage of land for farming</p>	None

7. NEEDS ASSESSMENT FOR THE USAIP (SCHOOLS) PROJECT

7.1 Introduction

USAIP's aim is to conduct action research to explore the feasibility of schools playing an extension role with regard to urban agriculture. Specifically, the project focuses on schools as a focal point in their communities for new innovations in urban agriculture. The project also tests the feasibility of schools producing seed of new crop varieties commercially.

The project selected three primary schools in Kampala on the basis of land availability, presence within project sites of collaborating NGOs (Environmental Alert and Plan International) and the nearby presence of environmental hazards from industries or dump sites. The three schools working with USAIP are:

- Lubiri Nabagereka Primary School, Ndeeba Parish, Rubaga Division
- Valley St Mary's Primary School, Mperewe Parish, Kawempe Division
- Reach Out Primary School, Buziga Parish, Makindye Division

The USAIP team worked with two members of staff from each school, usually the agricultural teacher; the Headmaster/mistress of the school played a supervisory role.

The capacity to identify the needs and interests of the farming community must be a key activity of any institution involved in agricultural extension and environmental education. In addition, if schools are to become commercial seed producers, there is need to document demand for seed, identify suitable crops, understand farmers' varietal preferences and concerns about seed quality, and their willingness to purchase seed from this source. Since community needs are diverse and change over time and no information exists on seed demand of urban farmers, the challenge was to find rapid and accurate methods to generate the required information.

7.2 Methodology

Community meetings were held in September 2002 at each of the selected school sites to select technologies for extension activities and assess seed demand. A total of 23 people (13 males and 10 females) participated at Valley St. Mary's Primary School, 15 people (4 males and 11 females) were present at Reach Out Primary School, while 14 people (9 males and 5 females) were present at Lubiri Nabagereka Primary School. Farmers were mobilised by the local council chairpersons. Enterprise selection involved identifying of the main crops grown in the area and prioritising crops that could be grown in a season, by show of hands. Seed demand was assessed by identifying the seeds that farmers buy, their seed sources, prices and farmers' willingness to purchase seed if it were to be produced commercially by schools.

7.3 Mpererwe Parish, Kawempe Division (Valley St Mary's Primary School)

7.3.1 Enterprise selection

The most important crops selected were maize, beans, onions, groundnuts, sweetpotato, cassava, *matoke*, cocoyam, and vegetables. Cocoyams were mainly for sale and the rest were for food security. Most households had about 1/8 acre available for cultivation (Table 20).

Table 20. Area under cultivation by farming households in Mpererwe Parish

Area (in acres)	Per cent of farmers
1 and above	5
0.25 – 0.5	15
0.125	80

The selected crops, in order of importance, were: sweetpotato, maize / beans, *matoke* and cassava. Sweetpotato received the highest ranking because most households (80%) grow it for both home consumption and cash. Beans and maize ranked the same because they were important for food and sometimes for cash; even farmers with small pieces of land could afford to grow these crops. *Matoke* and cassava were eliminated because of their long time to maturity. Community members suggested that the project works on three crops -- sweetpotato, maize and beans.

7.3.2 Sources of agricultural extension information in the area

Two people mentioned community groups in the area that were engaged in agriculture. A NARO technical staff member offered information concerning bean production, to some members of the community. Two people used the radio as a source of agricultural information, and the majority depended on indigenous farming knowledge.

7.3.3 Assessment of seed demand

An estimated 60 per cent of farming households within the community reportedly buy seed/grain both for eating and planting purposes, mainly for maize and bean. Farmers were not sure of the names of the maize and bean varieties they purchased. The amount of seed bought depended on the land area owned by a particular household but, on average, households buy between one and 4 kg of maize seed and 2 kg of bean seed.

Farmers buy seed from input supply shops in Kyanja and Mpererwe as well as from local shops and markets. They expressed concern about seed quality, as in some cases they had purchased seed that did not germinate. Most farmers reported buying seed without knowing its type or/variety; some feared that what they bought was uncertified seed dusted with purple or green colouration in imitation of commercial seed treatment. Farmers indicated their willingness to buy seed from the school -- provided that the seed is of good quality.

Community members expressed interest in new varieties, especially of new maize varieties from NARO-Namulonge, orange fleshed sweetpotato varieties, and fruits from NARO-Kawanda such as oranges, guavas and papaya.

7.4 Buziga Parish, Makindye Division (Reach Out Primary School)

7.4.1 Enterprise selection

The crops grown in the communities around the school were sweetpotato, *matoke*, maize, beans, vegetables, cocoyams, sugarcane, cassava and cowpeas. An estimated 70 per cent of households grew sweetpotato. Most households had about 1/8 acre available for cultivation (Table 21).

Table 21. Area under cultivation by farming households in Buziga Parish

Area (in acres)	% of households
1 and above	5
0.25 – 0.5	10
0.125	85

The priority crops in order of importance were: sweetpotato, vegetables (cabbage, *nakati* and tomatoes), beans and maize. Sweetpotato was ranked first because most households (70%) grew it for home consumption. Vegetables ranked second because they have a ready market within the locality and do not require much land. Beans and maize were selected as a majority of households also grew these two crops. Community members suggested that the project works on three crops: sweetpotato, maize and beans.

7.4.2 Sources of agricultural extension information

Environmental Alert, an NGO, provides information on crop production and food preparation to the community and schools.

7.4.3 Assessment of seed demand

The majority of farming households (65%) buy seed, mainly of maize and beans, every season. The main bean varieties purchased are Kanyebwa, Kawuula and Nambale, all local varieties. Farmers purchase local maize varieties from retail and grocery shops in the community. They expressed concerns about seed quality. Some members reported instances where purchased maize seed had not germinated.

Quantity bought depended on the price, which averages around Ush. 800 per kg for beans and Ush. 300 per kg for maize. Farmers expressed willingness to buy seed from the school at a price of Ush. 500 per kg for either crop, and expressed interest in new varieties -- especially Nalongo (Longe 5) variety of maize.

7.5 Ndeeba Parish, Rubaga Division (Lubiri Nabagereka Primary School)

7.5.1 Enterprise selection

There are 15 zones in Ndeeba Parish with about 250 households per zone. Out of the 250 households in each zone, about 40 households are engaged in farming. According to participants, the most important crops grown there were maize, beans, onions, tomatoes, sweetpotato, cassava, *matoke*, cabbage, cocoyam and eggplants -- cocoyams, tomatoes and eggplants mainly for sale and the rest for food. The priority list for food crops comprised, in order of importance: beans, sweetpotato, maize, cocoyams and *matoke*, while the priority crops for sale were maize and *matoke*. Most households in the area can access up to about 1/8 of an acre (Table 22).

Table 22. Area under cultivation by farming households in Ndeebe Parish

Land area (acres)	% of households
1 and above	5
0.25 – 0.5	20
0.125	75

The priority enterprises selected in order of importance were maize, beans and tomatoes -- maize and beans having the advantage of being used for both home consumption and sale.

7.5.2 Sources of agricultural extension information

Community members reported that the presence of an organisation called Women Together for Development (WOTODEV), located in Natete, which teaches improved farming methods particularly for bananas, cassava and cabbage.

7.5.3 Assessment of seed demand

Farming households typically eat all they produce, so they regularly buy seed. The crops for which seed is commonly bought are maize (varieties not known) and beans (Nambale, Kawuula and Kanyebe varieties). On average, each farming household buys about 3 kg of beans and maize seed per season.

Most households buy maize seed from milling factories nearby. Prices vary with source (Table 23). Farmers generally buy bean seed from nearby local markets at an average cost of Ush. 700 per kg. Farmers expressed concern about seed quality: sometimes bean seed is not viable and fails to germinate – even in one case bean seed donated by an NGO. Farmers present agreed that they would buy seed produced by the school. They pointed out, however, that the price they would be willing to pay would depend on yields (i.e. an indication of willingness to pay more for access to improved varieties) and the price of seed from other sources in a given season. Farmers expressed interest in trying out new crop varieties.

Table 23. Sources and prices of maize seed

Source	Ush. per kg
Milling factory	240
Owino market	400
“Container” village [informal shops] next to Owino market	500

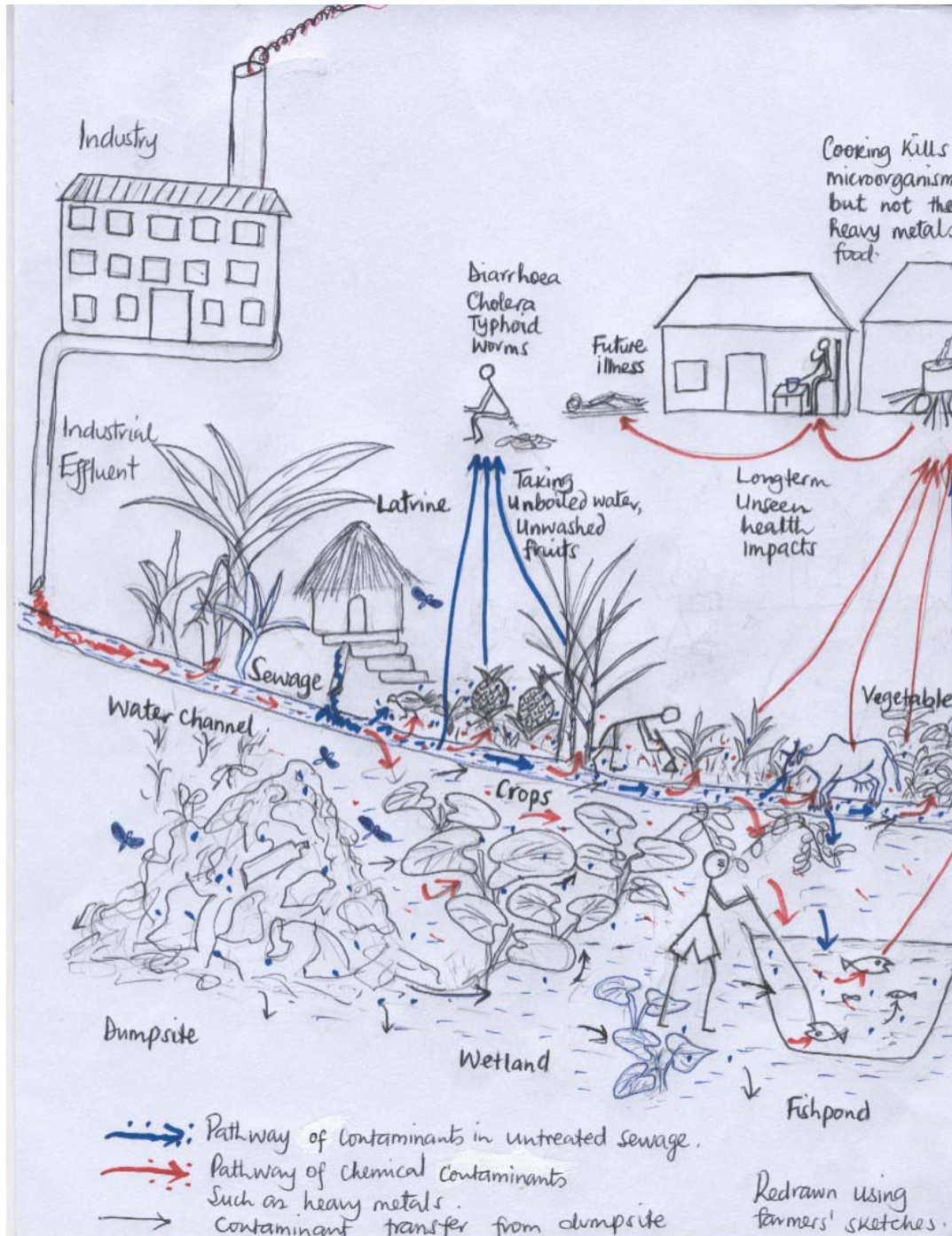
Appendix 1. Characteristics of wealth groups

Wealth Indicator	Very rich	Rich	Average	Very poor
Occupation	Salaried and/or own large business	Salaried and/or own medium size business	Informal employment/ business, e.g. market vendors, <i>boda boda</i> operators, brick making	Informal, casual employment, e.g. casual labour, handicrafts, porters, stone quarrying; some are beggars
Income level	High	High-medium	Medium-low (e.g. Ush. 2,000 per day)	Low to very low
Educational level	Secondary and above	Secondary and above	Primary	None but some have primary education
Housing	Own house or flat with electricity and running water	Own house or flat with electricity and running water, or rented house/flat	Rent 1-2 rooms with no electricity or running water; some own a small house and use water from springs	Rent small rooms for Ush. 5,000/month, or own grass-thatched houses; housing is overcrowded
Assets	Cars, telephones, real estate, farms	Cars, telephones	Inherited land	None
Type of school that children attend	Good, some go to boarding school	Good schools	UPE schools, pay school fees by installment, can afford UPE extra costs	UPE but cannot afford extra costs
Health status	Good	Good	Moderate, often ill with malaria	Poor, high levels of malnutrition
Type of health care system used	Private clinics	Private clinics	Cheap clinic, government health units	
Quality of meals	Eat a balanced diet	Eat a balanced diet	Fair, cannot afford balanced meals	
UPA enterprises and objectives	Livestock for commercial purposes, crop production for home consumption	Livestock for commercial purposes, crop production for home consumption	Subsistence farming, often on borrowed or rented land	

Appendix 2. Possible sources of contamination, exposure pathways and health effects of urban agriculture

Often farmers are not aware of the specific ways in which their agricultural activities have harmful health and environmental effects. During each PUA, these issues were discussed using the following diagram and explanation.

Figure 1: Schematic drawing showing possible sources of contamination, exposure pathways and health effects of urban agriculture



The release of untreated sewage into the water channel and wetlands introduces micro-organisms such as bacteria and worms into the water. The micro-organisms continue to multiply as they feed on decomposing sewage. The micro-organisms and worms can be taken up by animals and people if they drink water from the wetland, eat unwashed fruits or sugarcane grown in contaminated soil, uncooked food or vegetables from the wetland, or handle food with unwashed hands after working in the wetland. The germs, which continue to multiply inside the alimentary canal, may eventually cause diarrhea, dysentery or cholera.

Washing fruits and vegetables with plenty of clean water before eating may remove some of the dangerous micro-organisms and reduce the danger of infection. Proper cooking of food and vegetables before eating kills most of the germs.

However, when industries release chemicals in water channels and wetlands, the chemicals do not decompose but remain in the soil and water. Some chemicals such as heavy metals are absorbed from the soil by food crops and vegetables grown in the wetlands. Sometimes the food crops, vegetables and fruits growing in the wetland directly contact the wastewater from industries during flooding or when soil splashes on them. The chemicals remain on the surface of these crops, and animals feeding on the crops or grass from the wetland ingest the pollutants which accumulate in the meat and the milk and then may be consumed by people.

Cooking of food crops or vegetables does not kill or destroy the heavy metals! Therefore, eating food crops, vegetables, fish or fruits grown in soils contaminated with heavy metals is one of the pathways of transferring heavy metals into the human body. People may also be exposed to the chemical pollutants through contact when working in contaminated soil without protective gloves and gumboots, when eating with unwashed hands, or by inhaling dust while working in contaminated soil. Ingested pollutants such as heavy metals may have long-term health effects that are more difficult to treat.

Appendix 3. Institutions supporting UPA in Bukesa and Banda

Institution	Type
Bukesa - UNFA	National farmers' association
Ugachick	Commercial poultry company
Kadicoba	CBO
Bukesa Urban Farmers	Farmers' association
BUCADEF	NGO
Nsola Zone Women Development	CBO
Banda Living Earth	NGO
Banda Community Development Program	CBO (owns a community center)
Banda Garbage Collectors	CBO (youth involved in garbage collection)
Banda Community Environment Initiative	CBO (youth group involved in sensitization and initiating programs on protecting environment in the area.

Appendix 4. PUA team

Name	Institution
Gertrude Atukunda	NARO
Soniia David	CIAT - Coordinator Urban Harvest in Kampala (formerly SIUPA-K) (to early 2003)
John Jagwe	IITA
Maria Kaweesa	Environmental Alert
Prossy Musoke	Makerere University
Grace Nabulo	Makerere University
A. Namagembe	NARO
Charles Niringiye	NARO
Robinah Nyapendi	IITA
Benson Odongo	NARO
Constance Owori	NARO
Margeret Azuba-Semwanga	Kampala City Council
Silver Tumwegamire	CIP
Lucy Aliguma	Acting Coordinator Urban Harvest in Kampala (formerly SIUPA-K) (from March 2003)
<u>USAIP team</u>	
Fred Baseke	Makerere University
Moses Kalyebara	Plan International
Maria Kaweesa	Environmental Alert
Richard Miiro	Makerere University
Margaret Azuba Semwanga	KCC