Flowering Economy of Naivasha

Impacts of Major Farming Systems on the Local Economy

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by

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Dedicated to …

My parents' lifelong hardwork and determination to educate their children

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Abstract

The Naivasha Lake in Kenya is surrounded by commercial production farms. These farms earn huge amounts of foreign currency, but the extent to which they contribute to the economy of Naivasha is insufficiently known. This study is an attempt to identify major farming systems in order to understand how they affect the economy of Naivasha. Several criteria such as size, ownership, inputs used, produces and production purpose were used for making the distinction between farming systems. The spatial-temporal development of the different farming types were analysed in order to identify the driving forces for particular trends. We found that the employee income is contributing to the economy of Naivasha in form of regular expenditure and savings. We also found that both small and large farms contribute to the economy through local sale of their products. The current farm expansion trend is away from the Naivasaha Lake; towards the Nairobi Nakuru highway and the Naivasha town. In general the large farms contribute more by virtue of their volume of trade however both framing types generate secondary flows of money and employment in Naivasha. We recommend that planning should consider the spatial heterogeneity of different elements and channels which contribute to the economy of Naivasha.

Acknowledgements

Secularism is the way to live **Jai Baba Di**

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1. Introduction

1.1. The pressure on Lake Naivasha ecosystem

The environmental threats to ecosystems are a universal problem nowadays. An ecosystem is composed of biophysical and socio-economic elements and processes, which interact with each other and are interlinked with feedbacks. People can benefit from services provided by ecosystems such as food and water; regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other non-material benefits (World Bank, 2005).

The Lake Naivasha ecosystem is an important and reliable source of freshwater for the region. This ecosystem is under pressure because of the economic activities around it. The transformation of agriculture from traditional subsistence to a modernized and industrialized agriculture sector is a phenomenon observed across the developing world (Pingali, 2007).

The growth of large commercial scale activities in form of the booming flower industry along with the existing small farms around the Naivasha lake have implications on the demand for resources of this ecosystem. The economic activities also cause population growth through generation of employment. The population benefits from the ecosystem services but also causes direct and indirect impacts on the ecosystem (World Bank, 2005). The effect of this demand on resources has been studied many times (Alfarra, 2004; Huatuco, 1998; Perera, 2002). However, the effect of these activities on the local economy and the various contribution channels has not been studied so far. A study to define and locate the elements channels and their role in the economy would be useful. This is essential for so that the government policies regarding can address the issues concerning sustainable economic development.

1.2. Farming systems in the Lake Naivasha area

The farming systems around the Naivasha Lake are among the elements in the Naivasha economy which benefit from the Lake. These farming systems need to be distinguished in order to understand their different economic and environmental impacts. Distinguishing of farms based on size into two major farming systems of large and small farms is undertaken by different studies, but there is no consistent definition. Some previous studies define all the farms of more than 5 hectare as large or medium farms and those of 5 or less hectare as small farm (Hughes, 2001). According to the National Bureau of Statistics (2007), large farms have an average size of around 700 hectares and small farms as those between 0.2 and 12 hectares. Another study defines small farms as those with an average holding size of 2 hectares (Mogaka, 1996). However the

classification can also be based on aspects such as cropping patterns, purpose of farming, irrigated or rainfed farming, level of mechanization. The large farms involved in flower farming can be characterized on the basis of their infrastructure such as greenhouses and the level of export while some can be distinguished on the basis of mechanization and irrigation levels. For example, some large farms are using costly pivot irrigation systems (Ahammad, 2001).

It is also useful to note that farms resources include not only physical items such as land and water, but also social resources such as agriculture information, security and social influence (Solichin, 1996). Each farm has its own inputs and outputs and sometimes the output of one farm enterprise is the input of another (FAO, 2007).The inputs and outputs of a farming system can be expressed in their own physical units and / or in monetary units (Ittersum, 1997). Combinations of inputs and outputs of the production techniques should be analysed to gain an insight in the feasibility of the farming systems (Koeijer, 1999) and not to forget the sustainability. They can also be used a for classifications. Land, labour planning and management activities, seeds, feed, fertilizer, insecticides, irrigation water, farm buildings are the inputs for the production process (Rasul., 1964). Input factors can be defined as a resource which is used in an activity or otherwise used in the management or operation of a farm. Relative to a given time span, input factors may be classified accordingly as to whether they are fixed or variable or whether or not they are under the farmer's decision making control (FAO, 2007).

Any physical product or service generated by an activity can be defined as output (FAO, 2007)**.** At the farming system level, output is income, whereas at the market level output is commodity supply (Sumelius, 2000). The impacts of a farming system result from the use of inputs and their interactions during the production process and they can be positive or negative for the community and or the environment itself. Therefore it is necessary to identify and define and locate the large farms and the small farms as well as their range in terms of size, production type and production purposes and the kind of inputs and outputs used so as to enhance the economic analysis. This understanding can be used to assess their impacts on the local economy of Naivasha through the various channels. Understanding the difference among farming systems can help policy makers to define and guide policy response to societal goals. If certain farming systems provide more local economic benefits than other systems, they may be focused at in order to promote local development. Similarly if certain geographic locations and economic channels or marketing arrangements contribute more then local interests may direct economic development funds towards enhancing them (Krinke, 2002).

1.3 Circular flow of money and local economic impacts

The different elements and channels which contribute to the economy have been studied by Lipsey, (1972). However whether or not all these channels and elements are important in The Naivasha situation is yet to be

studied. Moreover the possibility that there are different spatial patterns depicted by such elements and channels could also enhance the economic planning processes. The general circular flow of money in an open economy is illustrated in Figure 1.1. This circular flow for the economy as a whole includes many components such as firms, households, government and financial intermediaries. Firms generate revenue by sale of their products. This revenue is used for making payments against different input costs. Households providing their services to the firms receive wages which they use to make expenditure and savings. Taxes paid by the households and firms to the government take out the money from the regular flow and they are used by government to procure the goods and services from different firms (Lipsey, 1972). The Naivasha economy is recognised as an open economy and farming systems as well as the employees form the major elements. All the productive activities in an economy are likely to generate some impact on the economy of the region, in which they are located. Policymakers, industry officials, and others often need information on the economic impacts of specific local economic sectors. According to Hodges, (2008) the initial change, the "direct" effect, has "indirect" or "multiplier" effects that reverberate throughout the local economy. The order of magnitude of the impact generated from each sector can be different depending on the various linkages and their strength. The impacts can be for example, in the form of change in income or generation of employment, which may or may not be spatially homogeneous (Krumme, 2003; Richardson & Gordon, 1978; Robert, 2003). Therefore considering that the agricultural sector is a part of the economy establishing the strength of the potentially available agricultural linkages is necessary to understand its contribution towards the economies such as the Naivasha economy.

The production linkages foster growth in agro-processing, food marketing and intermediate input services demand. Production linkages include backward linkages – the input demands by farmers for farm equipment, pumps, fuel, fertilizer and repair services – as well as forward linkages from agriculture to non-farm processors of agricultural raw materials.

While agriculture's direct, private contributions to farm households are tangible, easy to understand, and simple to quantify, its numerous indirect benefits tend to be overlooked in assessing rates of returns (Pingali, 2007). To understand the relation between agriculture and the rest of the economy, a careful investigation is required, which includes identifying various non-commodity roles of agriculture(WorldBank, 2007; Xinshen, 2007). For example, increased farm revenues or increased local spending by farmers means more money circulating in the local community which maintains or strengthens the local economic health. The volume of inputs purchased per farm is also of interest because it is related to the level of economic activity produced by the farm enterprise. Just as the source of the inputs is of economic interest, so is the selling place of farm products –and accumulated profits. As incomes increase, households save more and spend more, stimulating growth and investment in other sectors. Agriculture provides tax revenues and supplies a wide range of raw materials to agriculturally-based local manufacturers (FAO, 2002; Krinke, 2002; Stringer, 2004). Farm

workers use their income to purchase goods and services in the local economy, generating more jobs in the area. These ripple effects are often referred to as the economic multiplier effects, as one job can create additional jobs in the local economy (AgImpacts, 2007). The poor typically spend a high share of their income on food, and therefore benefit from increases in food production that reduce prices. The strength of this effect depends on the degree to which farm production is tradable and the associated price-elasticity of demand (Xinshen, 2006). The primary research methods used to estimate the effects of shifts in supply or

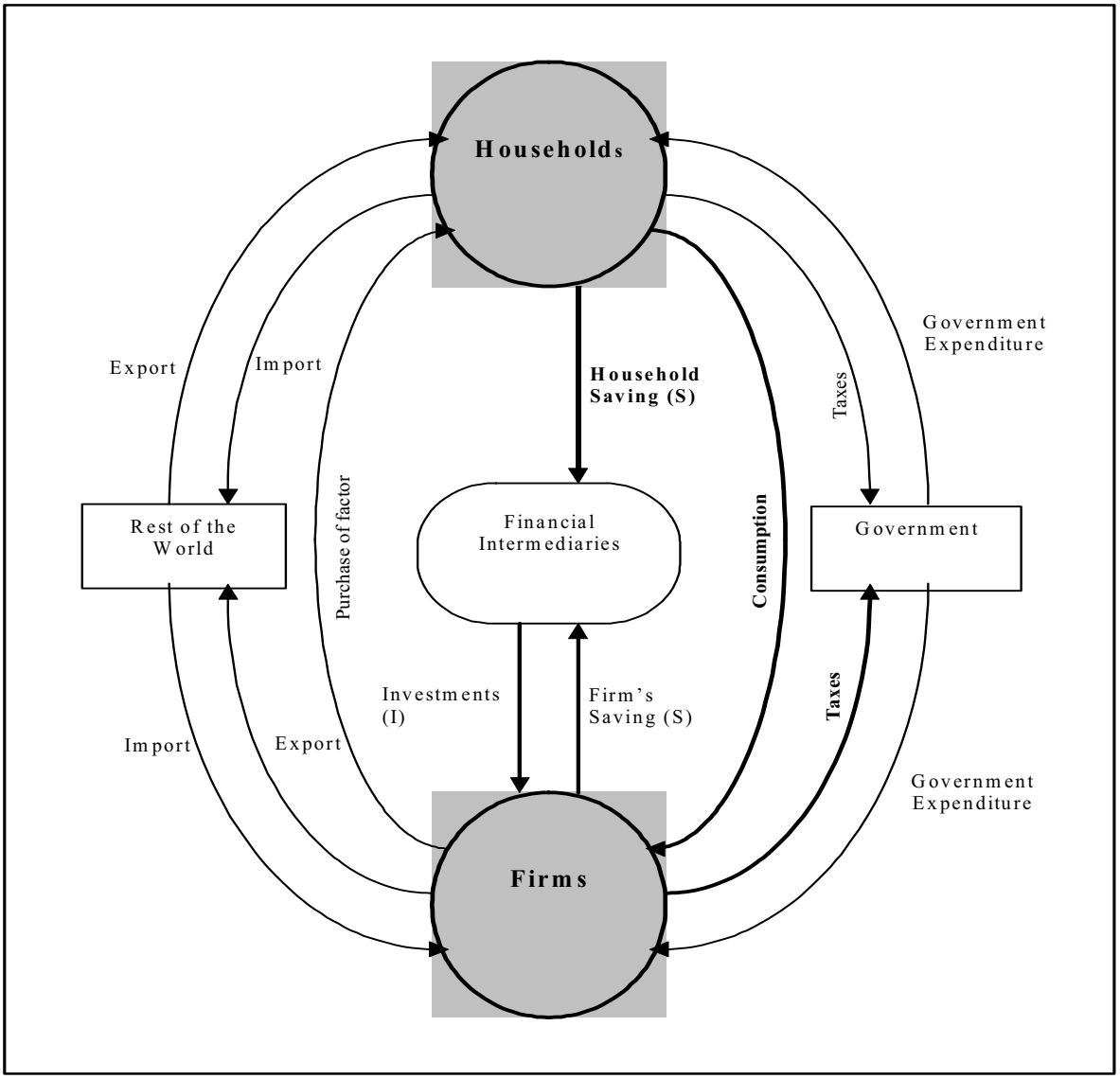

Figure 1-1: Circular flow of money in the economy. Source; Lipsey, (1972)

demand on local economies are local area studies, input-output modelling and other econometric modelling. Local area studies tend to rely on surveys and other data to summarize farm purchases, management and sales at a detailed local level. However spatially resolving the economic analysis could be supplemented by statistical analyses provide a better idea of the economic transactions occurring in the community (Krinke, 2002).

1.4 Problem statement

The rapid growth of the large commercial farms and its pressure on the Naivasha ecosystem has been considered by several studies. However the relative contribution of these large farms as compared to that of the small farmers and the employed community is insufficiently known. Filling the knowledge gap about different types of economic impacts, while considering their possible spatial heterogeneity, could guide well-informed policy and development decision making. Such types of policies and decisions are essential for sustaining the resources of this ecosystem and the economy of the surrounding area simultaneously.

1.5 Research objectives and Questions

This study attempts to define and map the farming systems as well as to analyse theirs and the employed community's channels of contribution to the economy of Naivasha.

Objectives	***Research Questions***
1. To identify the major farming systems around Lake Naivasha and their spatial-temporal development.	1. What are the major farming systems in the area? 2. By what criteria can thefarming systems be distinguished? 3. What changes occurred in their spatial extents over the specified period?
2. To identify the economic inputs and outputs of each system.	4. What kind of economic inputs are used by each system? 5. What is the source of these inputs? 6. What kind of outputs are generated?
3. To assess the contribution generated by both systems to the local economy	7. Through which channels do the farms affect the local economy? 8. How do these channels create economic impacts? 9. What is the spatial distribution of the different components and channels?

1.6 Study Area

Lake Naivasha is situated in the Rift Valley Provinceof Kenya. Its geographic coordinates are: 0^0 45' latitude South and 36^0 20' longitude East. It is situated at an approximate altitude of 1890 m.a.sl. and it covers an area of 140 Km^2 that fluctuates with inflow. Its catchment area is around 3300 Km^2 and it is drained by the following rivers: Malewa, Gilgil, Karati and Little Gilgil (Huatuco, 1998). Malewa and Gilgil rivers flow from the Aberdare Mountains in central Kenya bringing water to the lake. The Lake has no surface outlet. The combination of underground outflow and sedimentation of salts keeps the lake fresh. The area is covered by Acacia woodlands, with papyrus fringed in the shore and Water Hyacinth. The lake supports a diverse waterbird community, with more than 80 waterfowl species regularly recorded during censuses, with 400 avian species in total (Koyo, 2005). In the Lake Naivasha area, the existing farming systems are a major

component of the lake ecosystem. These farming systems derive economic and environmental services from the system. Many of these farms do horticulture and flower farming, which earns a huge foreign currency to the Kenyan government. As a result of the success of both the farming and tourism industry, there has been a local population explosion. According to the 1999 census of Kenya, the population of the Naivasha urban core was 32,000 and the whole of Naivasha municipality was 1,15,000 persons, and the flower and horticulture sector gives direct employment to around 25,000 people with almost the same number of people indirectly dependent on it, both as dependants and service providers (Odada, 2006). Kihoto is an area with small farms, located very close to the town on one side and to the lake on the other side (See Figure 1.2).

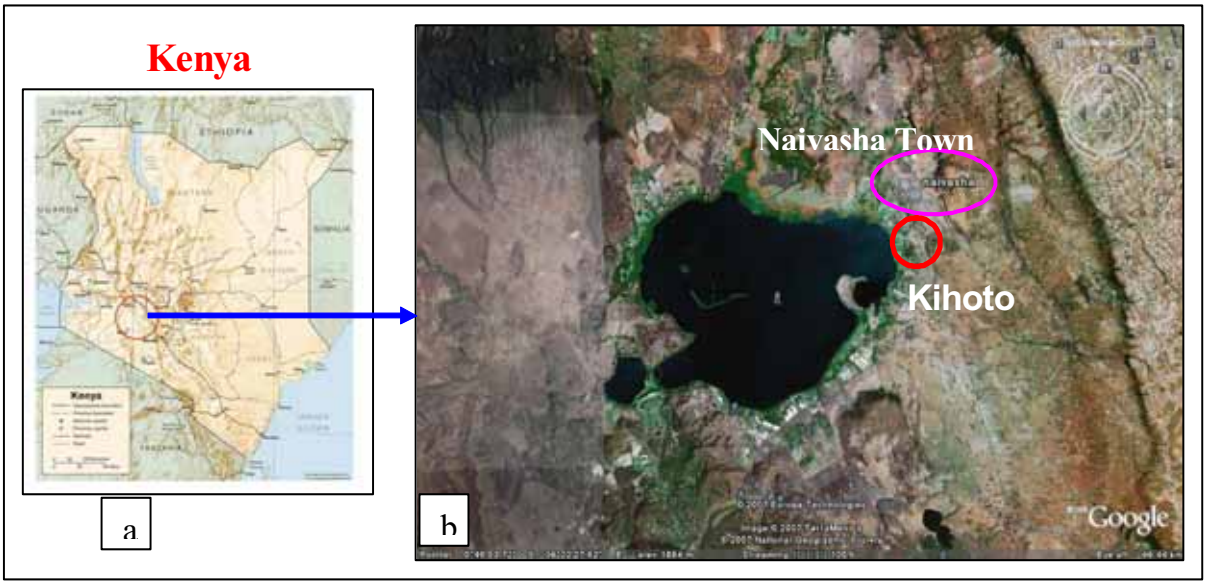

Figure 1-2: Lake Naivasha location in Kenya, (a) the detailed in image of Naivasha (b).
From: (a) (Permatasari, 2004)(b) Google Earth, 2007

1.7 Study approach and methods

The figure 1.3, broadly illustrates the adopted study approach. It is divided into three main phases according to the research objectives. The first objective of identifying farming systems and their spatial-temporal development is shown in the first phase. It includes a review of the previous studies. For example a pre-classification of large farms was done before fieldwork, on the basis of Ahammad (2001). The pre-classification was based on the size, production items and locations of the farms respectively. A stratified random sample was drawn on the basis of this classification. The fieldwork was carried out from 11th September to 8th October, 2007.

The main objective of this field work was to collect primary data through interviewing different categories of stakeholders. These interviews provided information about the socio-economic aspects of farming activities (large and small both) around Lake Naivasha. During the field data collection, the actual sampling of the farms, both large and small, was done based on the availability of the farm representatives. GPS points were

also taken for each farm interviewed. Inside Kihoto, farms were sampled randomly but the interviews depended on the availability of the farmers. Figure 2.2 shows that the sampled farms are distributed in the whole of Kihoto area. Two farms were sampled in the areas of Karagita and Kasarani to see whether there is any difference in the traditional small farms themselves in context of inputs (quantity & quality), produce, production purposes and revenue.

Table shows the different categories of stakeholders who were interviewed. These stakeholders have direct or indirect interactions with the farming activities happening around the lake in different capacities. Stakeholders include farm employees, relevant local businessmen and concerned local authorities. The representatives of local businesses such as banks, supermarkets, and hotel were dealing directly or indirectly with small or large farms. Informal interviews were conducted with some persons who are in the area from a long time and dealing with farming activities. Interviewees also ranked the different economic activities in the order of importance for the development of Naivasha.

All in all the following stakeholders have been interviewed:

Stakeholder Category	**Number of Respondents**
Large Farms	12
Small Farms	9
Large Farm Employees	25
Businessmen	19
Local Authorities	6

A Naivasha municipality territory map was obtained from the University of Nairobi. Some secondary data was obtained from the National Bureau of Statistics, Kenya. Observations and GPS points were recorded. For purposes of spatial visualization and analysing the spatial-temporal development of farms, the maps and tabular data obtained from previous studies and other sources along with GPS points taken were used.

The research approach also included the analysis of the survey results with respect to the identification and definition of the farming systems on the basis of the field work. Farm characteristics such as size, produce types, ownership, location, spatial-temporal development are described to show the overlapping and distinct values between the different farms.

The second objective of identifying economic inputs and outputs of the farming activities is dealt with in the second phase. Data obtained from interviews is classified as farming inputs and outputs. Input-output are analysed from economic point of view to identify the channels of economic impacts. Major physical and non-

physical inputs are reviewed based on the fieldwork collection. They are analyzed for different systems on the basis of their source, available consumption and cost, quality and types. Extrapolation of fertilizers and labour inputs cost for all the large farms is tried using the cultivated area of the sampled farm along with the relevant fertilizer and labour costs. Farm production and revenue generated were reviewed as output for each system.

The objective of economic contribution by the farming systems in the Naivasha area is further elaborated in the third phase through various focused channels identified from the previous chapters. These channels are a part of the circular flow of money in the economy (Lipsey, 1972). In case of Naivasha, channels are analysed using different techniques according to the data availability. Employees' and small farmers' local purchasing data are analysed by scatter plots, correlations and bar graphs. Local sales are also described and presented by bar graph. Extrapolation is done for the expenditure and savings in Naivasa by the total farm employees'. Extrapolation of local sale of vegetables for Kihoto farms and large farms is done using the figures from the sampled small and large farms local sale. In addition, spatial distribution of activity generated by each channel is visualized through maps to (generated using ArcGIS) to show their geographical distribution inside Naivasha. Changes in Built-up area are assessed inside the boundary of Naivasha municipal territory from 1986 to 2007. For this purpose, Landsat and Aster (Resampled) images are used, which are classified (Were, 2008). Opinions expressed by the various stakeholder group representatives during the interviews are also analysed.

This study has the characteristics of an explorative study because the time constraints only allowed collecting a limited sample for the area of interest. The interviews were conducted under these constraints.

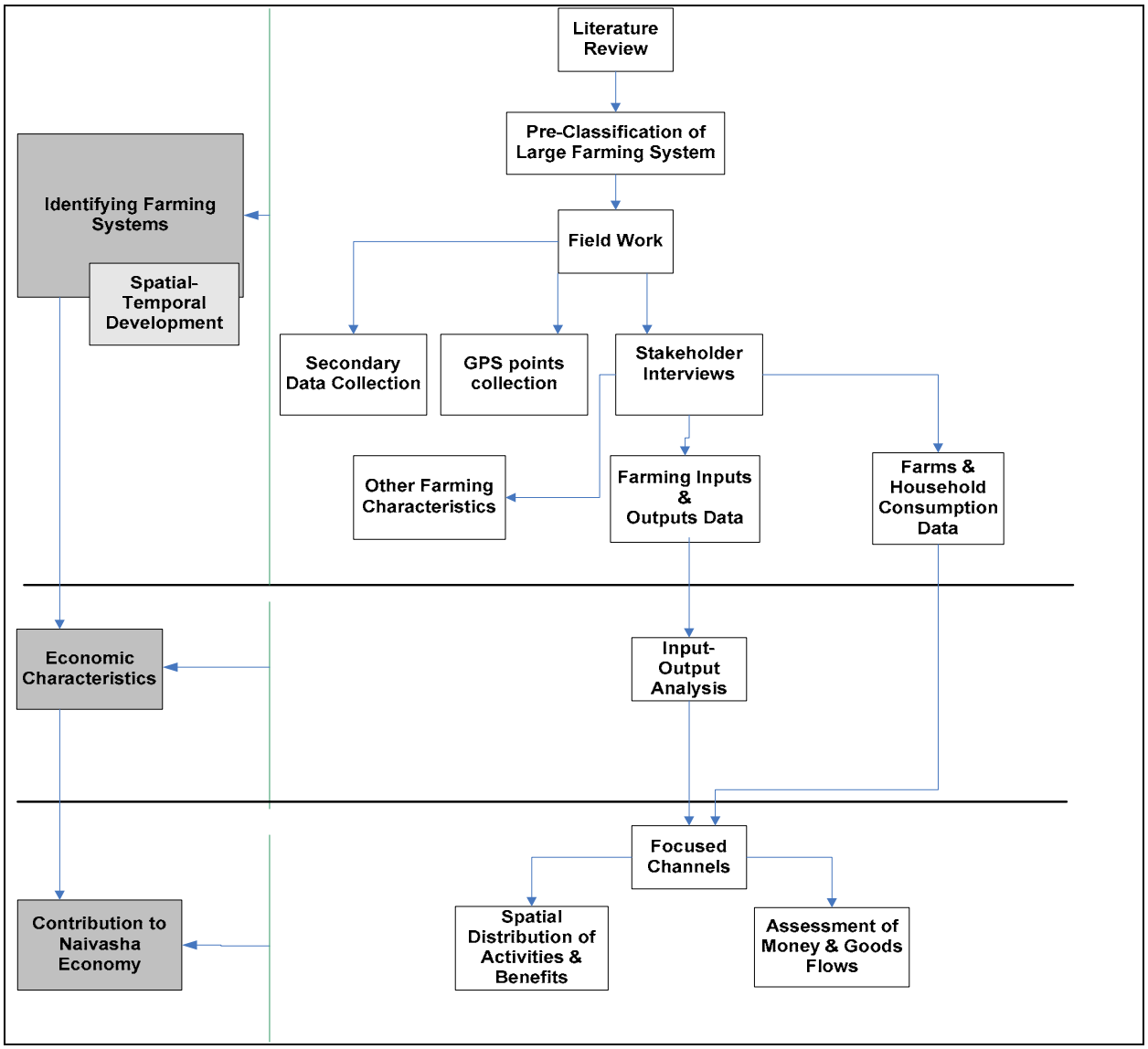

Figure 1-3: Study Approach and Methodology Framework

2. Lake Naivasha Farming Systems Analysis

2.1. Farming Systems

Farming systems are systems and therefore can be analyzed as any other system. The structure of a system is defined by the various characteristics of its components and the interactions between them. The way to process inputs into outputs determines the function of a system. The relevant interactions and feedbacks within certain boundaries are included as well as all those components which are capable of reacting as a whole to external stimuli from a system (Fresco 1992). Therefore to analyze a system it is necessary to understand how the interactions between various inputs take place and under which conditions. It is also important to understand to what extent the activities happening inside a system create impact on other relevant systems and to what extent the system itself gets affected by activities of other systems activities. A system may contain many subsystems, which can be interacting and getting affected by each other. Some systems are more flexible than others.

Farming systems can be a subsystem of a super-system which can also interact with several other physical and non-physical systems as they require a lot of inputs of different nature such as labour, water, land, markets, etc. During the various stages of the production process they use these inputs according to their requirements and thus interact with the input source systems in different ways. For example, different levels of water consumed create different kinds of impacts on the source of water. Similarly, the activities of the farming systems can be affected by other relevant systems. High wage demand in the labour market can force the farmers to reduce the labour intensive work in the production process by more mechanized or automated systems. The market forces of the place where they sell their output can force farmers to sell their produces at lower prices and thus reduce their profit margins. This can have further implications in the long run. The case of Naivasha farming systems is a clear cut case. Some farm representatives (large and small both) complained that over the years their profit margins have been reduced for various reasons such as increasing competition in the markets as well as increasing inputs costs. This is forcing the marginal farms to leave the business or to go somewhere else.

Farm types vary based on size, business organization, input use, marketing methods as well as the types of products grown. There are differences in labour, fertilizer and machinery inputs and the money unit that are recycled into the community under different types of farming systems (Krinke, 2002). Individual farms that broadly have similar resource bases, household livelihoods and constraints, as well as enterprising patterns and for which similar development strategies and interventions would be appropriate, can be defined as “a farming system”, which can include a few or many households, depending on the scale of analysis (Dixon, 2001).

The concept of farming system has important implications for the analysis of the roles of agriculture. The forms and magnitudes of externalities depend to a large extent on the biophysical and socio-economic factors that characterise a farming system (FAO, 2002).

Understanding of the difference among farming systems and their local economic benefits can help policy makers to support the particular type of farming with a certain ownership or marketing arrangements. This support will promote local development and consequently improve regional economy (Krinke, 2002).

To get a preliminary idea of how to identify the farming systems existing around the lake Naivasha, results of previous studies carried out are reviewed. These studies included the MSc research works of ITC in previous years, research done by some other organisations, articles in journals and internet publications.

2.2. Identifying and Defining Farming Systems

- **Pre-Field Work Classification**

The notion that there are at least two distinct farming systems, large farming and small farming, in the area has to be supported by evidence. Therefore, it is necessary to identify and define the farms. The review of previous studies helped to understand the past situation of the farms around the lake in terms of their size, the nature of production, their various input requirements especially water, and their interactions with other stakeholders. This involved the process of identifying various indicators or criteria which can highlight the distinction between the farming systems.

The base for the classification is a table compiled by (Ahammad, 2001) which shows data on total farm sizes and their respective cultivated areas based on the WARP (1997) and previous ITC studies based on cadastral information, satellite images, fieldwork and information from farms.

The farm table of (Ahammad, 2001) for the large farms is aggregated based on the ownership i.e. total area under one owner rather than per individual farm (See Table 2.1) in order to capture the spin-off effect of the farming activities in terms of how much money is going to whom and where? This aggregation is done also for avoiding the possible bias in the nature of the sample by including many farms owned by the same person or group. This same ownership issue could affect the pattern of the farms in terms of employment characteristics (wages, gender, skills and number), inputs using ratios (quantity and quality), produce types.

Based on this information, in the present study a pre-classification of large farms is done based on the differences in the farm sizes, production items and farm locations respectively. This pre-classification was used as a basis for sampling stratification

The ownership based aggregated farms are divided according to various relevant size categories. For categorization based on size, the ITC data are used because they are more reliable and recent in comparison to those of the WARP inventory. Out of each size category, farms representative of the mean size of the whole category or of each quartile of the category are selected. Along with this, variability in produce types is also confirmed. To prevent any kind of spatial bias in the sample selection, farm locations are determined using images and vector files created by the previous researchers of ITC. Selected sample farm locations are well spread around the lake. For this purpose, GIS software ILWIS and ArcGIS are used. The location of the selected sample is shown with the Landsat image of 1995 in the background (See Figure 2.1 in Appendix).

Table 2-1: Aggregated large farms classification and sample

Aggregate Size Ranges (in Ha)	Total Count	Sample Size	Sample Farm Name	Production Items
Below 50	13	4	WETAM INVESTMENTS	Vegetable -Fodder
			MUGUKU	Flowers
			SAFARI HORTI	Flowers
			OSIRUA/KIJABE	Flowers
50-100	4	1	KORONGO	Vegetable
100-300	4	1	LONGONOT HORTICULTURE	Vegetable -Fodder
300-1000	4	1	BRIXIA MARIO	Vegetable
1000-2050	4	1	OLSUSWA	Vegetable -Fodder
2050-3000	3	1	SHALIMER FLOWERS	Flowers
3000-7200	2	1	SULMAC FLOWERS	Vegetables-Flowers

Modified adaptation from Ahammad, 2001

- **Field Work**

In the field priority was given to the farms selected in the Table 2.1, for conducting interviews. But due to problems of accessibility and availability of the relevant person, this priority list had to be drastically revised. Substitute farms were selected primarily on the basis of availability of the relevant person that could provide information, still taking into account the desired distribution over the strata defined in the earlier phase. Their location is indicated in figure 2.2.

To single out the small farms from the large farms, local knowledge was obtained. The Kihoto location was suggested by Dr. Robert Becht, ITC who had been to the area several times in the last 10 years and has considerable knowledge about the physical as well as socio-economic characteristics of the area. Interviews

with different stakeholders also helped in getting a preliminary idea of defining these farms. Generally, the first characteristic considered by the people is the relatively small size of this category of farms. Second is that they are owned by Kenyans. Third is that, unlike the large farms, they use mostly simple hand tools, use less water and fertilizers. Fourth, they produce items which are indigenous to the area such as local beans, peas, tomatos, spinach and maize.

As told by the Kihoto farmers, the small farms area of Kihoto contains 30 small farms. It is unique in terms of combination of local ownership of the farms, farm employee's residences and closeness to Naivasha town, highway and lake. Most farms are inherited by the current owners. These owners are Kenyans. These farms came into being when a white man in the decade of 1960 sold the land to his employees who were Kenyans. Later these small farms, local name 'Shambas', were divided into 30 farms. The unique feature of these shambas is that each of them touches the lake so that it has access to the lake water easily for irrigation. The biggest shamba claimed is of 40 acres. Two samples were taken in the areas of Karagita and Kasarani. For locations, see figure 2.2.

- **Post-Field work Classification**

After the field work, the updated data was used from the ITC database (WWF) to find out the total area under large farms producing various items. The largest area comes under the farms producing flowers which are followed by the vegetables producing farms. The highest number of individual farms is found under the flowers production category. The proportion of area in the sample (Table 2.7 in Appendix) with respect to total farm area from the updated Table 2.2 database is (395 /4362) 0.09.

Table 2-2: Large farms according to produce type in 2007

Produce Type	Total Cultivated area (in Ha)	Number of Farms
Flowers	1781	58
Fodder	326	9
Fodder & Vegetables	501	10
Vegetables & Cereals	205	4
Vegetables	1482	22
Macadamia	50	1
Woodlots	17	1
Total	**4362**	**105**

Source: (WWF, 2007)

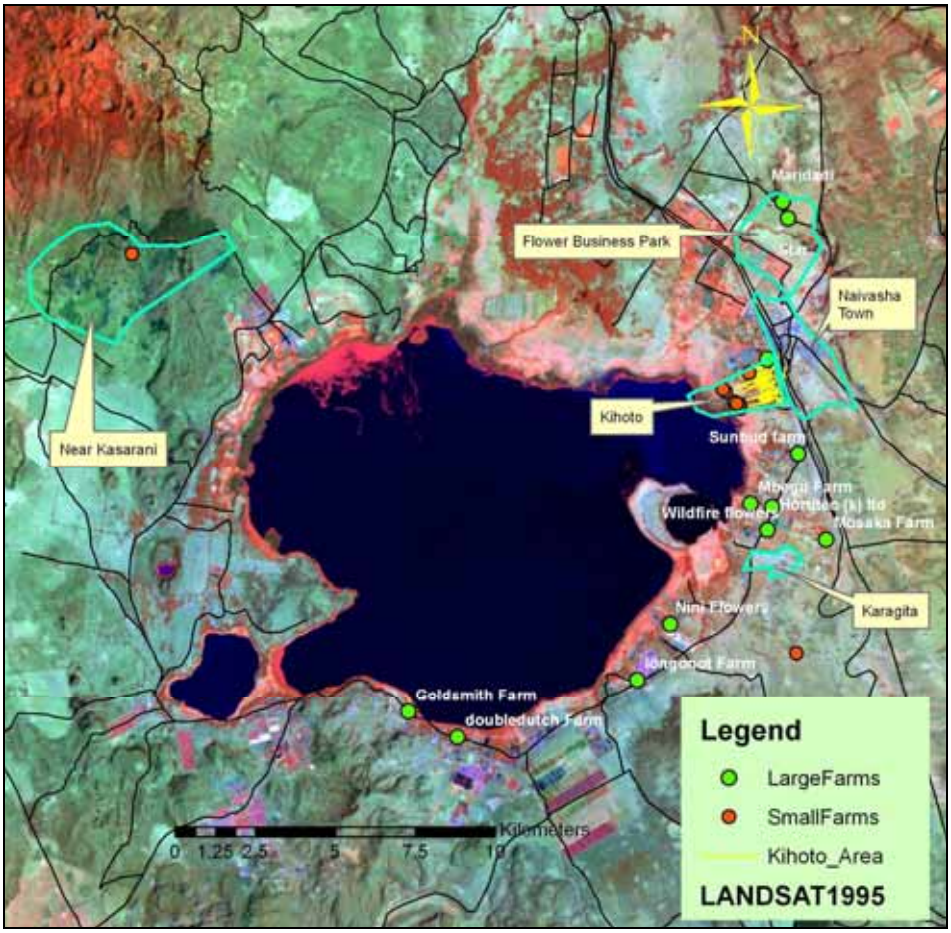

Figure 2.2: Spatial distribution of actually sampled farms

2.3. Spatial-Temporal Development

For getting an impression of the spatial expansion of the farms, earlier ITC studies were consulted (Ahammad, 2001; Harper, 2002). These studies reveal an increasing trend of expansion in large farms starting from 1976 up to 2004. This expansion can be mainly attributed to the boom in the flower industry of the area.

In 1930-40's, there were only farms for fodder crops around the lake shore. By the late 1950's Lucerne was by far the biggest crop around the lake. In 1975, there was only one flower farm in Naivasha, Sulmac (which by then was a division of Brooke Bond company), which was producing Carnations and summer flower varieties such as Statice. Sulmac was at one stage the largest Carnation farm in the world. In the 1980's flower farming really started to bloom and the floriculture industry started taking shape. These farms started expanding and covering particularly the southern area around the lake for the production of flowers and vegetables. Today there are around 40 large farms in the Lake Naivasha area (LNRA Secretary, 2007).

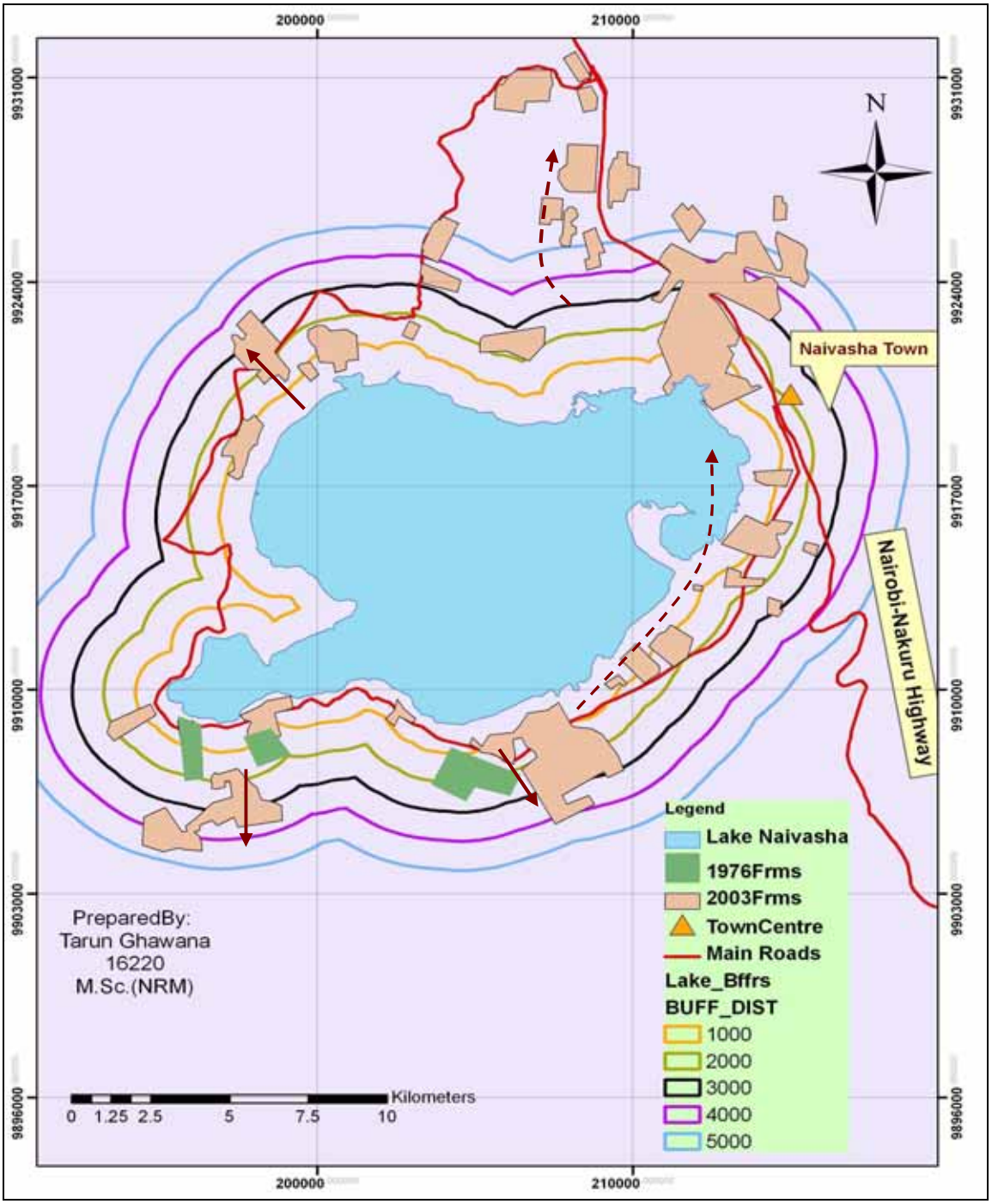

Figure 2.3: Increase in number of large farms from 1976 to 2004 in relation to distance to lakeshore
(For explanation of arrows, see text)

Figure 2.3 shows the farms that have been established between 1976 and 2004. Distance zones from the lakeshore are shown with intervals of 1000 meters. The large farms started coming up after the boom in the flower industry in the area in 1980's (Odada, 2006). The initial expansion was along the lake shore with the availability of the land for it. This was perhaps mainly to stay close to the lake as the source of irrigation. Distance to lake has a direct effect on the irrigation cost. The expansion after 1976 is showing two types of trends (See the arrows in the figure 2.3). The arrows perpendicular on the distance zones are showing that the farms are coming up now far from the lake which could be the result of no more available land for new farms or expansion close to the lake shore. This could also be interpreted as a driver for the farms to shift towards more sophisticated techniques of production such as greenhouses.

Another trend shown through broken arrows is that more farms are coming up towards North-East and South-East side. The reasons behind this could be that after nearly all the available land for farming near the lake is consumed by the farms, the farms are finding it economically attractive to expand towards the sides which are closer to the Nairobi-Nakuru Highway for fast and easy transportation of the produce to Nairobi. Another possible reason is the closeness to the Naivasha town which means easy access to supermarkets, fuel stations and banks. The proximity to the town and highway can reduce the transportation costs of the farms.

This spatial expansion correlates with the increase in irrigated area as expressed in Table 2.3.

Table 2.3: Estimated irrigated area in 1996, 1997, 1998 and 2001

Crops	1996-97	1998	2001
Flowers GH			614
Flowers Open	1280	3598	952
Vegetables	1041	2511	1623
Macadamia	440	-	361
Wheat	140	231	164
Fodder	656	728	756
Grass	24	285	561
Total	**3581**	**7353**	**5031**

NB: WARP:1996-97; Huaccho: 1998; Ahammad:2001. GH = GreenHouses

Source: Ahammad, 2001

The different figures for different years not necessarily reflect increase or decrease but rather a different way of measuring irrigated area.

The irrigated area of WARP 1996-97, Huaccho 1998 and the Ahammad study refer to the irrigated area around the lake. The irrigated area of Huaccho study was obtained using supervised classification of the TM Image of 21st January 1995. The WARP study entered the irrigated area of individual farms in 1996-97 based on field visits (Ahammad, 2001). The total irrigated area around the lake is found to be 5031 hectares in the Ahammad study. Landsat image 2000, cadastral map, road track of field associates and point map of observed GPS points were used simultaneously to delineate the irrigated area of each individual farm using screen digitization in ILWIS in Ahammad study.

The flowers inside the greenhouses in 2001 are covering 614 hectares of irrigated area. Flowers in open area covered less irrigated area in 2001 than compared to 1996-97-98 studies. Irrigated area for grass increased considerably from 1996-97 up to 2001. The difference in the total irrigated area of each study could be affected by the different methodology adapted.

New farms are also coming up over the years, as reported by large farm association representative. These farms are also changing the landuse of the area certainly (See Table 2.4).

Table 2.4: Irrigated area of new farms

Farm	Main Crop	Irrigated Area (Ha)
Herneth (Kenya) Ltd.	Flowers	16
Homegrown (Flamingo)	Flowers	72
Noordam Roses	Flowers	13
Wildfire	Flowers	41
Live Ware Ltd.	Flowers	17
Raymonde	Flowers	19
Three Point Farm	Flowers	253
	Total	**432**

Source: Ahammad, 2001

Not only that the number of irrigated farms increased, also the extent of the irrigated area on existing farms expanded (see Table 2.5).

Table 2.5: Farms with extended irrigated area

Farm	Crop	WRAP (ha)	Ahmmad(ha)	Increased Area (%)
Homegrown-KARI	Vegetables	9	62	588
Marula Estates	Fodder, Grass	374	687	84
Delamere Estates	Fodder, Vegetables	285	523	84
R. Wilcock / Mbegu	Flowers	7	43	514
Nyanjugu	Flowers	2	34	**1600**
Northlake Nursery	Flowers, Vegetables	1	51	**5000**
Sulmac Flowers	Flowers, Vegetables	521	623	20
Longonot Horticulture	Vegetables	1	121	**12000**
Homegrown Marula	Vegetables	20	84	320
Osirua / Kijabe	Flowers	20	40	100
Nini	Flowers	18	38	111
Total		**1259**	**2308**	**83**

Source: Ahammad, 2001

The irrigated area has increased for 3 farms dramatically which could be the result of increased cultivated area. One farm is producing only flowers while one other is producing vegetables only. One farm is involved in a combined production of vegetables and flowers. Others farms are also showing increase of more than 100%.

Table 2.6 shows the steep increase in area for Rose, Solidster and Bupleurum production by 1070% and 1733% from the year 1991 to 1997. During this period, the total area under flower production increased by 152%.

Many farms are going through changes in ownership. The most recent example was revealed during the fieldwork. This particular farm was acquired by an Indian company between the months of August-September 2007.

Table 2.6: Trend in flower production cultivation

Flower	1991 / ha	1993 / ha	1995 / ha	1997 / ha	Change 1991-97(% of1991)
Rose	47	145	210	550	**1070**
Alstromeria	50	115	160	180	260
Spray Carnations	220	185	180	140	36
Statice (Limonium spp)	118	180	225	85	28
Standard Carnations	27	48	54	61	126
Solidster	3	35	50	55	**1733**
Bupleurum	1	45	50	50	**4900**
Cut Foliage	16	30	38	45	181
Chrysan. Cuttings	9	11	10	41	355
Tuberose	10	22	35	40	300
Lisianthus	-	-	14	20	-
Other	138	170	303	343	148
Total	**638**	**986**	**1329**	**1610**	**152**

Source: Ahammad, 2001

2.4. Other characteristics of the large farms

Tenure type

Out of 12 large farms sampled, 8 farms are fully owned by the current operators while 3 are operating on a long term lease basis. Exact lease periods were not disclosed. One farm is owned partly by the current operators while a part of it is on lease (See Table 2.7 in Appendix). Out of 12 farms sampled, 10 are owned by foreigners either directly in the form of individual ownership / group or indirectly in the form of shareholding. Any difference between these categories is not known.

Land price

In case of large farms, the current rate of land for purchasing around the lake is from 1 to 2 million Ksh per acre around the lake. The price of land is drastically lower: 0.2 million per acre, for the farm which is on the other side of the road and far from the lake.

Total farm and crop cultivation area

With respect to total farm size of the 12 large farms sampled, the smallest farm is of 4 hectares while the biggest farm sampled is of 82 hectares, see Table 2.7 in Appendix. 3 farms (25%) are having area less or equal to 17 hectares. Out of 12 farms sampled, 75% are having a cultivated area of less than 50% of the total farm size. In only 1 farm (no. 9) the share of cultivated area is as high as 97% of the total farm size.

One of the reasons given for such a low percentage of cultivated area was the relatively new set-up of some farms. Some other farms do not have benefit of expanding any more because of additional cost. In these farms the irrigated area is equal to the cultivated area, which means that the production is fully irrigated. In the remaining farmland, there are either farm buildings for official / residential purposes or just lying empty as a grass land or falls in the riparian area of the lake.

2.5. Characteristics of the small farms

Kihoto has seen some important changes in landuse over the years as reported by Naivasha Municipal Council authorities and small farmers of Kihoto. The landuse has certainly changed at least for some part, from farm land to residential plots. Farmers are cutting their shamba land as plots for sale as well as building houses to put on rent (See Figure 2.4).

This landuse change is reported to be driven by two factors: Income from farms is insufficient and unstable; secondly, the employees' of the large farms need houses to live as the accommodation facilities provided by the large farms are not sufficient enough for all. This offers the small farmers higher and more stable income than their agriculture activities.

Figure 2.4 a) Farm lands as plot for sale in Kihoto b) Houses on the farm land in Kihoto

Tenure Type

Out of 9 small farms sampled, 7 are owned by the respondents or their family, only one is on lease (See Table 2.8 in Appendix). For one farm, we do not have any clear information on this aspect. The difference in ownership could be expected to make difference in the decisions regarding production techniques, wages level, labour facilities etc.

Land Price

In case of the small farms, there is a considerable increase in the current lease rate / price of the land in comparison to their prices at the purchasing time. The closeness to lake brings more value to the land in general. This can be seen in the case of small farms. For the farms which are far from the lake and can not draw water from it, such as the ones behind the Karagita and Kasarani area, the land price is relatively low. One interesting fact in case of Kihoto is that the land which is very close to the lake is having low price in comparison to the price of land a bit farther from the lake. This is because of the flooding problem of the land part close to the lake. This flooding causes severe damage to the crop (See Figure 2.5 and Table 2.9 in Appendix). One farmer reported that in the current year he has lost around 6 acre of farm land to the high water level of the lake. Whether this happens with this severity every year is not clear. But every year, after the monsoon, some farm land near the lake part goes under water.

Figure 2.5: Flooded farms in Kihoto

Total farm size and crop cultivation area

Out of 9 small farms sampled, total farm size of 8 farms is known and 50% of the small farms is less than 5 hectares. The smallest one was 1.2 hectare while the biggest two were around 17 hectares. The crop cultivated area in around 40% farms is far below 50% of the total farm size (See Table 2.8 in Appendix). The reasons given was the increase in the distance of the land from the lake which makes the irrigation cost more than the production gain. In these cases, most of the land is kept empty with only acacia trees and used as grazing land for their own cattle.

2.6. Comparing large and small farms

While analyzing the data (Refer to Chapter 3 also), it was tried to use several criteria to distinguish into separate categories. There is a considerable overlap in the figures available for most of the criteria and the gap for distinction comes when we see the order of magnitude for particular criteria. (See Table 2.10 and figure 2.6). The common range of size between two kinds of farms is 4 hectare to 17 hectare (See Tables 2.7 and 2.8 in Appendix). But small farms are mostly on the lower side having the minimum farm size smaller than minimum for large farms. In case of produce large farms are generally having flowers as main crop, while in small farms it is vegetables. Large farms do production purely for commercial purposes but small farms produce also for their own consumption. The analysis of all the criterias mentioned in the figure 2.6 is done for the sampled large and small farms. Under the large farm category, Farm No. 2, 3, 5,6,8,9 pass 75% criteria to fall under this category. Under the small farm category, all the farms except farm no. 2, pass 75% criteria to fall under this category.

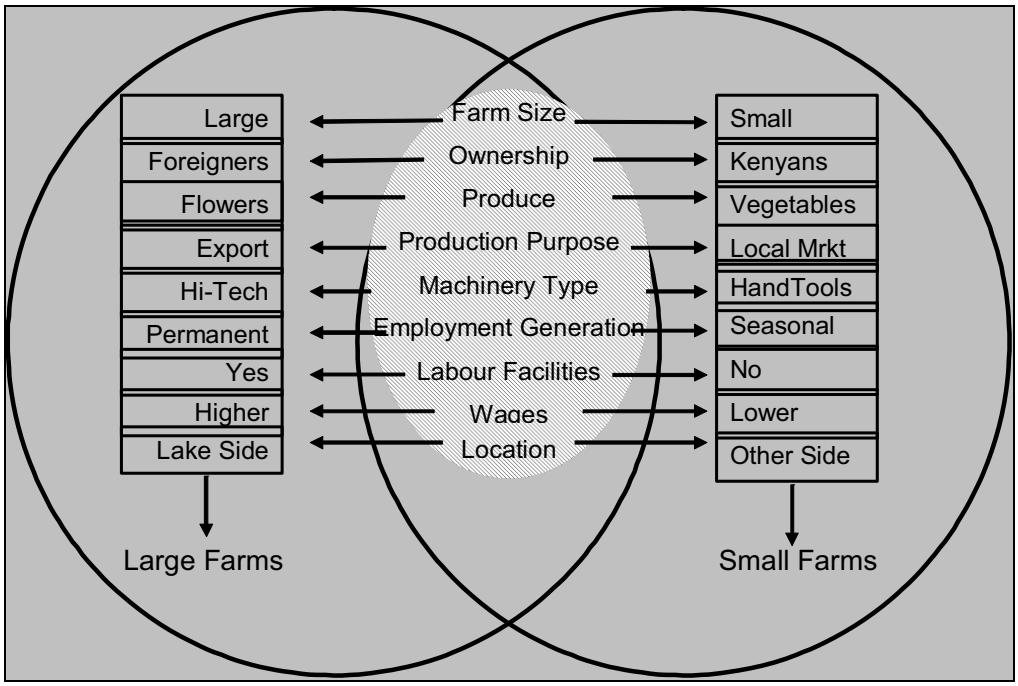

Figure 2.6: Some criteria used for distinction between two types of farms

Table 2.10: Some criteria used to define the distinct farm types

Criteria	Large Farms	Small Farms
Total Farm Size	Minimum → 4 Hectare Maximum → 82 Hectare	Minimum → 1.2 Hectare Maximum → 17 Hectare
Cultivated Area as Percentage of Total Farm Size	Minimum → 5% Maximum → 96%	Minimum → 7.5% Maximum → 96%
Produce	Main Crop→ flowers (Mostly Roses) Vegetable → French Beans, Tomatoes, Onions Cereals → Baby Corn Dairy Seeds / seedlings	Main Crop → Vegetables (Mostly French Beans, Tomatoes; other: local beans, potatoes, cabbages, sukumwaki, spinach); Cereals→ Maize Flowers → Summer flowers and other than roses Dairy, Fuelwood
Ownership	Except one, all are owned & operated directly / indirectly by foreigners.	Except one on lease by a foreigner, all other are owned and operated by locals.

Conclusion

A boom in farm development along the lakeshore occurred in the 1980's. The large farms are now dominating the area with their sheer sizes and the huge money involved in their production processes. The distinction between the farming systems cannot be based only on one criterion. The different criteria analysed are overlapping in the sampled farms. The difference comes when we see the order of magnitude for a combination of criteria considered. The large farms are broadly categorized as those farms which are generally owned / leased by foreigners and mostly involved in, but not limited to, the flower production. Most of the large farms are much bigger in size then the small farms. On the other hand, small farms are those farms which are generally owned / leased by Kenyans and mostly involved in, but not limited to, the vegetable production for local sale. The initial spatial expansion in the farms area was along the lake shore the current trend is towards the town side and the highway.

3. Input and Outputs of The Farming Systems

To understand the effects of the farming activities on the economy of Naivasha, it is important to consider the inputs and outputs of these activities from an economic point of view. This can give an insight in the linkages of these activities with the rest of the economy of Naivasha.

3.1. Farming inputs – water, fertilizers, machinery, labour

Due to the scale of production and the extent of their cultivated area size, large farms require large quantities of water and fertilizers. Thus the sampled farms consume huge quantities of water and fertilizers and also pesticides for the various processes of production. The farms are using hi-tech machinery for production as well as a large amount of labourers.

In small farms, the scale of production is not as big as in the large farms. In case of Kihoto, these farms are using lake water and fertilizers-pesticides for commercial agriculture.

3.1.1. Water

Large Farms

The lake is the prime source of irrigation for the sampled large farms. One farm was reported to draw water only from a borehole (Farm No. 4) and of one farm the source of water used was not recorded. The estimates (see Table 3.1 in Appendix) given by the farm representatives of water consumption for the roses vary from 2 m^3 / day / hectare to 50 m^3/ day / hectare (See Figure 3.1). Difference in produce type does not appear to have a correlation with water consumption per day per hectare. Large Farms do not pay any kind of water charges, except for a one time water permits fees to get permission for water abstraction. The other regular cost occurring to these farms for water use could be accounted under the electrical charges to run the pumps or some maintenance cost for pumps and reservoirs/ aquifers.

Small Farms

In the case of the Kihoto farms also, the lake is the prime source of irrigation. In the case of the Karagita farm, a borehole is used for irrigation. The farm in Kasarani is a totally rainfed farm. Electrical and fuel pumps, canals, sprinklers, underground pipes and boreholes are used to irrigate the fields. The small farms are also not making any kind of payment for water. The only water cost occurring to these farmers also is in the form of electricity charges to run the pumps.

Small farmers are not aware of the amount of the water consumed and do not keep any record regarding the water consumption.

Because the data on water consumption are insufficient, no extrapolation from the sample to all farms could be made in this respect.

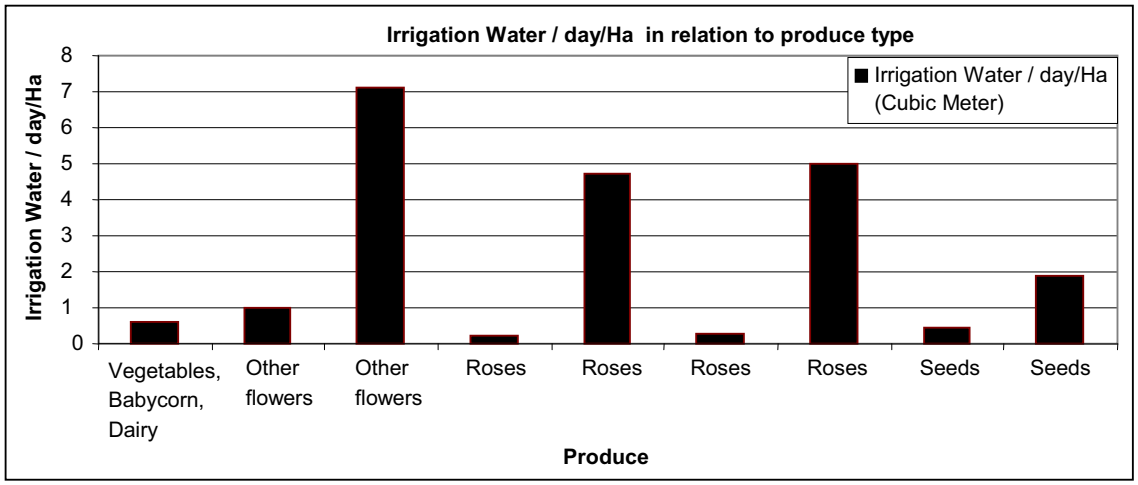

Figure 3.1: Water / day/ Ha in relation to the type of produce for large farms

3.1.2. Fertilizers-Pesticides

Large Farms

In case of large farms, the general tendency is that seed producing farms use more fertilizer per hectare than flowers, vegetables or maize production. With respect to pesticides the seed producing farms generally use less pesticide per hectare than the farms with flowers, vegetables or maize production. Large farms are spending huge amounts of money on pesticides and fertilizers. It ranges from 7.0 million Ksh per annum for pesticides on the lower side and 53.0 million Ksh per annum for fertilizers on the higher side (See Table 3.2 in Appendix). They buy these products mostly from Nairobi based companies.

Small Farms

Estimates (See Table 3.3 in Appendix) given by the small farmers on the consumption of fertilizer per hectare for different produces cannot be compared with each other, because the seasons and their durations mentioned for produces vary. Farmer's were not exactly sure about the consumption of fertilizers or pesticides by each different produce because they buy it for the total cultivation area and do not keep any record of the varying proportions applied to each produce. In case of the flower crop, consumption rates of fertilizer vary from 100 kg / season / ha to nil. The small farmers buy their fertilizers locally.

It has been tried to calculate an extrapolation based on the relevant figures for some of the input costs for the whole of the large farms.

- **Extrapolation of fertilizer cost to all large farms**

To maintain the consistency of extrapolation with the other input calculations, it is done using the cost figures with the crop cultivated area of each type of farm.

Table 3.4: Extrapolation of fertilizer costs for sampled large farms

Produce	Farm No.	Cultivated Area (in Ha)	Cultivated Area (in %)	Fertilizer Cost (in Ksh)	Produce Cultivated Area x Fertilizer cost / ha (in Ksh)	Pesticide Cost (in Ksh)	Produce Cultivated Area x Pesticide cost / ha (in Ksh)
Roses							
	2	5.0					
	3	7.0					
	6	21.0		53 million Ksh /yr (2,523,809 / ha /yr)	2,523,809 x 96 = 242,285,664	7 million Ksh / yr (333,333 / ha /yr)	333,333 x 96 = 31,999,968
	10	21.0					
	11	17.0		12 million Ksh (705,882 / ha /yr)	705,882 x 96 = 67,764,672	20 million Ksh (1,176,470 / ha /yr)	1,176,470 x 96 = 112,941,120
	12	25.0					
		96	**64**		Av total 154,000,000		Av total 72,500,000
Other Flowers							
	5	4.0		3 million Ksh (inclusive of Pesticides)			
	8	4.0					
	9	(Total 39) 32.0		9 million Ksh / yr (281,250 / ha /yr)	281,250 x 40 = 11,250,000	17 million Ksh (531,250 / ha / yr)	531,250 x 40 = 21,250,000
		40	**27**				
Dairy, Vegetables, Baby corn							
	4	9.0					
		9	**6**				
Seeds							
	1	1.2					
	7	1.5					
	8	1.0					
		3.7	**3**				
		149	**100**				

NB: Crop Cultivated area of the individual farm is used to calculate the fertilizer / pesticide costs per ha in the columns (Fertilizer Cost (in Ksh) and Pesticide Cost (in Ksh)).
: Collective subtotal of Crop cultivated area for each produce is used to calculate the values in the column (Produce Cultivated Area x Fertilizer cost / ha (in Ksh) and Produce Cultivated Area x Pesticide cost / ha (in Ksh)

For fertilizer, maximum cost for roses is found in farm 6, minimum cost for roses in farm 11 (from the column 'Produce cultivated area x Fertilizer cost / ha'). Using these values in combination with the figure for farm no. 9 (other flowers) gives us a maximum and minimum value for 91 % of the cultivated area. Dividing this by 91 and multiplying by 100 results in a maximum and minimum expenditure for all the sampled large farms of 278,610,619 Ksh / year and 86,829,310 Ksh / year respectively.

In the same fashion, for pesticides, maximum cost for roses is found in farm 6, minimum cost for roses in farm 11 (from the column 'Produce cultivated area x pesticide cost / ha'), using these values in combination with the figure for farm no. 9 (other flowers) gives us a maximum and minimum value for 91 % of the cultivated area. Dividing this by 91 and multiplying by 100 results in a maximum and minimum expenditure for all the sampled large farms of 147,462,769 Ksh / year and 58,516,448 Ksh / year respectively.
Applying now the total cultivated area of all the large farms around the lake from the Table 2.2, i.e. 4362 hectare, the cost/ha with minimum and maximum figures of our sample can be used to establish the **approximate total figure of payment by all the large farms for fertilizers and pesticides, with a maximum and minimum range.**

For fertilizers it will be 8,156,372,618 Ksh / year using maximum figure of cost,
or
Using minimum figures, it will be 2,541,942,619 Ksh / year

For pesticides it will be, using maximum figure of cost, as 4,316,997,304 Ksh / year.
or
Using minimum figures, it will be 1,713,078,833 Ksh / year.

3.1.3. Machinery

Large Farms

All the farms are using various kinds of machinery (See Table 3.5 in appendix) ranging from tractors to hi-tech computerized fertigation (= fertilizer mixing with water for produce) systems for different processes of production. Some of the machines are imported such as the fertigation systems, while some others, such as tractors, are purchased from Nairobi. Some machines used are of general nature such as tractors, drip irrigators, sprinklers, spraying machines and electrical pumps but other machines are only used for very specific types of produce. For example, defoliator machine and motorized mist blowers are used only in the case of flower production. Similarly, a seed clearing machine is only associated with the seed processing activity. Usage of machinery does not show any strong correlation with the cultivated area size. It is more related to the produce. For example, the defoliator machines exclusively used by flower farms are used by a farm of 21 hectares as well as one of 32 hectares. Another example is the fertigation machines which are used by most of the large farms. This machinery cost the farms huge amounts in the form of maintenance. Maintenance of greenhouses cost 10,000 Ksh / hectare to one farm. Another farm spends around 4,000 ksh / day only on fuel for the vehicles. Cold storages cost from 20,000 Ksh per month to 0.6 Ksh million per month.

Small Farms

Small farms are using mostly the simple hand tools (See Table 3.6 in appendix). Fuel or electrical water pumps are used for irrigation. These pumps and tools are purchased locally from Naivasha town or Nairobi. The tools do not cause the farmers any kind of maintenance costs. Maintenance cost for the usage of fuel or electrical pump was told to be negligible.

- **Electricity expenditures**

Electricity expenditures incurred by each of the individual large farm goes into millions of Ksh. This expenditure occurs into the form of bill payments to the electricity company or the fuel charges for running the generators. The electricity company has monopoly over the electricity supply in Kenya.

In the case of Kihoto, the small farmers reported to pay regular monthly bills for their household electricity consumption to the electricity supplying company. In one case where a farmer is using an electrical pump, he also reported to pay bills on regular basis. In the area behind Karagita, the farmer is using a borehole for irrigation, for which he uses an electrical motor to draw the groundwater. Here also payments are reported to be made regularly @ 6,000 Ksh / month.

Because of the fragmentary nature of the information, wide diversity of machinery used and lack of clear relation to produce type and area, it is not possible to extrapolate findings to the total number of farms and express its influence on the economy of Naivasha.

3.1.4. Labour

Large Farms

Labour is the most dynamic and the most important input in the production process. Large farms are generating mass employment. For example, large farms producing seeds are using 41 labourers / hectare. In the farms producing other flowers the labour ratio per hectare ranges from 6.5 to 25. For vegetable and cereals, it is 40 / hectare and 4.5 / hectare respectively. Even though large flower farms are using hi-tech machinery for their production, it is still a labour intensive industry. There is no relationship of the cultivated area with the labour use per hectare. Farm no. 3, having cultivated area of 7 hectare, uses 19 labourers / hectare while the farm no. 5 uses 25 labourers per hectare. Most of the large farms are using the permanent type of labour with additional seasonal labour. Some representatives of large farms stated that they need

generally seasonal worker for the harvesting process of different produces. The number of permanent employees is higher than that of seasonal or contractual employees (See Table 3.7 in appendix).

> In an interview, an old resident of the area told that even back in the decades of 1970-80, each farm used to hire seasonal employees at harvesting time. On the Southern lakeshore, Sulmac was the biggest farm which probably had 1500 employees, Oserian had from 250 to 500.

Most of the sampled farms use a combination of semi-skilled and unskilled labour. Some of them use only unskilled labour. Some others use skilled labour in combination with semi-skilled or unskilled labour.

Small Farms

Small farms also generate employment according to their capacity (See Table 3.8 in appendix). It is difficult to quantify the data in exact numbers as it is expressed in different units (from mandays to number of people, per season or per day). Vegetables and flower production consume most labour as their crop area is comparatively larger and their various processes, such as sowing and harvesting, demand intensive work. The labour type is mostly seasonal / casual in the small farms. The number of permanent employees is far less than that of seasonal labour. Most of the sampled farms use unskilled labour. Only for flower and dairy production some skilled labourers are employed.

- ***Direct Costs of Labour***

Wages

The monthly gross wage of the general worker in the large farms is on average around 4,500/- Ksh / month and ranges from a 3,000 Ksh / month minimum to a 9,000 Ksh / month. The maximum applies for skilled labourers (See Table 3.9 in Appendix). In small farms payments are made on daily basis, and sometimes on weekly basis. The average wage rate varies from 100 to 150 Ksh per day (See Table 3.10 in Appendix).

Extrapolation for large farms – wage cost

For extrapolating the wage cost for large farms for different produces, the figures from the Tables 3.7 and 3.9 (in the Appendix) are used as base figures. These figures are combined in the composite table (See Table 3.11) for each produce category. Crop cultivated area is used with average monthly wages for showing a framework for extrapolation because in the large farms, around 90- 95% labour is employed directly in the production process. Rest 5-10% staff comes under different categories such as security, administrative office etc.

Considering the large difference in the crop cultivated area and the number of employees for each produce type, the minimum and maximum figures are calculated. Applying the wage / ha from column 'No. of Employees x Avg. Monthly Wages (in Ksh)', to total hectare of produce type gives us the values in the column 'Employees Average Monthly Wages / Ha x Total Crop Cultivated Area for Produce'. Adding all minimum and maximum values for the column 'Employees Average Monthly Wages / Ha x Total Crop Cultivated Area for Produce' gives total minimum and maximum labour cost for total sample.

The total average minimum monthly labour cost for all the sampled large farms around the lake can be extrapolated using figures (from column 'Employees Average Monthly Wages / ha x Total Crop Cultivated Area for Produce') for farm no. 1, 2, 5 and 4 as 12,109,437 Ksh.

On the other hand, the total average maximum monthly labour cost for all the sampled large farms around the lake can be extrapolated using figures (from column 'Employees Average Monthly Wages / ha x Total Crop Cultivated Area for Produce') for farm no. 8, 6, 9 and 4 figures 13,813,245 Ksh.

Dividing the minimum and maximum value of 'Employees Average Monthly Wages / ha x Total Crop Cultivated Area for Produce' with total hectare of sampled farms gives labour cost / hectare.

Applying this to the total cultivated area from table 2.2 gives a range of labour cost / month occurring to all the large farms around the lake.
using the minimum cost over total cultivated area of the sample times total cultivated area will give us the **approximate total minimum figure of average labour wage cost / month for all the large farms i.e. 503,060,611 Ksh.**
Or
using the maximum cost over total cultivated area of the sample times total cultivated area, will give us the **approximate total maximum figure of average labour wage cost / month for all the large farms i.e. 573,841,664 Ksh**.

Table 3.11: Extrapolation of labour wage cost for sampled large farms

Farm No.	Produce	Crop Cltvtd. Area		No. of Employees	Avg. Monthly Wages (in Ksh)	No. of Employees x Avg. Monthly Wages (in Ksh)	Employees Average Monthly Wages / Ha x Total Crop Cultivated Area for Produce
		(Ha)	(%)				
1	Seeds	1		50	3,000	150,000 (150,000 / Ha / month)	150,000 x 6 = 900,000
8	Seeds, cutflowers	5		150	7,000	1,050,000 (210,000 / Ha / month)	210,000 x 6 = 1,260,000
	Subtotal	**6**	**6**	**200 (7%)**			
2	Roses	5		129	4,200	541,800 (108,360 / Ha / month)	108,360 x 54 = 5,851,440
3	Roses	7		136	5,500		
6	Roses	21		505	5,550	2,802,750 (133,464 / Ha / month)	133,464 x 54 = 7,207,056
10	Roses	21		454	3,800		
	Subtotal	**54**	**51**	**1,224 (44%)**			
5	Other Flowers	4		140	3,300	462,000 (115,500 / Ha / month)	115,500 x 36 = 4,158,000
9	Other Flowers	32		819	4,500	3,685,500 (115,172 / Ha / month)	115,172 x 36 = 4,146,192
	Subtotal	**36**	**34**	**959 (34%)**			
4	Dairy-Veg-Crls	9		400 (15%)	3,000	1,200,000 (133,333 / Ha / month)	133,333 x 9 = 1,199,997
	Subtotal	**9**	**9**	**400 (15%)**			
	Total	**105**	**100**	**2,783 (100%)**			

NB: Crop Cultivated area of the individual farm is used to calculated the average monthly wages / ha in the column (No. of Employees x Avg. Monthly Wages (in Ksh))
: Collective subtotal of Crop cultivated area for each produce is used to calculate the values in the column (Employees Average Monthly Wages / Ha x Total Crop Cultivated Area for Produce)

Based on the sampled total labour and total cultivated area of the Table 3.7 in Appendix, the average labour per hectare for large farms is 24.

Using the figures from the table 2.2 of the total farm area covered as 4362 hectare, we can get the **labour force for all the large farms as 105,000 approximately.**

- ***Indirect cost of labour***

Labour facilities

Large farms provide their permanent employees with all the benefits of working in a regular industry such as housing, transport and medical provisions (See Table 3.12 in Appendix).

Out of 12 large farms in the table, 7 provide housing to their labourers. The farms which don't provide housing to their general workers provide them the transport facility.

Seven farms provide subsidised or free food and / or drinks to their workers during duty hours. In case of subsidised food, generally half of the cost of the food is paid by the company and the other half by the worker in which case the workers have to pay 5-10 Ksh per meal.

In one case, the farm management has opened a subsidised kiosk for the labourers to buy some groceries at cheaper rates. One farm owner, who has recently acquired the farm, claimed that they are planning to give a piece of farm land to workers to grow vegetables for their own consumption. A representative of another flower farm stated that they have allocated a small piece of farm land for vegetable production to sell the vegetables to employees on a lower rate. In some cases, it was reported that to the employees who do the spraying work, free milk was given as a preventive measure against the health-risk due to the nature of the job.

Five farms were confirmed to provide basic medical facilities such as first aid, free medicines and nurses. Some of them are providing a clinic facility with a doctor on the farm. In other cases, when no clinic is on the farm, the labourers can go to a particular hospital in the area and get treated free of cost. Some labourers stated to be not satisfied with the available medical facilities although these remarks were not of a very serious nature. Employers also contribute to the National Health Insurance Fund and the National Social Security Fund. In some cases they are contributing the full amount of these funds while in some other cases they pay half of it.

One farm, which is not part of the sample, has provided a hospital, school and housing facilities to its employees on the farm and is considered by the employees of other farms as an example for the high standard it maintains.

Out of 8 small farms, 3 farms provide housing to their employees. Some of them provide labourers with food or drinks during duty hours. In almost none of the cases any kind of protective gear is provided. There is no provision of medical facilities for the employees. There is no contribution by employers to neither the National Health Insurance Fund nor the National Social Security Fund.

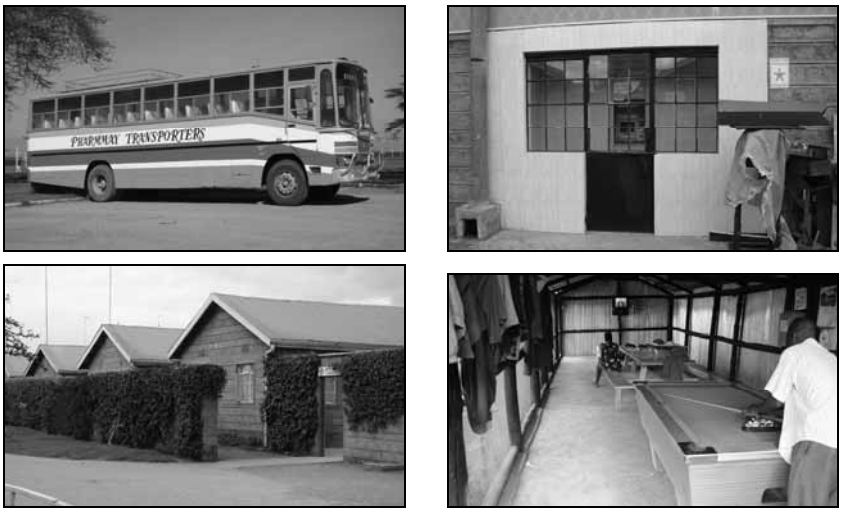

Figure3.2: ***Labour Facilities***: (top left) Transport for Employees (top right) ATM machines inside farm premises for employees use (bottom left) Housing Facility inside farm premises for employees (bottom right) Sport facilities inside farm premises for employees.

Figure 3.3: Subsidized canteen for employees inside the farm premises

3.2. Farming outputs – Production and Revenue

Farms use all these inputs in the production processes to produce various crops. These crops include flowers especially roses, vegetables and seeds. These crops are produced for different purposes and different markets. Sale of these produces generates revenue to these farms.

3.2.1. Production

Large Farms

The large farms mainly have a monoculture production. Most of the sampled farms produce flowers, while some others produce seeds / seedlings and vegetables. About half of the flower farms produce roses (See Table 2.7 in Appendix). Each individual farm produces millions of stems of flowers, respectively tons of vegetables or cereals each year (See Table: 3.13 in Appendix). Figures are expressed in different units by the farm representatives. Most of the respondents could give figures about last year's production, but only few were able to give them for the previous year's production.

Production has been increasing over the past few years in the sampled farms, which can be attributed both to expansion in area by the relatively new farms, to better technical efficiency and to farms having become fully operational in the course of time. Along with the increase in production, the cost of production is also increasing, which can be attributed mainly to the increase in cost of fertilizers, labour, machinery etc. All production items in these farms such as flowers, vegetables, seeds and cereals are mainly for export to direct and auction markets in the UK, Holland, Japan, and Dubai. Some products, e.g. seeds, go to large farms inside Kenya.

Small Farms

All the small farms sampled are engaged in mixed farming (See Table: 3.14 in Appendix). In case of Kihoto farms, the flower and vegetables are produced only on that part of the land where irrigation facilities are available. Dairy products such as milk and meat are sold in the local market. For milk, Kihoto buyers come directly at the farm and some hotels in Naivasha town are supplied by the farmer. Meat is sold to the butchers in the town for which they come with their own vehicles. The grazing land for this dairy livestock is not counted under the crop cultivation area of traditional small farms.

The main items of production in small farms are vegetables followed by cereals (Maize) and flowers. Among the vegetables produced, only French beans are produced for the purpose of export which goes again thru Nairobi based agents. Its production varies from 4 to 16 tons / year by individual farms. Other vegetables such as local beans, tomatoes, sukumwaki and cabbages etc. goes to the local market. Flowers also go for export through Nairobi based agents. Maize is produced mainly for own consumption. Its production varies from 1 ton to 3 tons / year on individual farms.

3.2.2. Revenue

Large Farms

The lowest revenue is earned on the only farm in the sample which is producing vegetables and cereals. The highest annual revenue is coming from a rose producing farm, although its crop cultivated area is considerably less than that of a farm producing flowers other than roses (See Table 3.15 and Figure 3.4). This farm is situated off -lake side. Table 3.15 shows the farms records arranged according to the ascending order of revenue per ha. Again, farm No. 9, producing is having the lowest revenue per ha while the farm No. 12, is again on the highest side of revenue per ha. Figure 3.4 shows the revenue earned per ha by each farm in relation to its produce. Rose producing farms are in general earning more per ha in comparison to other produce farms. However, keeping in view, the small size of our sample, having only one farm under most of the produce types, this result can not be used as a general trend for all the farms.

Table 3.15: Revenue for large farms for 2006

Farm No.	Location	Total Farm Size (Ha)	Crop Cultivation Area (Ha)	Produce	Total Farm Revenue (Ksh per year)	Farm Revenue per Ha (Ksh per year)
4	Off-Lake side	20	9	Dairy, Vegetables, Cereals	4,500,000	500,000
2	Lake side	8	5	flowers (roses)	3,000,000	600,000
9	Off-Lake side	40	32	flower (hyperican, Molucella)	260,000,000	8,125,000
8	Lake side	40	5	hybrid seeds, cutflowers, seedlings	60,000,000	12,000,000
6	Lake side	28	21	flower (roses)	270,000,000	12,857,000
7	Lake side	32	1	veg.seedling, flower seeds, tree seedling	20,000,000	20,000,000
12	Off-Lake side	82	25	flowers (roses)	765,000,000	30,600,000
		Total	**98**		**1,382,499,930**	

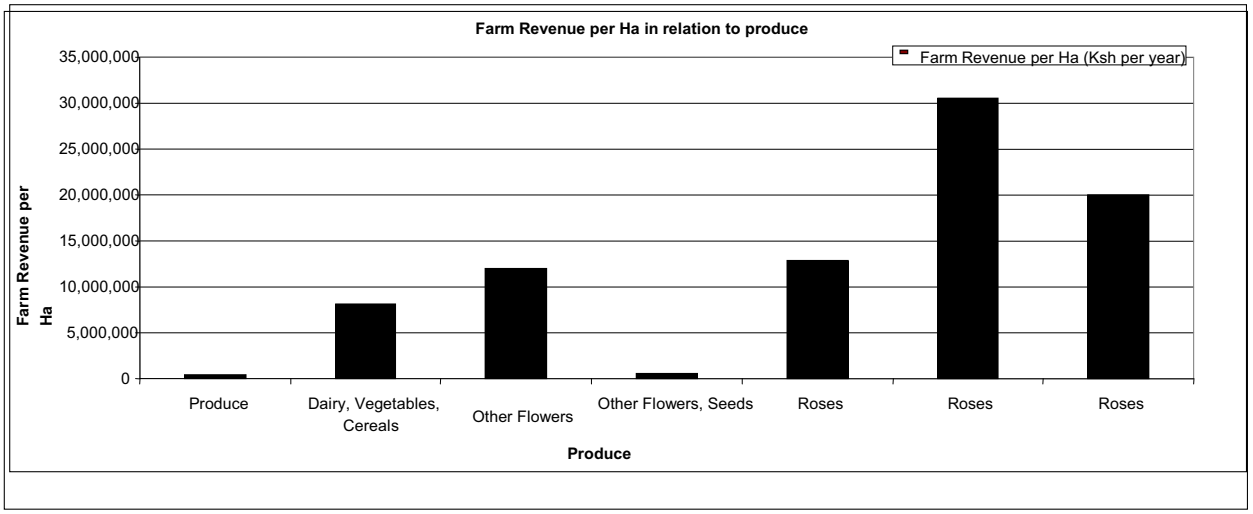

Figure 3.4: Farm revenue per Ha related to types of produces for large farms

- **Extrapolation of total revenue for all the large farms**

Using the total figures for cultivated area and revenue from the sampled farms (See Table 3.15) with the total cultivated area from table 2.2 gives 61,535,354,027 Ksh per year i.e. **61,535 million Ksh per year as total revenue for all the large farms.**

Small Farms

In small farms, revenue figures are dramatically less (See Table 3.16). In case of Kihoto, one 17 hectare farm is having total farm revenue of 1 million Ksh / yr, while another farm of the same size in Kasrani, situated on a slope near the ridges, is fetching only 40,000 Ksh / yr. This difference can be attributed to the cultivated area size, terrain conditions and the lack of irrigation facility since this second farm is totally rainfed with produce restricted to only maize and local beans. Even access to the market can be a cause for difference in revenue, since the farm in Kasarani was not approachable directly by automobiles. In figure 3.5, the left picture shows the farmer interviewed in Kasarani taking out the produce from the farm on a bicycle. Note the terrain conditions surrounding it. The Kihoto farms are on a flat terrain. Export companies are directly coming to the farm using their own vehicles (See figure 3.5 right picture). The closer proximity to the Nairobi-Nakuru highway and Naivasha town implies easier access to the local and external markets. When performing a nearest road distance analysis in ArcGIS software the Kihoto farms were found to be approximately on an average distance of 700 meters from the main road. The Kasarani farm is approximately 4 km from the main road while the farm located in Karagita is on the distance of about 1.5 km.

Figure 3.5: The difference between Kasarani (left) and Kihoto area farmers (right) in terms of access to markets.

The difference in the revenue per hectare between the two farms on the off-lake side location can be a result of difference in irrigation facilities. The farm other than the rainfed is having a borehole for irrigation.

The farms on the lake side are Kihoto farms directly getting the water from the lake. This could be one reason of their comparatively high revenue per ha. The sale of French beans contributes most to the revenue from the farm production in most of the cases since they are for export thru agents and fetch a good price. Flowers are also produced for exports and earn a respectable sum in relation to their crop area. Tomatoes and other vegetables are produced for sale in the local market but strongly provide the financial support to most of the producers especially in case of limited access to outside markets for their products. Cereals are generally

grown for own consumption (See Table 3.17 in Appendix). Selling places are at the farm gate and on the local market. Generally buyer's come with their own vehicles to take the produce.

Table 3.16: Revenue for small farms for 2006

Farm No.	Location	Total Farm Size (Ha)	Crop Cultivated Area (Ha)	Produce	Total Farm Revenue (Ksh per year)	Farm Revenue per Ha (Ksh per year)
8	Off-lake	16.8	4.8	local beans, maize	40,000	8,400
6	On-lake	7.7	5.6	Flowers, Vegetables, Dairy Production, Fodder	1,000,000	178,600
1	Off-Lake	1.2	1.0	Vegetables (sukumwaki, tomatoes, localbeans, potatoes, maize)	300,000	300,000
4	On-lake	4.8	3.2	veg, dairy milk	1,600,000	500,000
7	On-lake	16.8	1.2	Flowers, Vegetables, Dairy Production, Fuelwood	1,000,000	833,300
5	On-lake	6.5	0.8	vegetables (f.beans, tomatoes, sukumwa, cabbages), flowers	800,000	1,000,000
3	On-lake	2.8	2.0	Vegetables, cereals, fodder, fuelwood plants, grazing land	2,400,000	1,2010,000

- **Other Sources of Income for small farms**

Small farmers do activities other than agriculture to support their livelihood. Kihoto shamba owners either make charcoal by themselves by hiring some employees or give somebody a contract to use the trees on their land for making charcoal.

For the charcoal makers in Kihoto, cutting 25-30 trees gives enough wood to make 250 bags of charcoal. Each bag is of approximately 50-60 kg with a market price of around 900 Ksh. One shamba owner has employed 5 locals including a watchman. The respondent employee gets a salary of 3,500 Ksh/month. In Kasarani, shambas near the ridge are a supply source of charcoal. Cost of each bag to a market seller is 100 Ksh which they sell in the local market for 400 Ksh / bag.

Some of the farmers express concern about their unstable income from farm. They have no other source of income simply because they can not find any other work. This unstable income has resulted in the selling of farm land as plots or making houses for renting purposes. According to an estimate from a Naivasha Municipal Council employee who also is a shamba owner in Kihoto and residing in Kihoto itself, the monthly rent for one room (approx. 10 x 10 feet) is on an average 1,000 Ksh. There are around 200 plots in Kihoto. Each plot contains on an average 10 rooms. Each room can be considered as occupied by one family unit. Therefore, approximately there are 2000 rooms on rent in Kihoto, which generate 2,000 x 1,000 = 2,000,000 (2 million) Ksh / month to Kihoto shamba owners.

In Karagita area, small farm owners are selling water to the donkey-cart water suppliers. These suppliers further sell it in the residential areas where there is no infrastructure for water supply. The sample farm owner reported to sell water worth of 1,500 Ksh /day in summer periods and 500 Ksh / day during the other times. The quantitative figures could not be obtained.

The data for the small farms is not used for extrapolations due to the lack of consistent information. The available information is expressed in different units. These farms are managed by several members of the family who just work on availability basis to take care of their farming processes. Most of the respondents were not sure about the ratio of inputs applied in their farms on annual basis

3.3. Farming systems Distinction Criteria

Continuing the distinction between large and small farming sytems, inputs and outputs related variables are used for this purpose. The difstincion of large and small farms has been already explained based on some of these variables in the chapter 2.

Table 3.18: Some criteria used to define the distinct farm types

Criteria	Large Farms	Small Farms
Production Purposes	Flowers → Export Vegetable→ French Bean: Export; Others → Local Market; Cereals → Export; Dairy → Local Market	Flowers & French Beans → Export; Tomatoes & other vegetables → Local Market & own consumption; Cereals → Own Consumption; Dairy → Local Market
Machinery Type	Tractors, Heavy Trucks, Electrical Pumps, Coldroom, Fertigation System, Central Spraying System, Seed Clearing Machines, Drip Irrigation System, Defoliator Machine	Hand tools, sprinkler & Fuel / Electrical pump for irrigation
Employment Generation (Quantity & Type)	Permanent : 20 + Seasonal: 30 = 50 (Minimum) Permanent : 428 + Seasonal: 391 = 819 (Maximum)	Minimum → 6 man days or labour (Seasonal) Maximum → 91 man days or labour (Seasonal) * Only one farm has 8 permanent workers
Location*	Except four, all are on the lake side. Out of these four, one has additional land on the lake side also. Mostly are on the flat ground.	Except Kihoto, Other two sampled farms are on the other side of the road. One is just below the ridge on a medium slope. Kihoto farms are totally on the flat ground.
Wages	Minimum → 100 Ksh / day Maximum → 9,000 ksh/month (300 Ksh / day)	Minimum → 100 Ksh / day Maximum → 150 Ksh / day
Labour Facilities	Out of 12 farms → Housing: 7; Transport: 4; Basic Medical aid: 12	Out of 9 farms → Housing: 3; Transport: none; Basic Medical aid: none
Tax Payments	All are paying various taxes and fees. All are contributing to NSSF, NHIF, and Trading License Fees.	Almost none of the farms are paying any direct tax.

NB: In the sample, the percentage of large farms on-lake side in comparison to the percentage of small farms is less. However, it was observed during the field work that most of the large farms are on-lake side while most of the small farms in areas other than Kihoto are off-lake side.

Conclusion – Comparing the inputs and outputs of large and small farms

Both large and small farms use lake water as the prime source of irrigation. The use of fertilizers-pesticides costs huge amounts to the large farms: 0.7 million to 2.5 million Ksh per ha for fertilizer and 0.3 million to 1.2 million Ksh per ha for pesticides.

Small farms in Kihoto also use fertilizers- pesticides but small farms in other areas are reported not using fertilizers or pesticides. For example, one small farm in Kihoto, uses 100 kg/ season.

The main large farm inputs include Hi-tech machinery bought from Nairobi, small farms use hand tools and fuel/electricity-based irrigation pumps. Both types of farms also require labour often sourced from other areas outside Naivasha. The large farms employ labourers permanently, whereas for the small farms, the labourers are employed seasonally or occasionally. Large farms use the inputs for purely commercial production which is meant for export. Small farms also do production for exports but a part of their revenue comes from the local sale of their products. This share of local sale in total revenue is 100% in case of sampled farms other than Kihoto (Refer to chapter 4). They produce also for their own consumption. To add to their income, they are using their land also for activities other than agriculture such as charcoal-making, building houses for renting purposes and selling borehole water to private water suppliers.

4. Farms' Contribution to Naivasha Economy

4.1. Role of farms in the economy of Naivasha

To fully assess the contribution of the farms to the economy of Naivasha, it is necessary to deal with the social, environmental and economic linkages of these farms. Under the constraints of time and scope of the present study, only the economic linkages could be focused on.

The economic linkages in the Naivasha area can be expressed as in figure 4.1. This corresponds to some extent with two focused channels of figure 1.1 in chapter 1, namely; "expenditure and savings by the households" and "taxes paid by the farms" to the government. A distinction can be made between direct and indirect contributions of the farms. The farms are contributing directly through the local purchases of their inputs and through selling their produces in the local market. Farms pay taxes like any other business unit which contribute directly to the local econmy. Farms generate money flows, which goes into the form of wages to farm employees and as returns to small farmers respectively. Local expenses made by these groups as households produce an indirect effect by farms on the economy of Naivasha. These expenses are analysed in more detail because they represent two different sections of the Naivasha population directly involved with the farming activities. Spatial distribution of activities generated is visualized through circles on maps. The purpose of these circles is to show the concentration of economic activities generated through a particular channel in an area irrespective of their sizes.

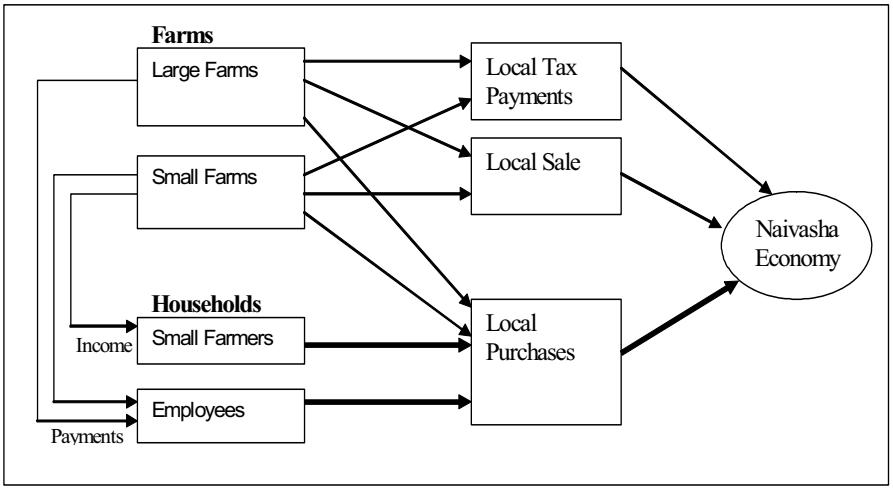

Figure 4.1: Conceptual Framework - Focused Channels

4.1.1. Employees' Household Expenditure

The employees' receive wages from the farms in return to their services for production. The wages transform into expenditure and savings. Employees' make regular expenditure on procuring goods, paying for rent and education. Employees' expenditure is a major channel through which farms contribute to the local economy in Naivasha (See Figure 4.1). Farm employees have come mostly from outside the area in search of job. Many of them have come from Western, Nyanza, Central and Rift Valley provinces. Some of them are living here with their families while some are living single. To see any effect of this fact on their expenditure patterns in Naivasha, the expenditure patterns of the employees' is analysed for these two categories separately.

- **Employees' living with family**

Employees' living with family form 60% of the sample. Rest is the employees' living without family.

Figure 4.2 shows the saving and expenditure on monthly basis in Naivasha by employees' living with family. The farm employees are numbered according to the ascending order of size of family income. This family income need not be exclusively dependent on employees' wages but also other sources of income are included. There is no pattern between family income level and expenditure / savings percentage in Naivasha. Also there is no pattern between savings and local expenditure. Employees' save some money partly in the local banks and also in their houses; the amount which is saved in the two different places could not be quantified.

In all cases, the total of savings and expenditure does not add up to 100% of income (See table 4.1 in appendix). This is represented by the section "unexplained" of the stacked columns. Even though the employees are living in Naivasha with their families, the difference could be transferred to the native region or spent outside Naivasha by employees. This is because most farm employees are coming from outside Naivasha in search of jobs and still may have some family connections back home. In some cases, e.g., farm employee No. 11 and 14, the large unexplained part could be a result of employees' hesitation to give the right information about their savings or underestimations of their monthly expenditures.

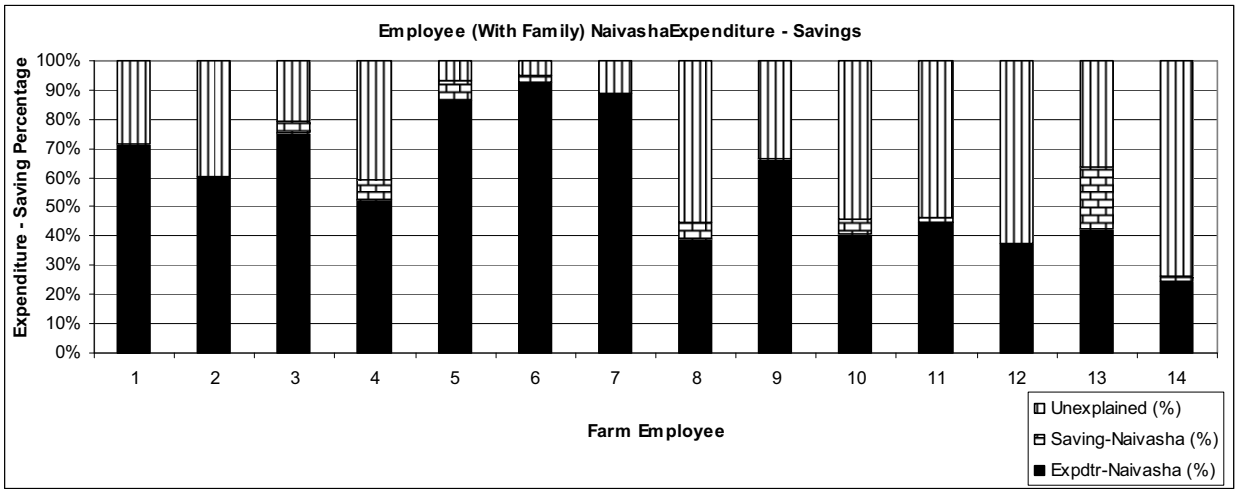

Figure 4.2: Comparison between farm employees' (with family) monthly expenditure and savings in Naivasha

The expenditure patterns are visualized in absolute as well as in percentage of income form so as to highlight both possibilities in the economic analysis. This is shown in Figure 4.3 and Figure 4.4.

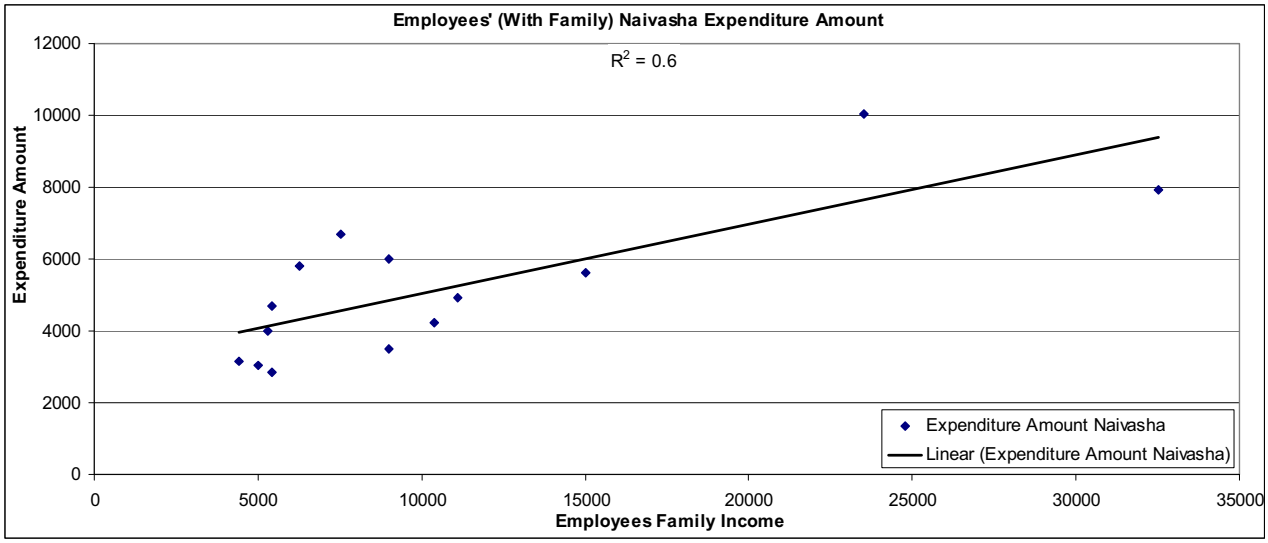

Figure 4.3: Relationship between employees' (with family) absolute income and their monthly expenditure in Naivasha in absolute figures

Figure 4.3 shows that there is a positive relationship between employees' absolute income and the amount of monthly expenditure in Naivasha. The corresponding Table 4.3 shows the high adjusted R^2 value, the significant F and t statistics at the 95% probability level and 13 degrees of freedom. The relationship is as expected, i.e. at the lower levels of incomes for people living with family; a slight increase in income may cause incurring more expenditure to reach at a comfortable level of consumption. This level of consumption could be argued to be different for each family but here it is assumed to be meeting the subsistence requirements of family members.

Table 4.3: Regression for Naivasha monthly expenditure by employees (with family) against absolute income

Regression Statistics					
Adjusted R^2	***0.54984***				
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	31762771	31762771	***16.87862***	***0.001450515***
Total	13	54344781			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	3104.786	622.7152	***4.985885***	0.000317	1748.006535
X Variable 1	0.193237	0.047035	***4.10836***	0.001451	0.090756488

When exploring the monthly expenditure as percentage of the income, there is only a weak relationship (See Figure 4.4) despite the visible effect of the higher income group. This relationship scales down (standardizes) the absolute income of the different income groups as shown in Figure 4.3. The weak relationship can be

explained by similarity in consumption patterns and low income disparity with the exception of three relatively high income cases.

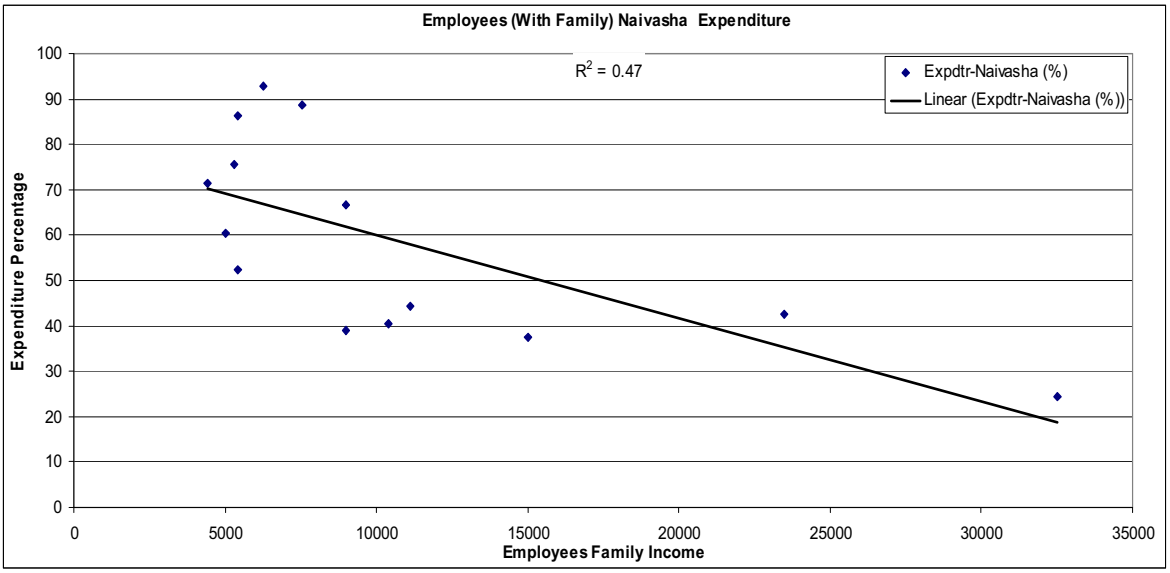

Figure 4.4: Relationship between employee (with family) % monthly expenditure in Naivasha and income

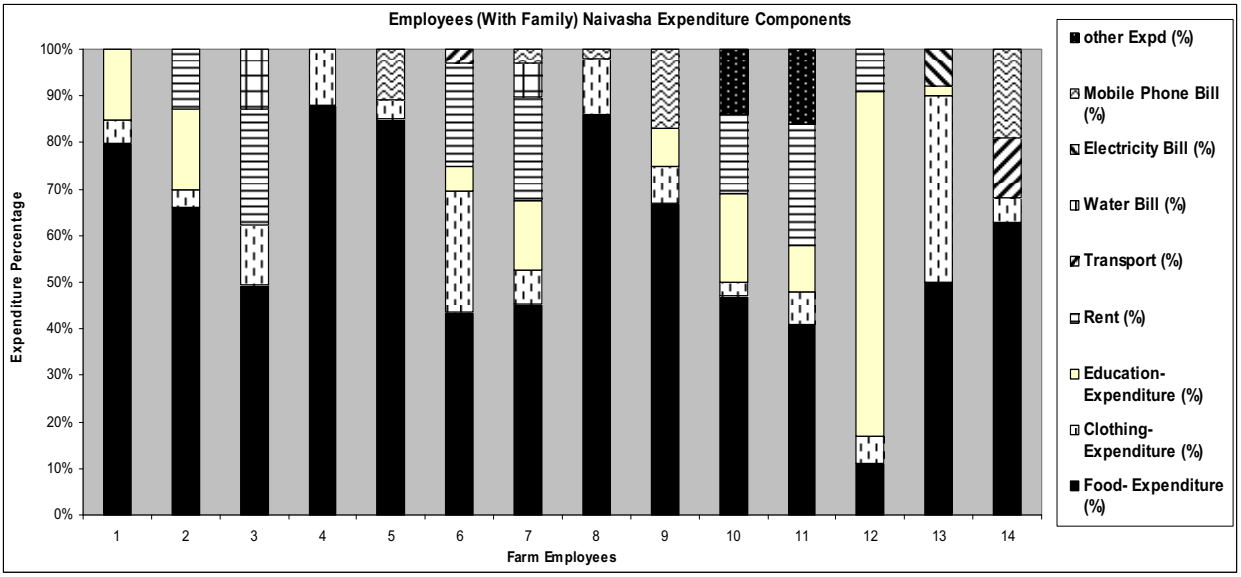

Figure 4.5: Components of the monthly expenditure by farm employees (with family) Naivasha in percentages

Figure 4.5 shows that the monthly expenditure is dominated by basic needs (i.e. food, rent and clothing) (see also table 4.2 in Appendix). This is a characteristic of a relatively poor population. It implies that most of the interviewees earned low wages probably because of semiskilled or unskilled jobs. Education of the children is also a considerable expenditure. In a case of a family with a relatively higher income level, education is the biggest expenditure component. Transport, water and electricity commonly are smaller expenditure components. It was however not clear why the mobile phone expenditure was prominent in some cases

irrespective of different income levels. This might be due to fashion or the need to communicate with where they came from.

- **Employees living without family**

The saving and expenditure in Naivasha by employees living without family is shown in Figure 4.6.

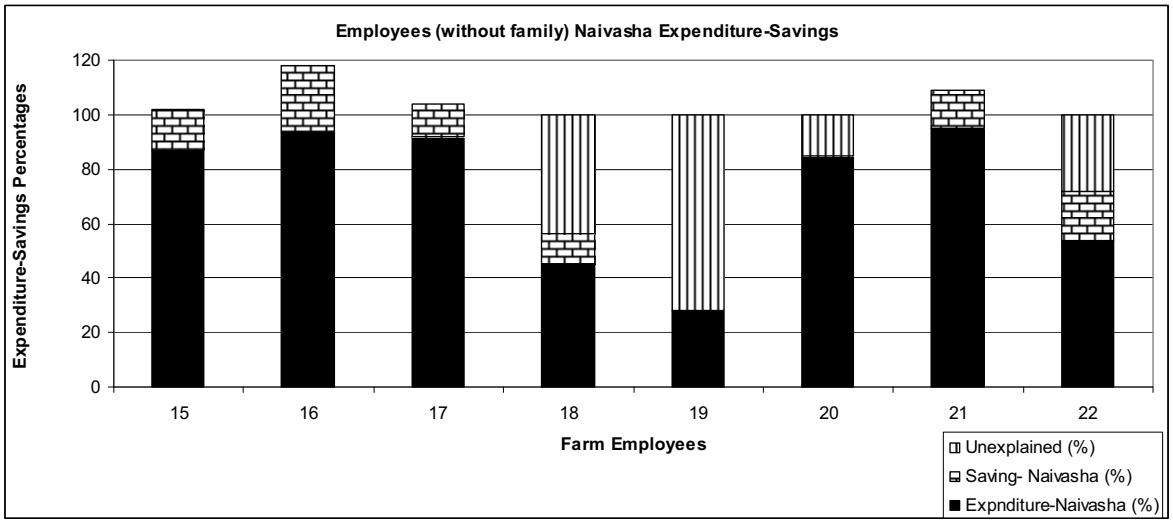

Figure 4.6: Comparison between farm employees' (without family) monthly expenditure and savings in Naivasha

The results are similar to the findings from the data on farm employees living with family. Most of these employees' have come from outside Naivasha with their families still living in their native region. These farm employees have been numbered according to the ascending order of income. There is no distinct observable relation between income level and expenditure / savings percentage in Naivasha. Also there is no observable relation between savings and local expenditure. Employees' save some money partly in the local banks and also in their houses; the amount which is saved in each of the two different places could not be quantified.

In many cases, the total of savings and expenditure does not add up to 100% (See table 4.4 in appendix). The difference probably is transferred to the native region as their families are still living there or it is spent outside Naivasha by the employees'. In some cases, the total of expenditure and savings is going beyond 100% of income as shown in figure 4.6. This could be the result of overestimation of monthly expenditures by the employees'. One possibility could be that employees' are spending more using the amount taken in the form of loan or using some past savings.

There appears to be no relationship between the absolute amount of expenditure and income levels of employees'. Note that in this case the income includes only the salary earned by the employee, not the total family income. It has been reported by these employees' that they have no other source of income in Naivasha. Also local expenses only comprise individual needs of the employee. The regression runs for this absolute amount of expenditure and expenditure as a percentage of income, showed R^2 of nearly 0. This could

be due to the fact that they are sustaining at very low level of incomes ranging between 3,000 – 6,000 Ksh / month. A slight increase in income does not compel them to spend more. Instead they may start transferring more money to the family members in the native region.

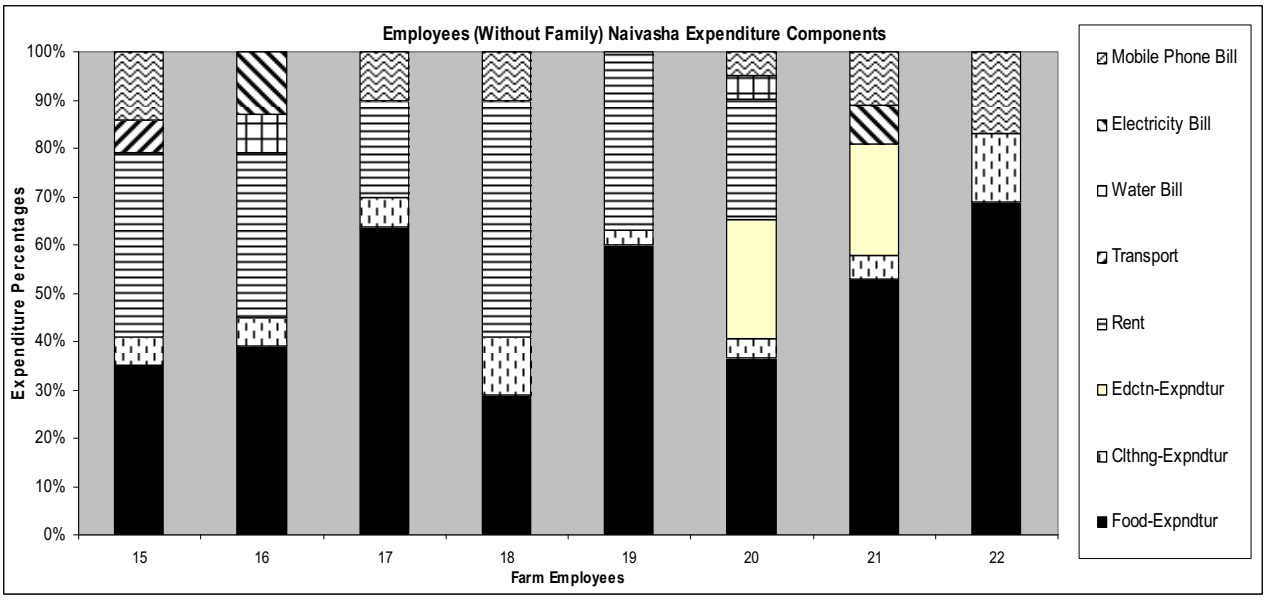

Figure 4.7: Components of the monthly expenditure by farm employees (without family) in Naivasha in percentages

Also for the farm employees living without family, the expenditure is dominated by basic needs (i.e. food, rent) (see Figure 4.7 and also Table 4.5 in the Appendix). It implies that most of the interviewees had low salary probably from semiskilled or unskilled jobs. Transport, water and electricity occur as smaller expenditure components. Mobile phone expenditure was prominent in some cases irrespective of different income levels probably due to the same reasons as in the case of employees' living with their family.

4.1.1.1. Extrapolation of monthly expenditure and savings in Naivasha by farm employees

Using the minimum (503,060,611 Ksh) and maximum (573,841,664 Ksh) extrapolated average labour wage costs for the total large farms (Refer to Chapter 3), we tried to extrapolate the total monthly expenditure and savings in Naivasha made by different categories of farm employees.

Using total figures of monthly expenditure and savings from the Table 4.1 and Table 4.4 in Appendix, we got the figures of total monthly expenditure and savings in Naivasha made by all the sampled employees' as described in Table 4.6.

Table 4.6 : Monthly Income and expenditure-savings of total sampled employees' inside Naivasha

Employee Category	Employees' Salary	Total Family Income*	Total Expenditure	Total Savings
With Family	71,421	149,821	72,418	7,961
Without Family	36,291	-	25,789	4,175

* In case of employees' living with family, the figure in the column 'Total Family Income' includes the other sources of income to family in addition to the employees' monthly salary.

- **Employees (with family)**

The monthly expenditure and savings made by families are made out of their total family income which includes other sources of income to the family in addition to the employee salary. First, we use the ratio of employees' salary / total family income to find out the contribution of employees' salary to the total family income. This comes out as 47% of the total family income. The total of expenditure-savings is 112% of employee salary.

It is assumed that monthly income occurring to the employees' is fully spent and saved inside Naivasha.
Under this assumption, the 60% of minimum extrapolated total average monthly cost (503,060,611 Ksh), i.e. 301,836,366 Ksh as extrapolated wages that goes to this category of employees as monthly wages, and which goes directly into the economy of Naivasha.

Using the same assumption, with the 60% of maximum extrapolated total average monthly cost (573,841,664 Ksh), gives 344,304,998 Ksh as extrapolated wages that goes to this category of employees as monthly wages, and which goes directly into the economy of Naivasha.

- **Employees (without family)**

Using total figures of monthly expenditure and savings from the Table 4.4 in Appendix, we got the figures of total monthly expenditure and savings in Naivasha made by all the sampled employees' living without families as described in Table 4.6.

In this case, the monthly expenditure and savings made by sampled employees' are made out of their salary from the farm and they do not have any other additional source of income in Naivasha. Therefore, the total monthly expenditure made by all the sampled employees' in this category is 71% of the total income under this category. Total monthly savings are about 12% of the total income. This becomes collectively 83 % of their income.

As the 40% of minimum extrapolated total average monthly cost (503,060,611 Ksh), we get 201,224,244 Ksh which are extrapolated wages that goes to this category of employees as monthly wages. 83% of this amount i.e. 167,016,122 Ksh goes directly into the economy of Naivasha.

As the 40% of maximum extrapolated total average monthly cost (573,841,664 Ksh), we get 229,536,665 Ksh which are extrapolated wages that goes to this category of employees as monthly wages. 83% of this amount i.e. 190,515,432 Ksh goes directly into the economy of Naivasha.

Using the minimum estimates for both categories of employees', gives 5,626,229,856 Ksh / year going as expenditure and savings in Naivasha by employees'. For the maximum, it is 6,417,845,160 Ksh / year.

4.1.1.2. Spatial Distirbution of employees' local purchase channel

To understand the impacts of the employees' regular expenditure, it is important to know where they spent it. Expenditure incurred by the large and small farm employees is spatially concentrated related to their residential locations in the area. Most of the sampled employees' purchase their food items from the nearby markets. But some of the workers living in other areas, such as in Kihoto and Karagita, go to the town to buy from supermarkets. For buying clothes almost all the sampled workers go to the open market in the Naivasha town. The reasons being given include the variety of items as well as enjoying the trip to the town. Mobile cards, rent and education expenditure incur at their residential locations. The distance of these residential areas from the town could also be a factor affecting the decision about the procurement location (See Table 4.6).

Table 4.7: Distances between employees residential areas and Naivasha Town

Employees Residence Areas	Approx. Distance from Naivasha Town (in Kms)
Kihoto	1.5
Karagita	6.0
Komohea	19.0
Kamere	22.0
Kasarani	32.0

A part of the money of employee's expenditure in the residing area could result in a next round of expenditure in the same area as regular expenditure by the local shopkeepers' household. Local shopkeepers are assumed to be residing in the area since many shops are actually part of their house buildings. Some part could go outside (Naivasha town or other places) for procurement of their merchandise from the wholesale. Figure 4.8 in Appendix, shows areas of concentrated expenditure through circles. These circles of different sizes are surrounding the employees' residential areas spread around the lake. The areas near the town are shown through one circle. The width of arrows pointed towards these circles shows the potential strength of the channel benefits occurring to each circle as the same. The arrow of the small circle around the Naivasha town is wider than the others. This reflects the expenditure made by the employees' living near to the town as well as the expenditure made by employees' living in other areas during their visits to the town.

4.1.2. Small farmers (Households) – monthly family expenditure

Small farmer's expenditure contribution to the economy can be divided into two parts: one is the purchase of farming inputs such as handtools, irrigation pumps, seeds and fuel; the other is the regular monthly expenditure incurred by their family or household.

The contribution of the purchase of handtools is negligible since they are bought only once in many years. Pumps are reported to be purchased from outside Naivasha especially from Nairobi and also once in so many years. Fertilizers are bought from the local government shop. Figures for the fertilizer purchasing cost were not disclosed however.

Supermarkets representatives reported that small farmers give them business in the order of 3,000 - 200,000 Ksh / month. Financial institution surveyed gets 400-500 small farmers as customers from area close to Lake Naivasha as well as from surrounding areas. The number of small farmers coming only from Lake Naivasha surroundings is not known. The electricity company gets revenue by small farmers payment for their household electricity consumption but the share of this revenue in the total revenue is unknown.

The sample data on the small farmers' monthly expenditure is small in number but it could be showing the general trend of their expenditure behaviour caused by the fact that they are living in the area from a long time with their families. This implies that the expenditure, savings and investment made by these farmers is most likely to occur in Naivahsa.

Table 4.8: Composite table of small farmers' personal economic characteristics

Total farm revenue Ksh	Total_annual-Family Income Ksh	Total _monthly-Family Income Ksh	Total Naivasha Expenditure		Home-Saving	Bank- Deposit (Naivasha)	Investment-Naivasha
			Ksh	%			
1,000,000	1,000,000	83,333	17,083	20		Yes, Local Bank	None
1,000,000	1,240,000	103,333	22,667	22		Yes, Local Bank	Built Houses for Rent, Car
2,400,000	1,360,000	113,333	18,016	16	Yes	Yes, Local Bank	Shares, House
800,000	800,000	66,667	21,850	33		Yes, Local Bank	None
1,600,000	1,600,000	133,333	17,000	13		Yes, Local Bank	None
300,000	300,000	25,000	10,553	42		Yes, Local Bank	350000 ksh, for cows
40,000	40,000	---	---				
---	---	---	29,500				
---	---	---	18,867				

NB: Total Naivasha expenditure is shown as percentage of Total-Monthly-Family Income

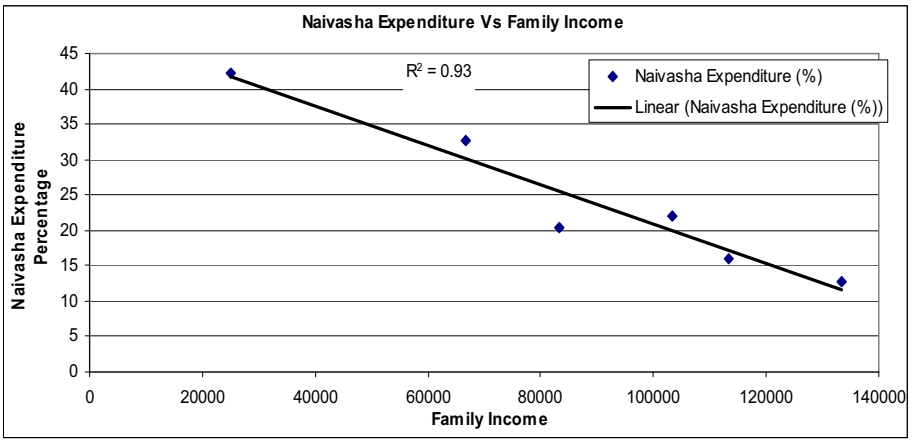

Figure 4.9: Relationship between farmers' monthly Naivasha expenditure percentage and Income

Figure 4.9 shows a strong negative relationship between the percentage expenditure and the income of small farmers. This can be possibly explained by the tendency for people to spend less after reaching a comfortable level of consumption. In this case an increase in income may imply an increase in absolute expenditure but the expenditure-income ratio declines with increasing income. For example, Figure 4.10 confirms that the relationship between absolute expenditure and income is positive although it is a weak one.

The details on expenditure components reveal that despite their own farming production including vegetables and cereals for own consumption, families incur expenditure on purchasing food items from the markets. The biggest part of monthly family expenditure goes on food items. However, no fixed ratio of food expenditure is observed with the increase in absolute amount of expenditure or income (See Table 4.9 in Appendix).

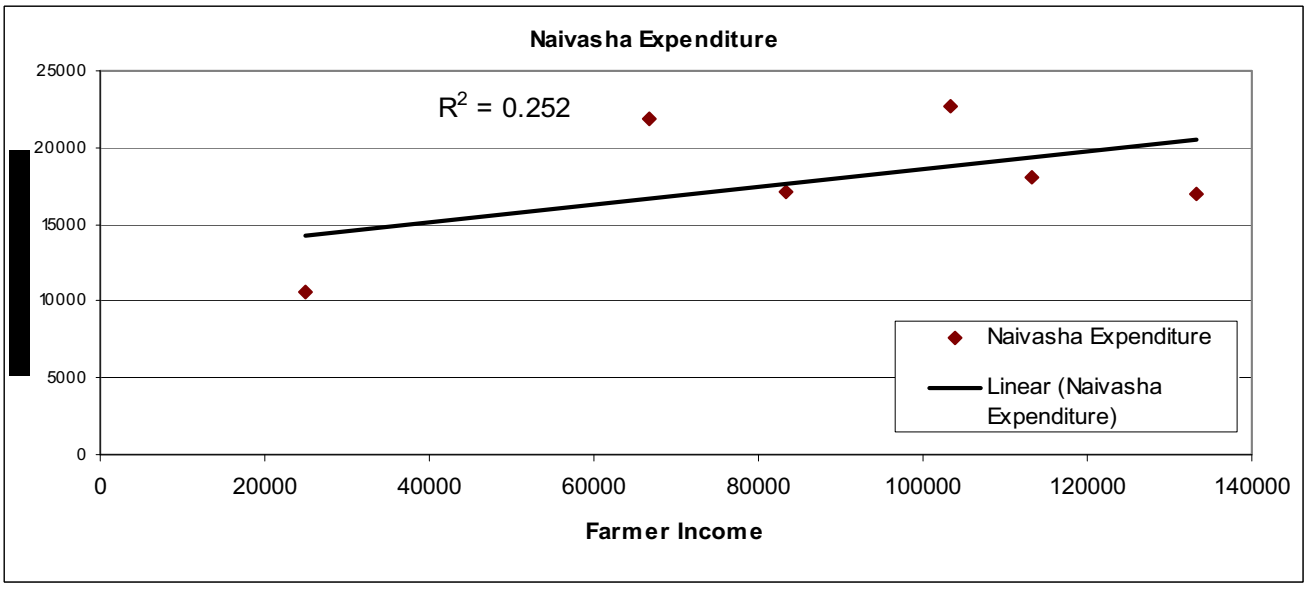

Figure 4.10: Relationship between farmers' absolute monthly Naivasha expenditure and income

In general, the difference in statistics between the small farmers and the employees' expenditure income relationship is due to the differences in the income and the magnitude of expenditure. Farmers', by virtue of land ownership, have higher incomes, higher expenditure values and higher income disparity.

4.1.2.1. Spatial Distirbution of small farmers local purchase channel

Small farmers do their general monthly purchasing from the markets nearby their living places. Therefore the spatial distribution of their local purchasing is less centric as compared to that of the large farms. Kihoto farmers are buying their goods from the Naivasha town market since they are located very close to it. Farmer's from the small farm areas of Karagita also come there sometimes to purchase some goods and use other business services (See figure 4.11 in Appendix). The figure 4.11 shows three areas of concentrated expenditure through circles. The residential areas towards the south-west of the lake (Kamere, Komohea etc.) are not circled as there is no information about any small farmers' presence around these areas. The distance from other circles also makes these areas non-feasible as locations of regular purchasing for the small farmers. Residential areas near the town are also not circled as again there is no information about small farmers living there. Small farmers coming to the town from other areas are not expected to do the purchasing from the local shops of these residential areas. The circles are surrounding the two residential areas of small farmers namely Karagita and Kasrani, spread around the lake as well as the town centre. The width of arrows pointed towards these circles shows the potential strength of the channel benefits occurring to each circle. The arrow to the circle around the town is wider than other circles. This reflects the expenditure made by the small farmers' living in Kihoto and surroundings as well as the expenditure made by small farmers living in other areas during their visits.

The contribution through the small farmers and farm employees expenditure channel could be comparatively more than other channels as it is more widespread as well as it is expected to stay for longer time because of the multiple round of expenditure generated in the local area.

4.1.3. Large farms – monthly expenditure

Large farms buy major items of their inputs from outside Naivasha (for quantities of fertilizers and machinery refer to chapter 3). This includes the purchasing of vehicles and hi-tech machines. However, they do local purchasing of some items and services from local supermarkets, fuel pumps, hotels and banks, etc. located in Naivasha town (see Table 4.10). They spend huge amounts at these businesses. In case of supermarkets they give business between the range of 35,000- 360,000 Ksh / month. For electricity company, they come in the highest consumption category which means the highest source of revenue for the company. The sampled fuel pump gets 55% of its total business amount from large farms.

Large farms have accounts in the banks thru which they pay their employees' salaries. Employees' of large farm too have their personal savings accounts in these banks.

Table 4.10: Summarized local purchase by large farms and small farmers (Households)

Business Type	Total-Cstmr Base-Large Farms (%)	Total-Cstmr Base-small Farms (%)	Total Business-Large Farms	Total Business-Small Farms
Supermarkets				
1			approx. 35,000 ksh/mnth	approx. 3,000 ksh/mnth
2	3-4 farms	Ca 50 customers= 25 %	360,000 ksh / mnth	200,000 ksh / mnth
Bank & Finance Institution				
1	20 farms, (farm employees make approx. 35%)			
2		400-500 (for loan)		
Hotel	5%			
Electricity Company			highest consumption category	lower consumption category
Petrol Station			55%	15%

4.1.3.1. Spatial Distirbution of large farms local purchase channel

Expenditure incurred by the large farms is spatially concentrated in the town. All the sampled large farms do their local purchasing and use of services only in Naivasha town because some facilities, such as banks and big supermarkets, are only available there (See figure 4.12 in Appendix). Another reason could be the better quality of products in the town market in comparison to the markets in other small areas. The figure 4.12 shows the circle around Naivasha town centre as the area of concentrated expenditure. The width of the arrow pointed towards the circle shows the potential strength of the benefits of this channel and reflects the large amount of expenditure made by the large farms.

- **Service and Goods Providers**

The businesses which provide the goods and services contribute to the local economy by providing employment to local people. Some of these businesses use the services or purchases items on local level such as transportation services, procurement of vegetables, milk, meat etc. by hotels. This results in the secondary flow of money at local level.

Some businesses are owned by people who are not local, e.g. the owner of the supermarkets in the town is a Kenyan from Nairobi. Similarly, banks are part of a chain of private or cooperative groups of national level. Electricity company and finance organization are semi-public bodies. This can result in the outflow of money from Naivasha. The extent in which this occurs and the possible secondary flow generated is not explored since it is beyond the scope of this study.

4.1.4. Local sale of products and tax payments

4.1.4.1. Local Sale

Large farms

Most of the large farms are not selling their products in the markets of Naivasha. Flower farms or seed farms have no market for their products there. Only one of the sampled large farms, producing vegetables and cereals, sells tomatoes (about 63,000 Kg / year) in the local market through the brokers. Some non-sampled farms engaged in dairying are reported to sell the milk and meat products in the local market through brokers.

Small farms

Small Farms production mostly goes to the local market. Most of the products which go for selling in the market are traditional varieties of vegetables and cereals such as spinach, tomatoes, peas, local beans and maize. Very few farmers go to the local market directly as they generally sell their products to the local brokers at farm gate.

Whether the quantity sold by these farms is enough to fulfil the demand, is not known because they are not the only ones selling produce to the market. For example, 6 small farms in the sample are selling collectively about 44 tons of vegetables / year in Naivasha while a sampled large farm is selling 63 tons of vegetables / year in Naivasha.

This implies that the number of large farms supplying goods in the local market could be small, but the volume of trade, for eg. vegetables, by these farms can be much higher than that of all the individual small farms together.

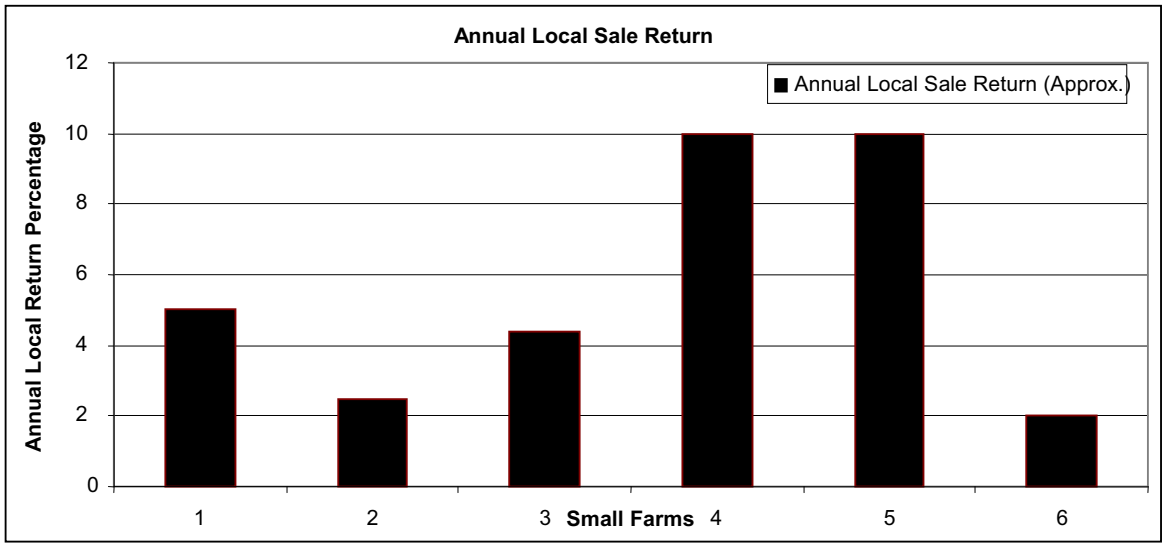

Figure 4.13: Annual return from local sale by small farms

Figure 4.13 shows that the annual returns from the local sale of products by small farms ranges from 20% to 100% of the total farm return (See also Table 4.11 in Appendix). The two farms showing 100% annual return from local sale only, are located on the off-lake side and have no access to lake water for irrigation. One farm is using a borehole and the other is totally dependent on rainfed agriculture. Also these farms are not accessible by main roads and also comparatively far from the main roads, which makes them inaccessible to export-brokers. Therefore, they are not producing anything but for the local market. The other farms are located in Kihoto and have the geographical advantage of being next to the lake (See figure 2.2 in chapter 2). One charcoal maker in Kihoto, each year sells around 50 bags of charcoal. If the selling price of each bag is 900 Ksh, his average annual returns becomes 45,000 Ksh /year. In Kasarani, the cost of each bag to market seller is 100 Ksh which they sell in the local market for 400 Ksh / bag.

4.1.4.2. Extrapolation of local sale of vegetables by small farms (Kihoto) and large farms

The total area covered by small farms around Lake Naivasha is not known. Also the number of small farms other than Kihoto area is not known. Therefore we are using the number of Kihoto farms to approximate local sales of vegetables only by Kihoto farms.

Referring to Table 4.11 in Appendix, we get the figure of 34.5 tons of local sale of vegetables by Kihoto farms included in our sample. The ratio of vegetable sale comes out as 8.6 tons per farm.

There are 30 farms in Kihoto. Using the ratio of Kihoto farms selling vegetables in the local market in relation to the total Kihoto farms in our sample as 0.6, we apply the same ratio for the total number of Kihoto farms. This comes as 18 farms, which gives us an extrapolated figure of local sale of vegetables by the Kihoto area farms as 155 tons.

Large farm selling vegetables included in our sample has cultivated area of 9 hectare. This gives us the ratio of 7 tons local sale per hectare. Now we know the total area covered by vegetables (including farms producing combinations of fodder-vegetables and vegetables-cereals since our sample farm also grows cereals) from table 2.2 i.e. 2188 hectare. Using the ratio of 7 tons per hectare with the total vegetable area in large farms (7 x 2188), gives us approximately15300 tons total local sale by all the large farms around the lake producing vegetables.

4.1.4.3. Spatial distribution of farmers local sale channel

Large and small farms supply their products in the local markets of residential areas in Naivasha. However, they supply some share of the marketed products to the town businesses because of the high demand in the town of their products due to the large population. This high demand leads to expectations of getting better selling prices than in other areas. The spatial distribution of local sale by small farmers, except Kihoto farmers, of their products can be assumed to take place only in the same concentrated areas (See figure 4.14 in Appendix) where they do their purchasing as households. The distance to the town market as a cost factor is a reason behind this. The earned money is spent more in the local area market as a household with only some money going to town for the procurement of those goods and services which are available only in the town.

The figure 4.14 shows the circles of local sale of farm products in the same areas where the local purchase by farm employees are concentrated. This reflects the assumption that small farmers are selling their products in the local markets of employees' residential areas including the areas around the town. The fact is that in most of the sampled areas, small farmers and farm employees are living together as landlord and tenants. Kihoto farmers are selling most of their products in the Naivasha town market (where they also buy goods) and less in nearby employees' residential areas. Therefore the influence on the economy of their local sale is highly concentrated in the town. Due to this reason, the arrow for town centre is wider than all the others.

4.1.4.4. Local tax payments

Large farms

Large farms pay several kinds of taxes to the authorities at various levels. Out of these only few go to the local authorities in direct form. They pay annual trading license fees to the local authorities as operating fees similar to a regular industry. Some of them are paying taxes on some labour facilities they provide. In the sampled large farms, the lowest amount of local tax paid is 12,000 Ksh / year while the maximum is 70,000 Ksh / year (See Table 4.12 in Appendix). When compared with the total revenue of the sampled farms, the percentage of the tax-amount going to Naivasha authorities directly is almost negligible. The highest

percentage of annual revenue going in the form of local tax for an individual farm is around 4 percent while the lowest is 0.03. The total tax income of Naivasha Municipal Council is not known.

Small farms

None of the sampled small farms pay any kind of trading license tax on annual basis to the local authorities. However, it was confirmed by one of the Naivasha Municipal officers that they pay a tax @ 35 ksh / day, if they come for selling their product in the open market of Naivasha. This market works on twice a week basis.

The businesses which get large and small farms as customers further pay their local taxes which go to the Naivasha Municipal Authority such as food storage license and trading license (See Table 4.13). Both the supermarkets are paying different kinds of taxes ranging from 7,000 Ksh annually for food handling to 30,000 Ksh annually for trading license.

4.1.4.5. Spatial distribution of tax channel

Taxes are paid to the Naivasha Municipal Authority located in the town. It was reported by the municipal authorities during the interviews that the amount collected is distributed in the whole municipal area according to the different requirements. The Naivasha municipal area is taken as a whole in this case since there is no information on the magnitude of difference in the potential benefits distribution between different wards. The benefits could be in the form of new roads in the municipality or maintenance of the existing roads, construction of water supply or sewage network, social welfare programmes for youth or other community members residing inside the municipality.

Table 4.13: Taxes and License fees paid by local businesses

Business Type	Local Tax Paid	Amount / percentage	Payment schedule	Whom
Supermarket 1				
	Trading License	30,000	Annual	N.M.C.
	Storage License	25,000	Annual	N.M.C.
	Food Handling charges	700 ksh / person * 5	Every 6 months	N.M.C., Public Health Division
Supermarket 2				
	Trading License	2,000 / month	Annual	N.M.C.
	Storage License	10,150 / 6 month * 2 = 20,300 / year	Annual	N.M.C.
	Food Handling charges	700 ksh / person * 5 = 3,500 / 6 months	Every 6 months	N.M.C., Public Health Division
Bank	Trading License			N.M.C
Hotel				
	Trading License	@35,000 – 40,000	Annual	N.M.C.
	Water & sewage charges	@2,000	Monthly	Water & sewage company, NMC

4.1.5 Identified interlinkages between small and large farms

Most of the employees have come from outside Naivasha to work in large farms. In the case of Kihoto and Karagita, they were found to be living in rented houses built on parts of the small farm lands (see also chapter 2). This payment of rent is a direct source of income to those small farm owners. In addition, they are customers of the small farm products such as milk, meat or vegetables which add to the business volume of Naivasha. This sale of products also results in more income to the small farmers (see food component of employees' Naivasha expenditure).

Not only that employment created from both types of farms is an important contribution to the local economy because the expenditure by farm employees leads to employment in supermarkets, banks, etc. but also there are possibilities of small farm owner's family members working in these large farms. One of the sampled employees' was member of a family of a shamba owner in Kihoto. Another interesting fact is that both the sampled small farm employees previously had been working in large farms.

4.1.6 Development of markets surrounding Naivasha

Naivasha is surrounded by several other market and trading centres (see Figure 4.15). The presence of these centres can not be attributed directly to the development of farms around the lake as an industry. But the fact that these farms have attracted a large number of workers to reside in Naivasha town and other nearby areas can not be neglected because it may be an indirect cause of development of these centres.

4.1.4.6. Increase in built-up area near Naivasha town

A positive influence by the development of farms on the local economy may reflect in a population increase and an associated expansion in built-up area. Therefore the increase in built-up area could be used as an indicator.

Referring to Figure 4.16, changes in built-up area are measured for the period from 1986 to 2007. This time period is selected to see the changes from the time of boom initiated in the farming industry around the lake. Landsat image of year 1986 and Aster image of year 2007 is used for classification. Aster image is resampled at 30 meter pixel size for matching the resolution of 1986 image. The user accuracy of built-up area is not assessed for the year 1986. For the year 2007, the user accuracy of built-up area is 80% (Were, 2007).

The Naivasha Municipality territory is chosen to see the changes in built-up area because farms around the lake fall under the jurisdiction of the Naivasha Municipal Council. The council has the authority to give permission for doing construction for various purposes (Residential / Commercial). Thus it can regularize or say control the development of infrastructure, which could be generated by development of the farming

industry in the area. A buffer is created around the town to measure the changes as most of the changes are expected to occur near town. Town is near the farms surrounding the lake and a segment of Nairobi-Nakuru highway passes through it. For these reasons most of the residential and commercial infrastructure is expected to occur near it. Buffer is made for the radius of 10 Kms from the Naivasha town point. Radius of 10 Kms is taken since it covers the minimum distance from the Naivasha town to the boundary of the Naivasha Municipality. Another reason is that it covers the two market centres falling inside the council boundary. The presence of these two centres could itself promote the development of infrastructure.

The resolution of Aster images does not allow differentiating the changes in residential or commercial built-up. Inside the 10 Km circle the built-up area has increased by 78% from 1986 to 2007. The increase in built-up area outside the circle but inside the municipal territory is 87% which is more than the changes inside the circle. However, the magnitude of area in actual units shows that the total built-up area outside the circle in 1986 was comparatively very small. The built- up area inside the circle was 6.7 Sqkm in 1986 which increased to 12 Sqkm in 2007. Outside the circle, the built-up area was 3.2 Sqkm in 1986 which increase to 6 Sqkm in 2007. A percentage increase in its area more than the percentage increase in built-up area does not reflect the correct picture. Inside the circle the changes between 1986 and 2007 occurred more in the town itself and south-eastern part of the lake close to the highway. This could be described by the development of the town area due to the activities generated and their potential benefits through different contributing channels from the farms.

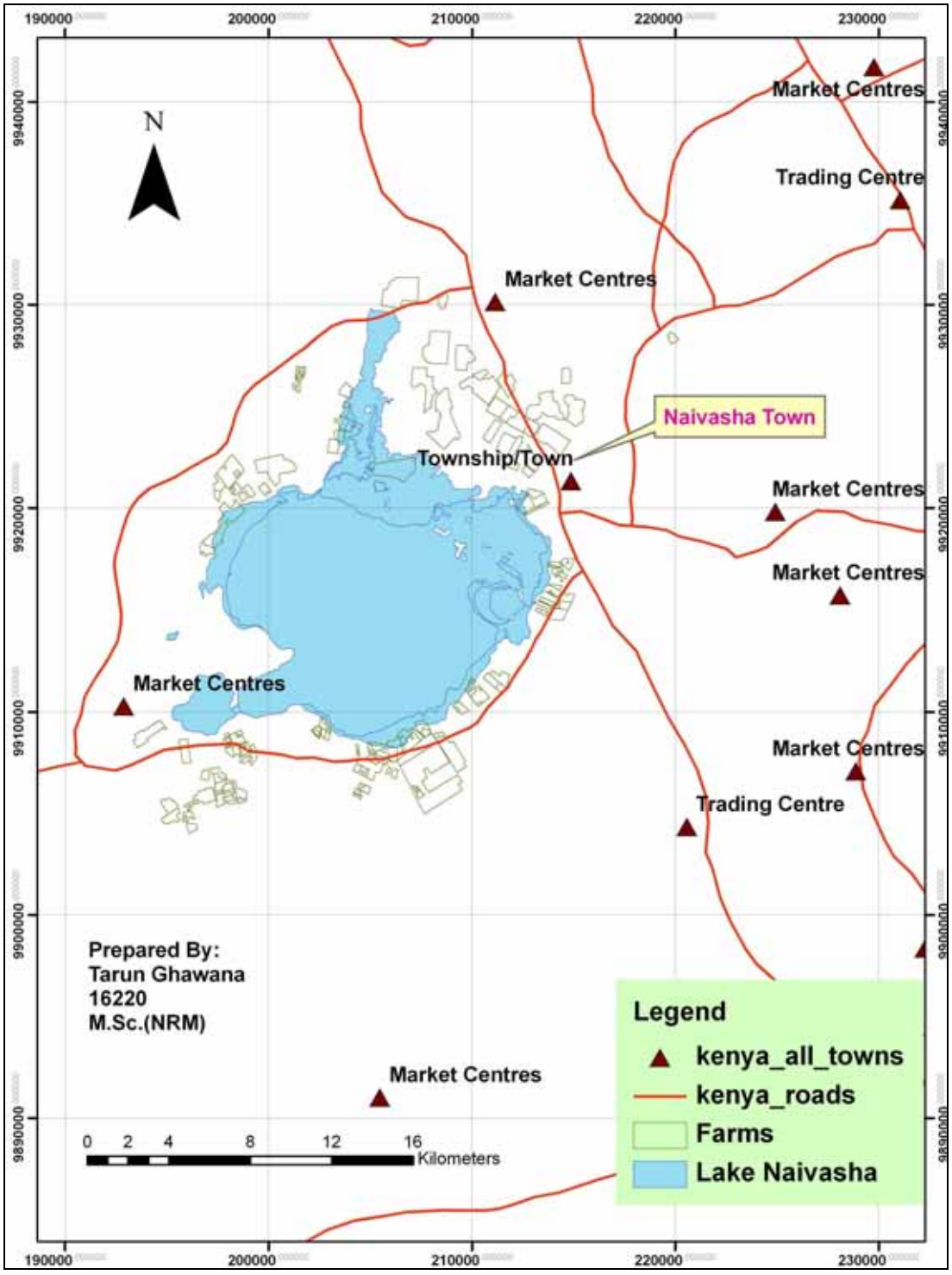

Figure 4.15: Spatial distribution of markets around Naivasha

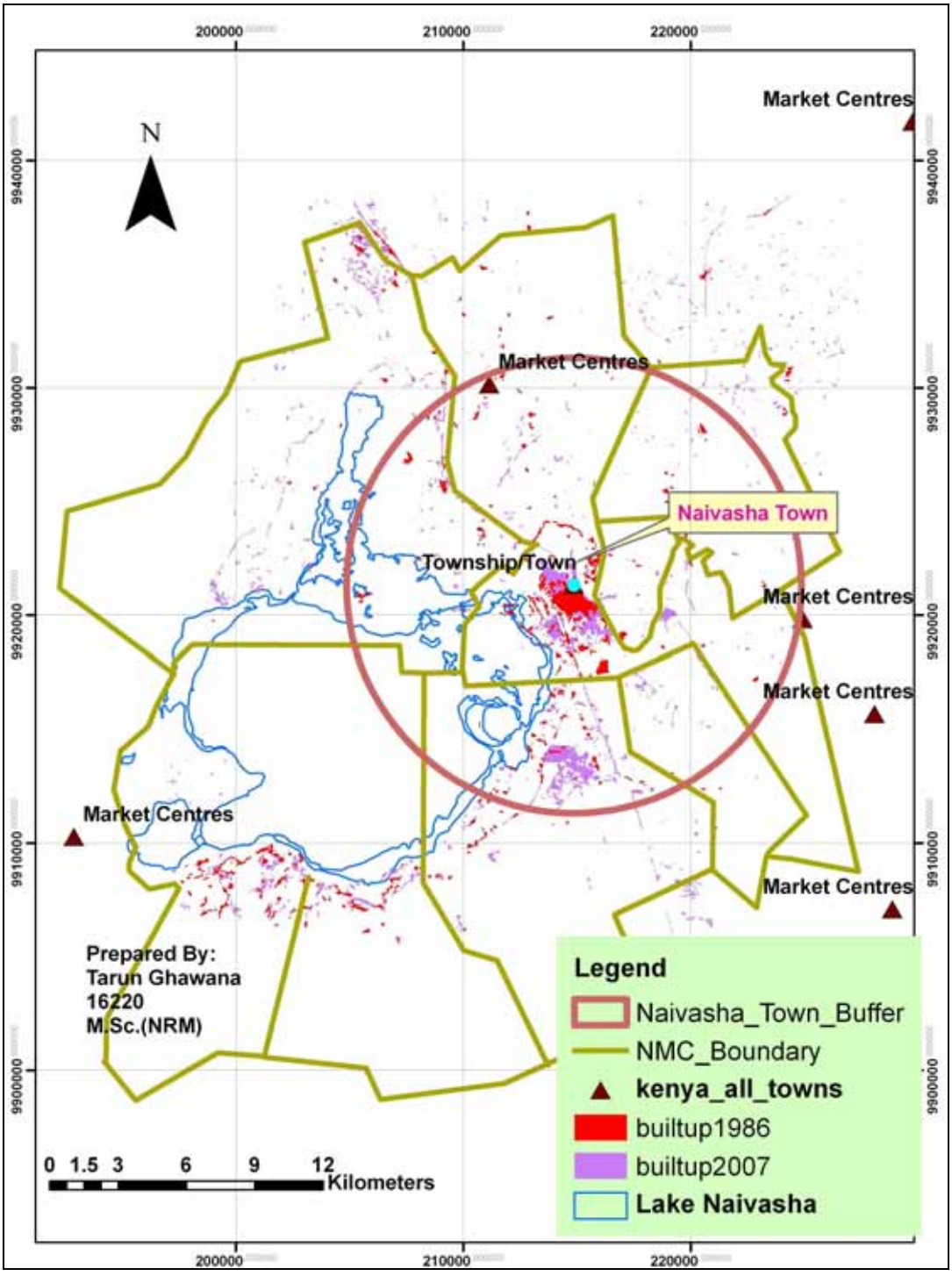

Figure 4.16: Changes in built-up area from 1986 to 2007 inside Naivasha Municipal Boundary

4.1.7 Opinions expressed – farming activities

The general response about the farming activities' effect on the economy is positive. Most of the people from different categories of stakeholders ranked the activities as good for the economy.

Table 4.15: Summarized average rankings by stakeholders of economic activities for Naivasha

Category Average	Large Commercial Farms owned by locals	Tourism	Small commercial Farms owned by locals	Service sector (Telecom, Education, BPO, Consultancy)	Large Commercial Farms owned by foreigners	Heavy Industries	Small & cottage industries	Small subsistence Farms owned by locals
Local Authorities	2.6	2.8	2	3.8	2.8	6.2	3.8	5.2
Local businessman	2.4	3.7	3.4	4	2	4.5	5.8	5.7
Pvt. Company employee	2	4	3	5	8	1	6	7
small farmer	2.6	4	5	4.6	4.2	5.4	4.6	4.6
Farm Employees	4	3	5	1	2	8	7	6
Overall Average	**2.7**	**3.5**	**3.7**	**3.7**	**3.8**	**5**	**5.4**	**5.7**

The table 4.15 shows the average rankings for different economic activities expressed by different stakeholder groups as well as overall average of all the groups together. To see the details of these averaged opinions on individual levels, refer to Table 4.14 in the appendix. The categories other than farming activities were included for the general picture not because of their present importance in the area but to get a comparative idea about the people's perception to the relative importance of the farms.

The local authorities ranked small commercial farms owned by locals as best for the economy followed by large commercial farms owned by locals. Local businessmen ranked large commercial farms owned by foreigners as best for the economic development of Naivasha, followed by large commercial farms owned by foreigners. Reason for difference in priority despite the same nature of farms was the issue of ownership which is expected to create difference in the capital involved in the farms. The more capital ownership is supposed to give more business. Small farmers ranked large commercial farms owned by locals as best for the economy of Naivasha followed by tourism. Interestingly, farm employees ranked service sector as best followed by large commercial farms owned by foreigners. The cause given was the higher rates of wages in the service sectors comparative to farms.

The overall average expressed, according to the opinions expressed by stakeholders, ranks the option "small subsistence farms owned by locals" as having the least potential for the development of the economy of Naivasha. The reason given was the small scale of production resulting in a small contribution to the economy. This is closely followed by the "small-cottage industries" option and the "heavy industries" option. Interestingly, the "heavy industries" option is considered on a low-scale despite considering it as good for employment generation and cash-flow in the economy. The reasons mentioned included the existence of the

flower industry which will not allow it to pick up. The best option considered for economy was the "large commercial farms owned by locals". It is followed by "Tourism", which is expected to earn quick foreign currency for the country as well as provide good business for the hotels and transport services. The general reason for preferring "large commercial farms owned by locals" over the "large commercial farms owned by foreigners" is the difference in ownership. The Kenyan owners are expected to invest more inside the Kenyan boundaries irrespective of investing inside or outside Naivasha. But the foreign owners are accused to take a large chunk of their profits outside the Kenyan boundaries.

4.1.8 Overall summarization of extrapolations for all the large farms around lake

The extrapolations are carried out to gain an insight about the inputs cost occurring to the large farms as well as their contributions to the local economy of Naivasha.

Table 4.16: Summarization of extrapolations

Total Cultivated Area (in Ha)		4,362
Total Revenue (in million Ksh)		61,535
Total Employees'		105,000
Total Employees' Cost / year (in million Ksh)	Maximum	6,886
	Minimum	6,037
Total Expenditure-Savings in Naivasha by Employees' (in million Ksh)	Maximum	6,418
	Minimum	5,626
Total Fertilizer Cost / year in million Ksh)	Maximum	8,156
	Minimum	2,541
Total Pesticide Cost / year in million Ksh)	Maximum	4,316
	Minimum	1,713

The fertilizer and pesticide cost collectively ranges from 4,200 to 12,400 million Ksh to all the large farms around lake. This is more than the labour wage cost which ranges from 6,000 to 6,900 million Ksh. However, the fact of interest regarding contribution to economy of Naivasha is that the fertilizers and pesticides are bought from outside. On the other hand, the total employee's wage cost is contributing more to the economy of Naivasha through their expenditure in Naivasha.

Conclusion

There are different contribution channels and also corresponding spatial locations namely wages, local purchase, taxes and local sale.

- **Wages**

The most prominent effect of the farms on the economy in Naivasha is through the direct and indirect employment because a substantial part of the wages is spent locally in Naivasha. Many households partly or completely get their income from the employment provided by the farms. In this respect the export-oriented large farms also generate more employment and hence they have the most substantial linkage to the local economy in addition to their impact on the regional and national economy. The large number of labour employed is residing now in Naivasha area and as such they spend and save a substantial amount of the income within. Small farms also generate the employment but most on the seasonal basis.

- **Local Purchasing**

The large farms buy their major inputs from outside Naivasha but they also do some local purchasing from supermarkets and use the services of local banks. Small farms buy their simple hand tools and fertilizers locally from Naivasha which contributes to the economy of Naivasha. In addition, the regular expenditure made by their households also adds to the money flow from these farms.

- **Taxes**

Large farms contribute by paying regular taxes to the Naivasha Municipal Council for operating as a trade unit. The small farmers also contribute by paying taxes on day to day basis for their direct sale in the local market. These taxes contribute to the development of the municipal territory under different requirements. The businesses providing services and goods to these farms locally which also pay taxes to the local authority.

- **Local sale of produce**

Some of the farms involved in dairy and vegetable farming sell their produces in the local market directly or through brokers. The quantity of vegetables sold by the large farms is expected to be much higher than the accumulative sales by small farms.

All these channels generate secondary flow of money. The people, who receive money from the primary flow of money, also expected to spend most of it locally.

- **Spatial Aspect**

The distribution of each channel's activities and potential benefits are spatially heterogeneous. Farm Employees expenditure in Naivasha is concentrated around the areas of their residence. This results in the generation of secondary money flows in these areas and thus supports the income of people residing there. However, a part of their monthly expenditures go to the town through some occasional procurement. The same is the case for small farmers' local expenditure. Large farms do there purchasing only from town. Local sale of the farm products by large and small farms is also important as it is widespread in the areas of employees' and farmers' residence as well as town. This availability of goods helps to keep the food prices relatively low. The low prices of food give more purchasing power to the community to buy other goods which supports various other businesses too. The taxes paid by the farmers are used by the municipality to perform various activities in the different parts of its jurisdiction.

Large and small farming systems are interlinked to each other through employment generated by farms and consumption of locally produced small farm products as well as renting houses by the large farms. The development of market / trading centres and increase in built-up area falling inside Naivasha municipal territory could be because of the development of large farms over the years. Opinions expressed also favour farming activities in general for the development of the economy in Naivasha. However, the issues of ownership and capital invested are reason for varying averaged rankings from different stakeholders. Overall summarization of extrapolations states the importance of farm employees expenditure and savings channel.

5. Conclusion and Recommendations

Conclusion

In general the large farms contribute more by virtue of their volume of trade however both farming systems generate secondary flows of money and employment in Naivasha.

The distinction between the farming systems cannot be based only on one criterion. The overlapping criteria make it necessary to see the order of magnitude for a combination of criteria to distinguish the farming systems. The initial spatial expansion in the farms area was along the lake shore however the current trend is towards the town side and the highway.

Lake is used by the large farms as well as small farms in Kihoto for irrigation. Large farms are doing purely commercial production using inputs for which a large amount of money goes outside Naivasha. Small farms are also engaged in production for commercial purposes as well as producing for their own consumption. Unstable farm income from agricultural products sale has forced small farmers to go for non-agricultural activities on the farm land which are resulting in the form of landuse changes.

Farms are contributing through different channels. These channels are generating money and good flows. The distribution of each channel's activities as well as potential benefits is heterogeneous. The development of market centres surrounding Naivasha and increase in built-up area could be considered as a part of the economic development happening because of the farms.

We conclude that the present status of small farms to a large extent is definitely influenced by the presence of large farms in the area. Commercial farming by Kihoto farmers for the purpose of export is motivated by the presence of the large farms. The development of large farms is resulting in the expansion of built-up area in the form of residential and commercial area for meeting the increased population demands. Different activities of farms such as local sale and purchase of goods is helping the isolated residential areas with local shops to survive.

Recommendations

Despite having the characteristics of an explorative study, the approach adopted has proven to be adequate to obtain suitable results and can be recommended for extensive studies. The unique primary information collected through interviews with different categories of stakeholders is analysed which can be a valuable source for the planners and the decision makers to take decisions. The identified channels of contributions to the economy from the farms are helpful in identifying the spatial concentration of economic activities and potential benefits generated to a particular area. This spatial heterogeneity is helpful for the planners to make well-informed decisions and make future plans for the development of the area in a sustainable manner. The similar plans could be made for the other potential areas for the development of farms. Future researchers can use the present study as the basis for studying extensively the differences in impacts created by different farming systems through some particular channel and how those impacts contribute to the overall growth of the economy of Naivasha.

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Appendix:

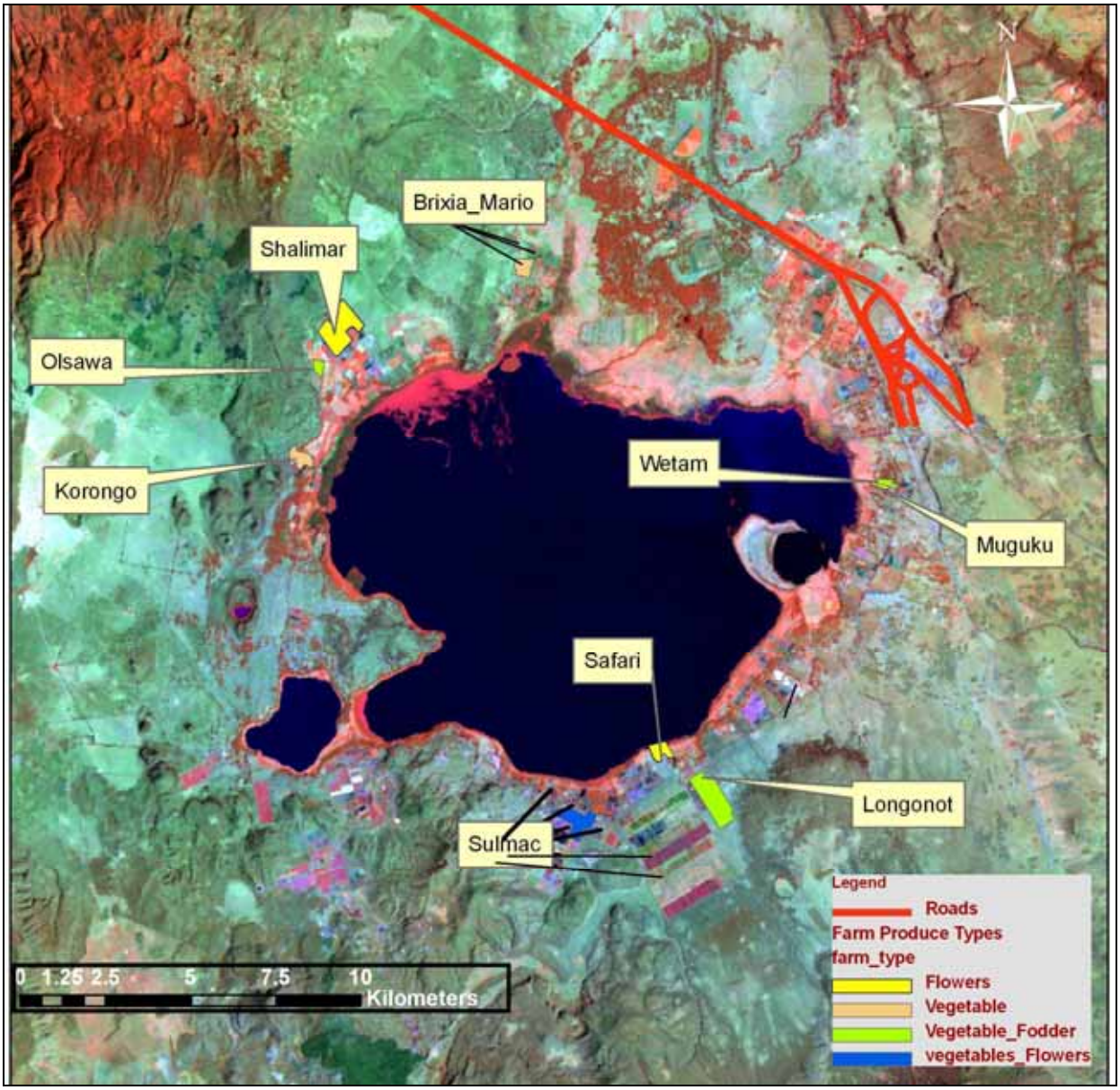


Figure 2.1: Pre-field selection of aggregated large farms

Table 2.7 : Large farm characteristics

Farm No.	Purchased / On lease	Farm operating Year	Total Farm Size (Ha)	Crop Cultivation Area (Ha)	Crop Cultivation Area / Total Farm Size (%)	Produce
1	purchased	1984	4	1.2	30	processing vegetable & flower seeds coming from farmers
2	purchased	1999	8	5.0	63	flower (roses)
3	purchased	1996	17	7.0	42	flower (rose)
4	purchased	1982	20	9.0	45	Dairy, Vegetables, Babycorn
5	On lease	2006	23	4.0	17	flowers (fibsebilla, mambs)
6	purchased	1997	28	21.0	75	flower (roses)
7	inherited	1977	32	1.5	5	veg.seedling, flower seeds, tree seedling
8	purchased	1986	40	5.0	13	hybrid seeds, cutflowers, seedlings
9	On lease, purchased	2000	40	39.0	97	flower (hyperican, Molucella)
10	On lease	2002	50	21.0	43	flower
11	purchased		51	17.0	33	flower (roses)
12	On lease		82	25.0	30	flowers (roses)

Table 2.8: Small farm characteristics

Farm No.	Purchased/rented	Farm operating Year	Total Farm Size (Ha)	Crop Cultivated Area (Ha)	Crop Cultivation Area / Total Farm Size (%)	Produce
1	purchased	2004	1.2	1.0	83	Vegetables (sukumwaki, tomatoes, localbeans, potatoes, maize)
2	On lease	1986	2.4	2.0	83	Flowers
3	inherited	1960	2.8	2.0	71	Vegetables, cereals, fodder, fuelwood plants, grazing land
4	inherited	1981	4.8	3.2	67	veg, dairy milk
5	purchased	1979	6.5	0.8	12	vegetables (f.beans, tomatoes, sukumwa, cabbages), flowers
6	Inherited	1960	7.7	5.6	73	Flowers, Vegetables, Dairy Production, Fodder
7	inherited	1978	16.8	1.2	7	Flowers, Vegetables, Dairy Production, Fuelwood
8	purchased	2004	16.8	4.8	30	local beans, maize

Table 2.9: Land prices of traditional Small Farms

How long this farm is operating	Location	Purchasing price	current rent/price (in Ksh)
1978	On-Lake Side	NA	15,000-20,000 Rent for the Lake side Boundary 50,000 Rent for Farm Gate side Boundary
1960	On-Lake Side	NA	1.2 million/acre price of land for first part(3 acre), 0.8 million / acre for second part(6 acre), 0.6 million/acre for third part(10 acre)
1960	On-Lake Side	NA	Upper part price: 60,000/acre lake part price: 40,000/acre upper part rent: 15,000/acre Lake part rent: 10,000/acre
1987	On-Lake Side		
1979	On-Lake Side	1,000 Ksh for 16 acres	1.3 million / acre
1981	On-Lake Side		1 million/acre
1986	On-Lake Side		
2004	On-Lake Side	0.18 million for 3 acres in 2004	0.4 million for 3 acres in 2007
2004	On-Lake Side	0.5 million/40 acres	2.8 million/ 40 acres

NB: One acre = 0.4 Hectare

Table 3.1: Large farms water input

Produce	Water abstraction	Farm No.	Total Farm Size (in Ha)	Cultivated Area (in ha)	Source of Water	Total Water	Irrigation Water / day/Ha (Cubic Meter)
Roses							
		2	8	5.0	Lake, Borehole	irrgtn-10,000 ltrs/day/5 hctr; wtr-400 ltrs/day	2.0
		3	17	7.0	Lake		
		6	28	21.0	Lake, Borehole	1,000 cubic meter/day	47.0
		10	50	21.0	Lake, Borehole	60 cubmtr/day	3.0
		11	51	17.0	Lake	850 cubmtr / day	50.0
		12	82	25.0			
Seeds							
		1	4	1.2	Lake		
		7	32	1.5	Lake	7 cubmtr/day	4.5
		8	40	1.0		seed - 15 cubmtr/day, seedlings- 4 cubmtr/day	19.0
Other Flowers							
		5	23	4.0	Lake		
		8	40	4.0	Lake	40 cubmtr/ day	10.0
		9	40	(Total 39) 32.0	Lake, Borehole	2,316 Cubmtr/ day / ttlfarm	71.0
Dairy, Vegetables, Babycorn							
		4	20	9.0	Borehole	20,000 cubmtr/ yr	6.0

Table 3.2: Large farms fertilizers- pesticides input

Produce	Farm No.	Cultivated Area (in Ha)	Fertilizer	Fertilizer / day / Ha (kg)	Total Fertilizer Cost	Pesticide	Pesticide/day/ / Ha(kg)	Total Pesticide Cost
Roses								
	2	5.0	600 kg/mnth/5 ha	4		4 ltrs/day/5 hctr	700 grams/day/hctr (@ 1 litre = 0.9 kg)	
	3	7.0						
	6	21.0			53 million Ksh /yr (2,523,809 / ha /yr)			7 million Ksh / yr (333,333 / ha /yr)
	10	21.0						
	11	17.0			12 million Ksh (705,882 / ha /yr)			20 million Ksh (1,176,470 / ha /yr)
	12	25.0						
Seeds								
	1	1.2						
	7	1.5	35 kg / day /1.5 ha	23		800 gms / week for all	114 gram / day	
	8	1.0	seed - 10 kg/day, seedlings--3 kg/day	seed - 20 , seedlings--6		seed - 1 kg /week, seedlings-400 gm/day	seed – 150 gram, seedlings-400 gram	
Other flowers								
	5	4.0	20 tons /year	14 (inclusive of Pesticides)	3 million Ksh (inclusive of Pesticides)			
	8	4.0	cutflwr-40 kg/day,	cutflwr-10 ,		cutflwr-3 kg/week,	cutflwr-400 grams,	
	9	(Total 39) 32.0	16,000 kg /week/ha	70	9 million Ksh / yr (281,250 / ha /yr)			17 million Ksh (531,250 / ha / yr)
Dairy, Vegetables, Babycorn								
	4	9.0	veg – 18,000 kg/yr; maize - 750 kg/yr;	7		veg. – 1,500 kg/yr	veg. - 450 gram/ day / hctr	

Table 3.3: Small farms fertilizers- pesticides input

Farm No.	Crop Cultivated Area (in ha)	Fertilizers/ Pesticide	Fertilizers/ Pesticide per ha
1	1.0		
2	2.0	flwr - 10 bags/ season;	100 kg/ssn/hctr
3	2.0	veg-20 kg/ssn (7 kg/ssn/hctr) Liquid: 10 litre/ssn (3.6 ltr/ssn/hctr);cereals- 10 kg/ssn (3.6 kg / ssn/hctr)	veg- 7 kg/ssn/ha; Liquid: 3.6 ltr/ssn/ha;cereals- 3.6 kg / ssn/ha
4	3.2	Veg-3 bags / 3 acre/ ssn; can = 3 bags / 3 acre/ ssn; pstcd= 5 ltrs/acre/ssn	Veg-1 bag / quarter ha / ssn; can = 1 bag / quarter ha / ssn; pstcd= 5 ltrs/ quarter ha /ssn
5	0.8	flwr- no fertilizer, pstcd- 1 ltr/acre/ssn	flwr- no fertilizer, pstcd- 1 ltr/ quarter ha /ssn
6	5.6	flwr-3 bags/acre (each bag25kg)	75 kg/ quarter ha
7	1.2	flwr- 50 kg/acre/crop DAP, UREA; veg-2 bags / acre;	
8	4.8	veg- DAP - 50 kg/yr	

Table 3.5: Large farms machinery input

Farm No.	Cultivated Area (in ha)	Produce	Machinery Type			Machinery-Cost-maintenance- fuel
			Irrigation Pump	Tractor / Trucks	Others	
1	1.2	Seeds	1 Electrical Pump		1 Seed clearing machine	
2	5.0	Roses	1 Electrical Pump	1 time / year	spray pump-2 , cooling machine-1	spray pmp- 200,000/ yr; irrigation pmp – 200,000/yr; cooling machines – 600,000/ yr
3	7.0	Roses	Yes	Tractors	Fertigation Machine, centralize spraying system, GH	GH – 10,000/hctr; 72,000 dollars in ttl
4	9.0	Dairy, Vegetables, Babycorn		1		
5	4.0	Other flowers				
6	21.0	Roses	5 Electrical Pumps	5 own two-wheels tractor; 3 insulated trucks of 7 ton	3 coldrooms, 5 spraying units, defoliator	612 ksh/day/tractor, 3,400ksh/day @each truck fuel
7	1.5	Seeds	3 Electrical Pumps	tractors -2; 1 truck; 1 pickup;	seeding machine-1; fertigation system-1; overhead sprinklers-900 pieces;	
8	4 0 .5 0.5	Flowers, Seeds	yes	tractors - 5; Trailers - 5	1 steam sterilizer, 1 coldroom,	tractors and trailers 5 each-mntnc cost: 30,000/mnth, 80 ltrs/week, 1 steam sterilizer -80-100 ltrs / week, 1 coldroom-20,000/mnth
9	(Total 39) 32.0	Other flowers	8 Electrical Pumps	tractors - 2, pckups - 2, saloon cars - 2, bikes -4, dumpers- 6,	Gnrtrs -3; coldstorage-2, spraying machines-3, shredding machines-1, sprinklers - 81; lights - 280, fertigation system-2, welding machine-1, defoliator machine-1, GV bag mchn - 1	cold storage - 1.2 million/mnth
10	21.0	Roses	2 Electrical Pumps		cntrl spraying machine- 3; fuel generator - 1; fertigation machine-1; mobile spray machine-1; motorized mist blower-4;	
11	17.0	Roses	yes	Subsoiler with the tractor once in a year	sachet	
12	25.0	Roses				

Table 3.6: Small farms machinery input

Farm No.	Total Farm Size (in ha)	Crop Cultivated Area (in ha)	Machinery type
1	1.2	1.0	flwr-8 zambes/3 acre/season;veg- 2 pangas/ 3 acre/ season;
2	2.4	2.0	Flwr-zambe, panga; 1 Diesel water pump
3	2.8	2.0	Veg- 4 zambe/ season; 2 zambe / season
4	4.8	3.2	Veg - 5 zambes / acre
5	6.5	0.8	flwr- 6 zambes / acre, 2 pangas
6	7.7	5.6	flwr- 10 zambe/acre;veg-7 zambe/acre;cereals - 5 zambe/acre;fdr-2 zambe/acre;1 petrol pump
7	16.2	1.2	Flwr-1 zambe / season; veg-1 zambe / season;Fdr-1 zambe / season; 1 electrical pump
8	16.2	4.8	veg-zambe, panga

Table 3.7: Labour Employed –large farms

Produce	Farm No.	Cultivated Area (in Ha)	Employment Break-up *)	Vegetable	P	S/C	Ttl lbr
Roses							
	2	5.0	T-1/ yr; P-20/yr (4/ha); W-15/mnth, H-20/mnth (Roses)	na	25	104	129
	3	7.0	136 (19/ ha) (Roses)		136		136
	6	21.0	20/18 weeks/Ha (Roses)	na	400	105	505
	10	21.0	424 - prmnt; seasonal-30/yr(20/hctr;1.5/Ha) (Roses)		424	30	454
	11	17.0	395 (23/ hectr) (Roses)	na	395	20	415
	12	25.0	16-17/hectr (Roses)	na	384		384
	Sub Total	**96.0**					**2023**
Average Labour per Hectare of Roses				**21**			
Seeds							
	1	1.2	Prmnt-20, ssnl-30		20	30	50
	7	1.5	NA				
Subotal		**3.0**		**50**			
Average Labour per Hectare of Seeds				**17**			
Other Flowers							
	5	4.0	prmnt - 100, ssnl-40 (25/hctr;10/hectr) (Other Flowers)	na	100	40	140
	9	(Total 39) 32.0	hyperican - field:6.5 / hect/yr, grdrds- 65; molucella - field: 12/hect/yr (Other Flowers)	na	428	391	819
SubTotal		**36.0**		**959**			
Average Labour Per Hectare of Other Flowers				**27**			
Dairy-Vegetable-Cereals							
	4	9.0	Vegetable-360/year(40/hectr);	360/year(40/hectr); 40/year (4.5 / hectr)	5	395	400
SubTotal		**9.0**		**400**			
Average Labour Per Hectare of Dairy-Vegetable-Cereals				**44**			
Otherflowers- Seeds							
	8	5.0	NA	na	150		150
SubTotal		**5.0**		**150**			
Average Labour Per Hectare of Other flowers-Seeds				**30**			
Overall Total		**149**		**3582**			

*) T= Tillage; P= Planting; W=Weeding; H= Harvesting ; P = permanent, S = seasonal; C = contract

Table 3.8: Labour employed - small farms

Farm No.	Cultivated Area (in ha)	Flower	Vegetable	Cereals	Fuelwood	Fodder
1	1.0	na	12/season	2/season	nil	
2	2.0	12 / yr				
3	2.0	T-10/ssn;S - na/ssn;I-1/ssn;W - 5/ssn;H-5/ssn	T-4/ssn;S - 12/ssn;I-4/ssn;W - 4/ssn;H-12 /acre/ssn	T-3/ssn;S- 3/ssn;I-3/acre//ssn;W - 2/ssn;H-4 /acre/ssn	T-na;S - nil;I-1/ssn;W - nil;H-nil	T-nil;S - nil;I-1/ssn;W - 1/ssn;H-1/acre/ssn
4	3.2	T-na;S - na;I-na;W - na;H-na	T-5/day/ssn;S - 5/acre / ssn;I-2/acre/ssn; W- 5/acre/ssn;H-f.beans = 15/acre/ssn; tmts= 4/acre/ssn			
5	0.8	4 / yr	10-12 / ssn			
6	5.6	T-10/ssn;S - 5/ssn;I-1/ssn;W - 5/ssn;H-5/ssn	T-10/ssn;S - 20/ssn;I-1/ssn;W - 10/ssn;H-nil	T-10/ssn;S - 1/ssn;I-1/ssn;W - 10/ssn;H-nil	T-na; S - 0/ssn;I-1/ssn; W - nil;H-nil	T-na;S - nil;I-1/ssn;W - nil;H-nil
7	1.2	T-1;S - 1/ssn;I-1;W- 1;H-2-3	T-2;S - 2/ssn;I-2;W - 1;H-1	T-nil;S - nil; I-nil;W - 1;H-nil	T-na;S - nil; I-;W - nil;H-nil	T-nil;S - nil; I- na;W - na ;H-nil
8	4.8		6 / yr			
9		T-na;S - na;I-na;W - na;H-na	T-3 acre/ssn;S-5/acre/ssn;In-1/acre/ssn;W-2/acre/ssn;H-5/acre/ssn	T-nil;S - nil;I-1/acre/ssn;W - nil;H-nil	T-na;S - na;I-na;W - na;H-na	T-2 / acre/ssn; S - na;I-1/acre/ssn;W - 1 person/acre/ssn;H-1 person/acre/ssn

Farm No. 9 uses 8 permanent labourers for Dairy.T=Tillage; S= Sowing; I=Irrigation; W=Weeding; H=Harvesting

Table 3.9: Large Farm Employees- Average monthly wages

Farm No.	Produce	Average_Payment_Labour	Average_Monthly
6	roses	185 KSH/Day for permanent worker	5,550
1	seeds	Gnrl wrkr--> 3,000 ksh/mnth; driver & office staff--> 6,000-8,000 / mnth; supervisor – 6,000	3,000
8	Seeds and cutflowers	Skilled Labour- 7,000-9,000 / mnth; semi-skilled lbr – 6,000-8,000 / mnth	7,000
2	roses	140KSH/avg,	4,200
3	roses	5,500 Ksh / mnth (includes HRA @1,200)	5,500
9	Other flowers	prmt & ssnl – 4,500/mnth,; csl-2,400/mnth; contract – 10,000/week	4,500
5	Other flowers	110 ksh/day	3,300
4	Dairy- Veg - Cereals	100 ksh/day	3,000
7	seeds	155 ksh/day -	4,650
10	roses	3,800/mnth - minimum	3,800

Table 3.10: Small farm employees- Average monthly wages

Labour_Payment_Basis
100 ksh/day (8 a.m.- 1p.m.)
100 ksh/day M; 80 ksh/day F
Veg- 150/day/season; Cereals - 150/day/season; Fodder- 4,500/month * 12 Fuel – 1,500/day * 2 /year
120 ksh/day
same payment to M & F
Permanent@3,000/mnth; casual@100 ksh/day
Veg.-6,000/season; cereals - 100 ksh/day *10 /season
20,000 ttl/yr

Table 3.12: Labour facilities in large farms

Total Farm Size (in Ha)	Labour_Facilities
28	No housing, provide transport from buses, subsidised lunch@5 ksh, 1 clinic
51	no housing
4	Housing facilities to 20 prmnt lbr, no food or drinks during duty hours
40	housing for all the staff, no transport, subsidised kiosk, nursery school, (upto 6yrs age free, 1 clinic with 2 nurses)
8	housing for some lbrs, no transport, no food or drinks
17	housing only for mgmt, no transport, medical
40	1 clinic, free medicine, with 1 doctor, 1 nurse; subsidised meals thru canteen; no transport, no housing
82	no housing, bus transport available, no canteen but coming up with one, no own hospital but lbr can go to hospital in business park
23	housing for some, no transport, hospital insurance, holidays, starting free lunch
20	housing for some, no transport, free milk
32	Housing; transport for one way to come to duty
50	no housing; transport available; free medication using centralized medication system of business park; subsidised cheap lunch; small patch for vegetable for selling it to the employees on a low rate

Table: 3.13 Total production for large farms

Farm No.	Cultivated Area (in ha)	2006	2005	2004	2003
1	1.2	30 million ksh	lower than 2006		
7	1.5	production is increasing			
5	4.0	300,000 stems/ month	Na	na	Na
8	5.0	cutflwr-2 million stems, seeds- 10 kg/yr, seedlings- 3 millions/yr	Same	same	cutting business
2	5.0	240 boxes	240 boxes	240 boxes	
3	7.2	7.5 million stems	8.5 million stems	8 million stems	
4	9.0	veg-frenchbean-38,000 kg/yr; tomato – 630,000 kg/yr; maize – 180,000 kg/yr	<2006	<2005	
11	17.0				
6	21.0	40 million stems (2007 estimate is 42 million)	36 million stems	38 miilion stems	
10	21.4	150,000 stems/week	60-80 thsnd stems/week	low production	
12	25.0	55- 66 million roses			
9	38.6	hypercan - 23 million stems; mouricilla- 3 million stems	hypercan - 16 million stems		

Table: 3.14 Total production 2006 for small farms

Farm No.	Cultivated Area (in Ha)	Flower	Vegetables	Cereals	Fuelwood	Dairy
5	**0.8**	4,000 stems / week	F.B.- 9 tons/yr; Tomatoes - 8 tons/yr, sukumwa& cbg - 6 tons/yr		na	
1	1	na	Tomatoes → 20 Ksh / Kg; Sukumwaki → 10 Ksh / bunch (0.3 million ksh/yr)	own consumption	na	na
7	1.2	80 carton * 300 flowers each	Tomatoes: No production bcz of not using chemicals.	no idea		18,250 litres/ year @ 10 sh/day
2	2.0	no idea			na	na
3	2.0	NA	F. B. --16 Tonnes Other -- 8 Tonnes	3 Tonnes	50 bags/year	
4	3.2		F. B. = 4 tons/ yr;tmts = 150 bxs /yr(63 kgs bag)		na	
8	4.8	na	L. B.- 20 bags/yr (90 kg each);	maize- 30 bags/yr (90 kg)		
6	5.6	2 Tons per year	9 Tons per year	1 Ton	na	Milk-18,250 litres/ year; Meat - 85 kg/ year
9		na	Tomatoes --> 7 ton beans --> 2 ton	no idea	no idea	no idea

NB: F.B. = French Beans; L.B. = Local Beans.

Table 3.17: Share of produces in revenue and crop area in small farms

Revenue / year from Flowers (in Ksh)	land under Flowers (in acre)	Revenue / year from Vegetables (in Ksh)	land under Vegetables (in acre)	Revenue / year from Cereals (in Ksh)	land under cereals (in acre)
20,000	1 acre	15,000	1 acre	Nil	Nil
	Rent 20,000 per acre / year		on rent for vegs		
0.3 million	8 acres	0.1 million	5 acres	0.2 million	1 acre
			2 acres is on rent for vegs, 10,000 for 2 acres		
NA	nil	3 million from beans, 0.2 million from other veg.	5 acres	0.2 million	1 acre
na	na	no idea	5 acres/season	no idea	only on borders of the fields
100,000 / yr	.5 acre	f. beans- 200,000 /yr, tomatoes – 250,000/yr, sukumwa, cabbages- 100,000/yr	1.5 acre	own consumption	only on borders of the fields
		Grows vegs for own consumption on a qrtr acre			
na	na	f.beans- 20%, tomts- 10%, sukumwa-5%	3 acres	own consumption	
full	full	na	Na	na	Na
na	na	40,000	1.5 acre	own consumption	1.5 acre
na	na	local beans-20,000	mixed farming so differentiation in cultivated area is not possible	maize-40,000	mixed farming so differentiation in cultivated area is not possible

Table 4.1: (With Family) Employees income-Naivasha expenditure-saving

Farm Employee No.	Employee - Salary	Total Income Amt (100%)	Total Expenditure Amount -Naivasha	Expenditure -Naivasha (%)	Saving-Naivasha (%)	Saving-Naivasha Amount
1	4,400	4,400	3,146	72	0	0
2	2,000	5,000	3,025	61	0	0
3	5,300	5,300	4,000	75	4	212
4	5,410	5,410	2,833	52	7	379
5	5,411	5,411	4,675	86	7	379
6	6,250	6,250	5,800	93	2	125
7	4,550	7,550	6,700	89	0	0
8	2,400	9,000	3,499	39	6	540
9	3,000	9,000	6,000	67	0	0
10	5,900	10,400	4,225	41	5	520
11	5,800	11,100	4,933	44	2	222
12	3,000	15,000	5,633	38	0	0
13	13,500	23,500	10,033	43	21	4935
14	4,500	32,500	7,916	24	2	650
Total	**71,421**	**149,821**	**72,418**			**7961**

Table 4.2 (With Family) Employees expenditure components

Farm Employee No.	Total Income (100%)	Food-Expenditure (%)	Clothing-Expenditure (%)	Education-Expenditure (%)	Rent (%)	Transport (%)	Water Bill (%)	Electricity Bill (%)	Mobile Phone Bill (%)	other Expd (%)	Total Expenditure Amount - Naivasha
1	4,400	79	5	15	0	0	0	0	0	0	3,146
2	5,000	66	4	17	13	0	0	0	0	0	3,025
3	5,300	50	13	0	25	0	13	0	0	0	4,000
4	5,410	88	12	0	0	0	0	0	0	0	2,833
5	5,411	86	4	0	0	0	0	0	11	0	4,675
6	6,250	43	26	5	22	3	0	0	0	0	5,800
7	7,550	45	7	15	22	0	7	0	3	0	6,700
8	9,000	86	12	0	0	0	0	0	2	0	3,499
9	9,000	67	8	8	0	0	0	0	17	0	6,000
10	10,400	47	3	19	17	0	0	0	0	14	4,225
11	11,100	41	7	10	26	0	0	0	0	16	4,933
12	15,000	11	6	74	9	0	0	0	0	0	5,633
13	23,500	50	40	2	0	0	0	8	0	0	10,033

NB: All expenditure components figures are expressed as percentages of total Naivasha expenditure amount.

Table 4.4 (Without Family) employees income-Naivasha expenditure-saving

Farm Employee No.	Rspndnt-Salary (100%)	Total Expenditure Amount - Naivasha	Expenditure-Naivasha (%)	Saving-Naivasha (%)	Saving-Naivasha Amt
15	3,300	2,866	87	15	495
16	4,100	3,850	94	24	984
17	4,300	3,950	92	12	516
18	4,550	2,050	45	11	501
19	4,800	1,341	28	0	0
20	4,800	4,066	85	0	0
21	5,000	4,750	95	14	700
22	5,441	2,916	54	18	979
Total	**36,291**	**25,789**			**4175**

Table 4.5: (Without Family) Employees expenditure components

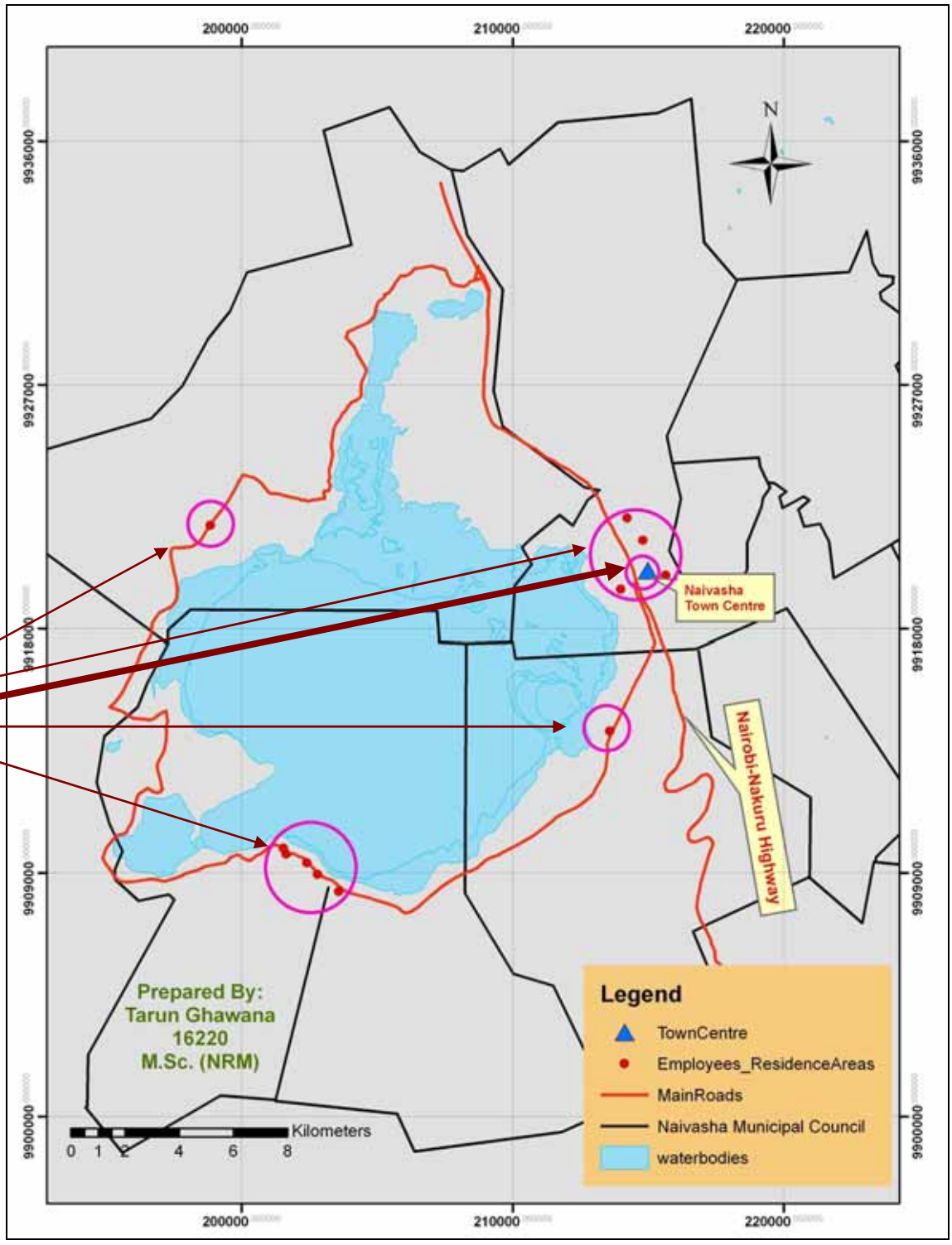
Farm Employee No.	Rspndnt-Salary	Food-Expndture (%)	Cltohing-Expndture (%)	Education-Expndture (%)	Rent (%)	Transport (%)	Water Bill (%)	Electricity Bill (%)	Mobile Phone Bill (%)	Total Expenditure Amount - Naivasha
15	3,300	35	6	0	38	7	0	0	14	2,866
16	4,100	39	6	0	34	0	8	13	0	3,850
17	4,300	63	6	0	20	0	0	0	10	3,950
18	4,550	29	12	0	49	0	0	0	10	2,050
19	4,800	60	3	0	37	0	0	0	0	1,341
20	4,800	37	4	25	25	0	5	0	5	4,066
21	5,000	53	5	23	0	0	0	8	11	4,750
22	5,441	69	14	0	0	0	0	0	17	2,916

NB: All expenditure components figures are expressed as percentages of total Naivasha expenditure amount.

Table 4.9: Small farmers – Monthly expenditure components

Food-Exp/Mnth (%)	Clothing-Exp/Mnth (%)	Education-Exp/Mnth (%)	Rent-Exp/Mnth (%)	Transport-Exp/Mnth (%)	Water-Expnd/month (%)	Electricity-Expnd/month (%)	Mobile Phone Bill (%)	Total Expenditure Amount - Naivasha
88	0.5	0	0	0	0	11.5	0	17,083
35	7	45	0	0	0	13	0	22,667
44	0.5	46	0	0	4	5.5	0	18,016
46	7	26	0	0	21			21,850
					phone, electricity, water --> 4,600 ksh/mnth			
58	10	20	0	0	1.5	9	1.5	17,000
85	0	3	0	4	0	0	8	10,553
	children send it from outside							
34	4.5	45	0	0	8.5	8.5	0	29,500
53	7	22	0	0	18			18,867
					phone, electricity, water --> 3,450 ksh/mnth			

NB: All expenditure components figures are expressed as percentages of total Naivasha expenditure amount.



Employees Monthly Expenditures

Figure 4.8: Spatial distribution of employees local purchase channel
(Circles indicate the areas of local purchase. Width of corresponding arrows shows the strength of potential benefits)

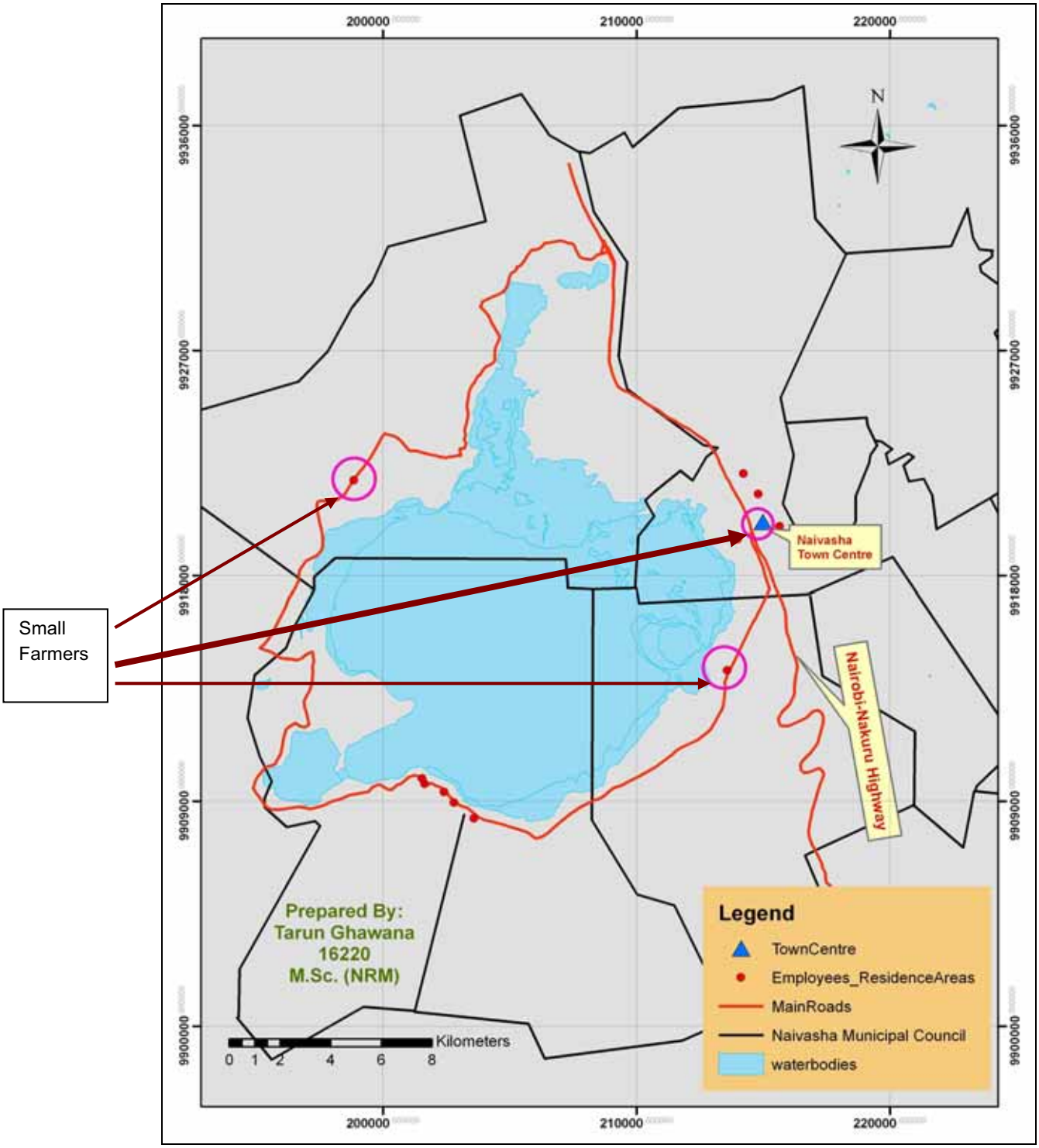


Figure 4.11: Spatial distribution of small farmers local purchase channel
(Circles indicate the areas of local purchase. Width of corresponding arrows shows the strength of potential benefits)

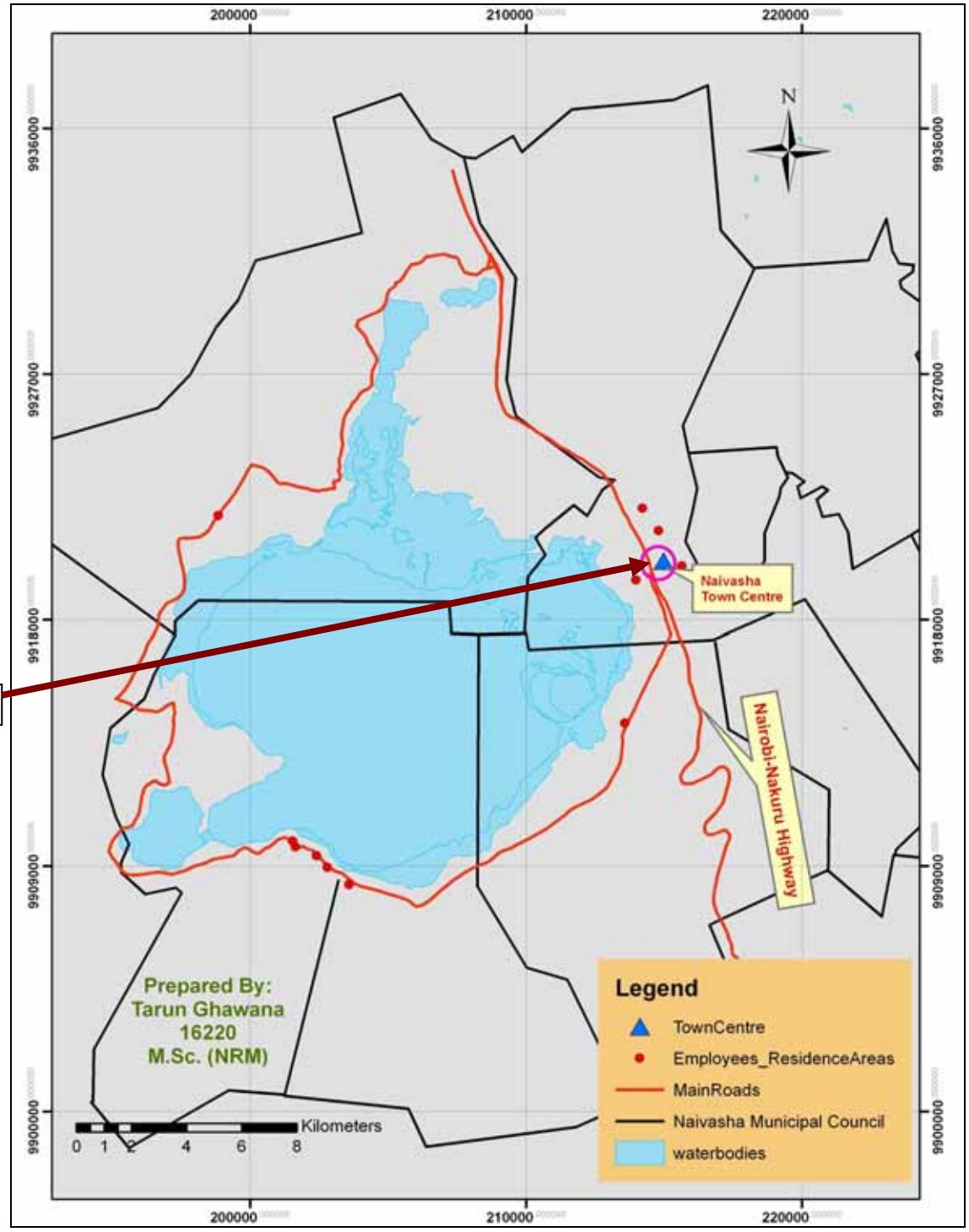


Figure 4.12: Spatial distribution of large farms local purchase channel
(Circles indicate the areas of local sale. Width of corresponding arrows shows the strength of potential benefits)

Table 4.11: Annual local sale returns (in Ksh) of small farms

Farm No.	Vegetables Returns	Dairy Returns	Cereals Returns	Vegetables (Approx. Qnty)
6 (Kihoto)	0.1 million	0.2 million	0.2 million	9 Tons [Tomatoes → 40 Ksh / Kg; Cabbage → 15 Ksh / piece]
Annual Local Sale Return (in Ksh) (Approx.)			0.5 million	
Annual Farm (in Ksh) Revenue			1 million	
3 (Kihoto)	0.2 million	0.18 million	0.2 million	8 tonnes
Annual Local Sale Return (in Ksh) (Approx.)			0. 58million	
Annual Farm (in Ksh) Revenue			2.4 million	
9 (Kihoto)	Tomatoes →0 .3 million ; Onion → 6,000			Tomatoes → 6 tons / yr; Onions → 1.5 tons / yr
Annual Local Sale Return (in Ksh) (Approx.)			0.31 million	
Annual Farm (in Ksh) Revenue	----			
4 (Kihoto)	225,000	18,000		Tomatoes → 150 boxes / yr (each box of 63 Kg)
Annual Local Sale Return (in Ksh) (Approx.)			0.24 million	
Annual Farm (in Ksh) Revenue	----			
5 (Kihoto)				
Annual Local Sale Return (in Ksh) (Approx.)			0.35 million	
Annual Farm (in Ksh) Revenue			0.8 million	Tomatoes → 8 tons / yr
1 (Karagita)				Tomatoes → 20 Ksh / Kg; Sukumwaki → 10 Ksh / bunch
Annual Local Sale Return (in Ksh) (Approx.)			0.3 million	
Annual Farm (in Ksh) Revenue			0.3 million	
8 (Kasarani)	40,000 / yr		30 bag/yr (90 kg) x 900 = 27,000	Local beans → 20 bag / yr (90 kg / bag);
Annual Local Sale Return (in Ksh) (Approx.)			0.07 million	
Annual Farm (in Ksh) Revenue			0.07 million	
7 (Kihoto)		18,250 ltrs / yr @ 10 ksh		Tomatoes → 20 Ksh / Kg; Sukumwaki → 10 Ksh / bunch
Annual Local Sale Return (in Ksh) (Approx.)			0.18 million	
Annual Farm (in Ksh) Revenue			1 million	

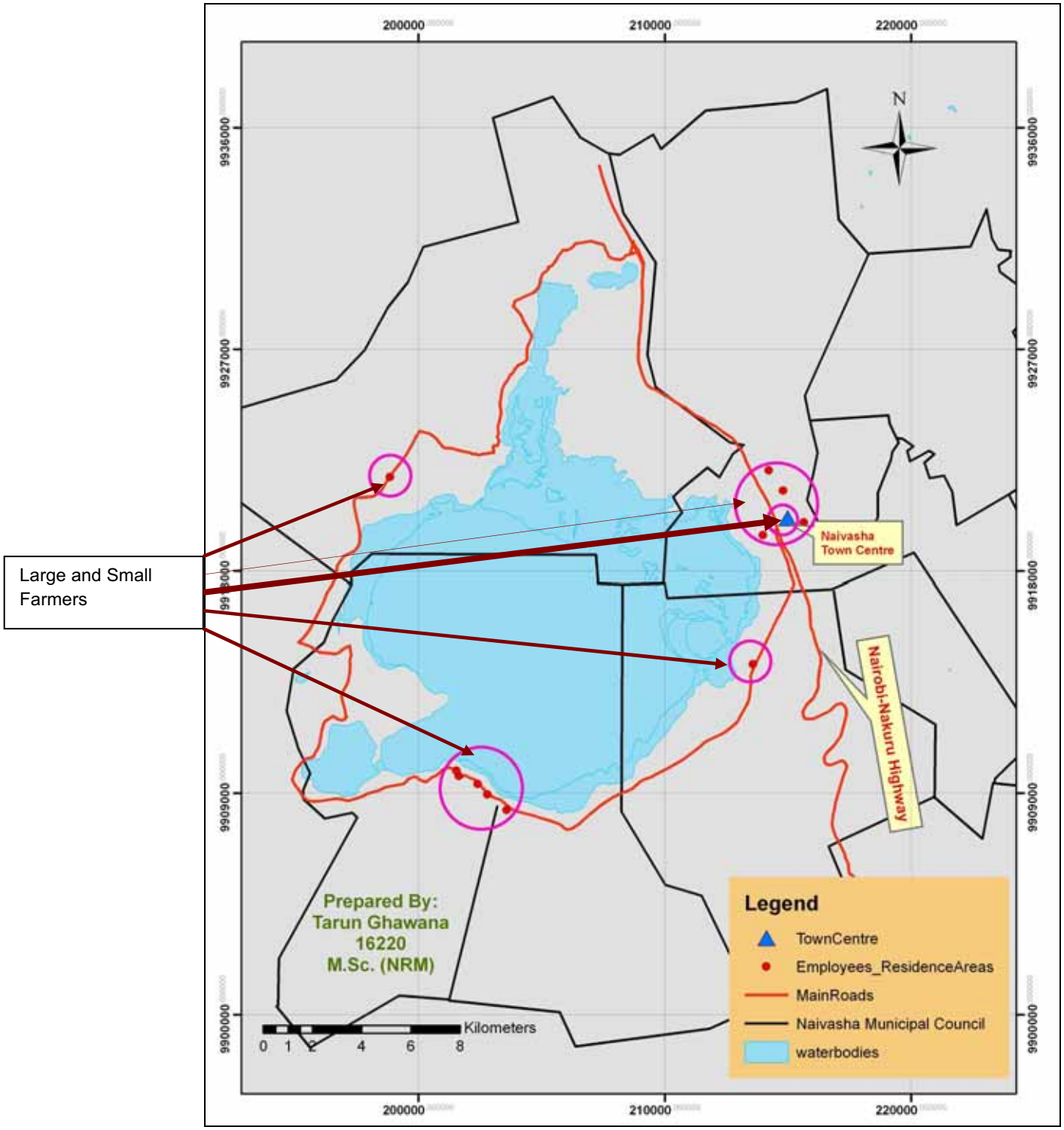


Figure 4.14: Spatial distribution of farmers local sale channel
(Circles indicate the areas of local sale. Width of corresponding arrows shows the strength of potential benefits)

Table 4.12: Local taxes and fees paid by large farms

Farm No.	Annual Farm Revenue	Income-Sale-Tax
6	270,000,000	NMC for production @ 70,000 ksh/yr
1		Trading license: 12,000/ yr
8	60,000,000	Trading Licence: 30,000/ year; Kiosk license fees- 15,000/yr, clinic fees – 30,000/yr; school license fees- 20,000/yr;
2	3,000,000	Trading license fees- 12,500/yr;
3		Trading license- 35,000/yr;
5		Trading license fees- 32,900/yr;
7	19,999,980	Trading license fees- 35,200/yr;

Table 4.14: Ranking of economic activities in Naivasha by stakeholders

Category	Large Commercial Farms owned by foreigners	Large Commercial Farms owned by locals	Small commercial Farms owned by locals	Small subsistence Farms owned by locals	Heavy Industries	Small & cottage industries	Service sector (Telecom, Education, BPO, Consultancy)	Tourism
Local Authorities	3	3	2	5	6	1	4	3
Local Authorities	2	1	1	2	4	6	5	3
Local Authorities	5	1	1	6	7	2	3	4
Local Authorities	3	2	1	5	7	6	4	2
Local Authorities	1	6	5	8	7	4	3	2
Average	**2.8**	**2.6**	**2**	**5.2**	**6.2**	**3.8**	**3.8**	**2.8**
Local businessman	1	1	2	4	3	7	6	5
Local businessman	6	1	2	5	1	3	4	3
Local businessman	1	5	6	4	8	7	3	2
Local businessman	1	3	5	8	6	7	4	2
Local businessman	1	1	3	5	6	5	4	2
Local businessman	2	5	3	8	4	6	1	7
Local businessman	2	1	3	6	4	6	6	5
Average	**2**	**2.4**	**3.4**	**5.7**	**4.5**	**5.8**	**4**	**3.7**
Pvt. Company employee	8	2	3	7	1	6	5	4
Average	**8**	**2**	**3**	**7**	**1**	**6**	**5**	**4**
small farmer	3	3	4	7	1	6	5	2
small farmer	8	1	2	3	6	4	5	7
small farmer	7	6	5	4	8	2	3	1
small farmer	2	1	8	6	4	7	5	3
small farmer	1	2	6	3	8	4	5	7
Average	**4.2**	**2.6**	**5**	**4.6**	**5.4**	**4.6**	**4.6**	**4**
Farm Employees	2	4	5	6	8	7	1	3
Farm Employees	2	4	5	6	8	7	1	3
Farm Employees	2	4	5	6	8	7	1	3
Farm Employees	1	3	5	6	8	7	4	2
Farm Employees	1	3	5	6	8	7	4	2

Farm Employees	1	3	5	6	8	7	4	2
Farm Employees	3	4	5	8	2	7	1	6
Farm Employees	3	4	5	8	2	7	1	6
Farm Employees	6	5	4	3	7	2	8	1
Farm Employees	6	5	4	3	7	2	8	1
Farm Employees	1	4	6	7	8	3	5	2
Farm Employees	1	4	6	7	8	3	5	2
Farm Employees	3	1	2	6	7	8	5	4
Farm Employees	3	1	2	6	7	8	5	4
Farm Employees	3	8	7	6	1	5	2	4
Farm Employees	3	8	7	6	1	5	2	4
Farm Employees	1	8	2	6	3	7	4	5
Farm Employees	1	8	2	6	3	7	4	5
Farm Employees	1	5	6	7	3	4	8	2
Farm Employees	1	5	6	7	3	4	8	2
Farm Employees	1	3	4	8	2	7	5	6
Farm Employees	1	3	4	8	2	7	5	6
Farm Employees	2	3	4	5	1	6	7	8
Farm Employees	2	3	4	5	1	6	7	8
Farm Employees	2	6	5	7	1	4	8	3
Farm Employees	2	6	5	7	1	4	8	3
Average	**2**	**4**	**5**	**6**	**8**	**7**	**1**	**3**

Farm Representative Questionnaire

Serial Number:…… **Date:……..**

Farm Name…… Date…….Xcd…….. YCD…..

Respondent Name…… Function……..

Owner (Individual/Group)…….

(Kenyan/ Foreigner)……..

Q1 How long this farm is operating?.....

Q2 How long are you involved in the farming activity here?.....

Q3 What is the total farm size?.....

Q4 What is the Land title: inherited/purchased/rented/other?

Q5 When it was purchased/rented and at what price? What is the current rent/price?

Q6 What is the total farm revenue?.....

Farm Production

Q7 What produce does the revenue come from? (Flowers/ Vegetables/Cereals/ Dairy Products/ Fodder/ Fisheries)

For each kind of production, ask the following question:

Q8 What is the share of crop in total revenue?

(1) Share of crop1……. (2) Share of crop2……

Q9 How much land is under crop1 …… (**9.1** How much irrigated area?) ……..

and How much land is under crop2 …… (**9.2** How much irrigated area?)

Cropping Cycle & Input involved per crop

Phases:

Q10 How much labour is required? (Number, mandays / manhours)

Q11 Do you use only permanent labour or get additional for this particular activity? If so, hen how many? From where do you get this labour?

Q12 How many people for management you require for this activity?

Q13 What kind of machinery do you use for production? For how much time you use it for this activity?

Q14 What is the quantity of each machinery type per unit of crop area?

If they are owned, then

Q14.1 On an average how much you spend on maintenance, fuel, etc. for different types of machinery for this process?

If you take them on rent for this particular activity,

Q14.2 How much you pay for them?

Q14.3 From where do you get these machineries?

Q14.4 Why do you take it from there? (Better quality, cheap, less distance)

Q15 What are the other inputs required for this activity? (Quantity and Quality)

Q16 How much you pay on average basis to these labourers (according to their skills or education; permanent, seasonal)? Do you make payments on monthly/ weekly/daily basis?

Q17 Do you provide them any facilities? such as housing, transport for labourers living outside farm, sanitary facilities, food or drinks during duty hours?

Q18 Do you pay any kind of income tax, sales tax? If yes then, whom do you pay the taxes? (share of differrent levels of authorities)?

Q19 Do you pay any kind of tax /levy/fine for different types of inputs (water)? If yes then, whom do you pay the taxes? (share of different levels of authorities)

Q20 How many different kinds of machinery costs on daily basis?

Q21 What is the last year's annual production of each crop? How does that compare to previous 5 years production? (Physical Vs Monetary units)

Year	Flowers (units?)	Vegetables (Tons)	Cereals (Tons)	Fodder (Tons)	Dairy Products (Kgs/ Litres)	Fisheries (Tons)

Q22 Can you give sum of production costs for each crop for Current and Previous 5 Years?

Input		Input cost	Input cost	Input cost per	Input cost	Input cost

		per unit (year1)	**per unit (year2)**	**unit (year3)**	**per unit (year4)**	**per unit (year5)**
Management	Upper Level					
	Middle Level					
	Junior Level					
Labour	Permanent					
	Seasonal (each season average)					
Machinery	Vehicles					
	Production Machinery					
Land	Crop Area					
	Irrigated Area					
Buildings	Office					
	Permanent Housing					
	Temporary Housing					
	Permanent Animal Sheds					
	Temporary Animal Sheds					
	Green Houses					
Water	Irrigation					
	Drinking					
	Other ( )					
Pesticides						
Fertilizers						

Q23 What market are you aiming at for crop1, crop2..?

Purpose	**Flowers (Tons)**	**Vegetables (Tons)**	**Cereals (Tons)**	**Fodder (Tons)**	**Dairy Products (Kgs/ Litres)**	**Fisheries (Tons)**
Own use						
Local Sale						
Regional						
National						
Export						

Q24 How do you sell it and at what price?
Crop1 / Crop2

FarmGate	**Local Market**	**Online**	**Price per unit**

Q25 How do you get the produce to the buyer?

Q26 Do you get any kind of financial subsidies or tax rebates from the Kenyan government or local authorities?

****

Farm Employee Questionaire

Farm Name…… Date…….XCD…….. YCD…..

Q1 Production (Flowers/ Vegetables/Cereals/ Dairy Products/ Fodder/ Fisheries)

Q2 What is your job profile?.....

Q3 How much experience you have in this kind of job?.....

Employment Characteristics

Q4 Is your job permanent or is it incidental/seasonal?

Q5 Do you live with your family?

If yes then,

Q6 How many people are living with you?

Q7 What is your place in the family?

Q8 What is the main source of livelihood for the family?

Q9 What is your contribution in the family livelihood? (Full/half/ less)

Q10 What are the other sources of income for family?

Q11 Composition of Family

Relation	**JobLocation (Farm / Outside)**	**Family Income Contribution**
Husband / Wife		
Children		
Parents		

Labour Returns

Q12 What is your salary / payment (Ksh)? (If hesitant to answer exact figures, use income ranges)

Q13 Do you get it on daily/ weekly/ monthly basis?

Q14 Where do you live?

If living on farm:

Q14.1 Do you pay rent for the housing facility? If yes then, how much?

If living outside:

Q14.2 where do you live? How much rent you pay?

Q14.3 Can you point on the map, where do you live presently?

Q15 How do you come here daily?

Q16 How long do you live here?

Q17 Did you come here from outside Naivasha region?

If yes then:

Q17.1 From which region you came here?

Q17.2 Why did you move from your region?

Q18 Other than salary, do the employers provide you any kind of drinks or food during duty hours?

Q19 What you used to do before this job?

Q20 Do the employers provide you any kind of health services? If yes, is it proper?

Q21 Do you get any other kind of benefits from the employers?

Economic Characterisitics

Q22 What is total monthly expenditure of family?

Q23 What is the family's general expenditure on day-to-day items? (use beans)

Item	***Purchase from:***
A. Food	
B. Clothing	
C. Education	
D. Rent (if any)	
E. Transport (if any)	
F. Other (if any)	

Q24 Do you save any part of your income?

If yes then,

Q24.1 Can you give an approx. % that how much you save in cash at home, how much you deposit in the banks or other financial savings?

Q25 Did you recently invest in or are you planning to do so, for example,

Item	***Purchase from:***
A. Land	
B. Livestock	
C. Vehicle	
D. Other	

****

Small Farmer Questionnaire - Household

Serial Number:…… **Date:……..**

Farm Name…… Date…….Xcd…….. YCD…..

Q 1 Where do you live?

If not on farm then,

Q1.1 Can you mark the place, on the map, where you live?

Q1.2 How long do you live there?

Q1.3 How do you come here daily?

Q2 Do you live with your family?

If yes then,

Q2.1 How many people are living with you?

Q 2.2 What is your place in the family?

Q 2.3 What is the main source of livelihood for the family?

Q 2.4 What is your contribution in the family livelihood? (Full/half/ less)

Q 2.5 What are the other sources of income for family?

Q3 Composition of Family

Relation	**JobLocation (Farm / Outside)**	**Family Income Contribution**
Husband / Wife		
Children		
Parents		

Economic Characteristics

Q4 What is total monthly expenditure of family?

Q5 What is the family expenditure (%) on:

Item	***Purchase from:***
A. Food	
B. Clothing	
C. Education	
D. Rent (if any)	
E. Transport (if any)	
F. Other (if any)	

Q6 Do you save any part of your income? Where do you save it? (with bank or somewhere else)

Q7 Did you recently invest in or are you planning to do so, for example,

Item	***Purchase from:***
E. Land	
F. Livestock	
G. Vehicle	
H. Other	

****

Local Authorities Questionnaire

Respondent Name……

Designation……..

Department……..

Q1 What kind of plans do you have for the development of lake Naivasha?

Q2 What are the major challenges in the development of lake Naivasha?

Q3 What kind of dealing you have with the farms existing around lake Naivasha?

Q4 Do you get any kind of tax/levy/fine on the use of these resources? Can you give some information per farm basis? (If no then why?-legal base, enforcement problem,)

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Local Businessmen Questionnaire

Business Type……

Location……. X Coord ……. Y Coord……

Q1 Do you provide any kind of service or material to the farms?

If yes, then

Q1.1 What kind of service or material do you provide to the farms situated around lake Naivasha?

Q2 How often do you provide them? How much?

Q3 What kind of farms uses your services or materials?

Q4 What is the approximate amount of business (in Ksh) they give you annually?

Q5 Do you pay any kind of tax for your business? If yes, then to whom? and approx. how much?

Are you the only one to provide this kind of services/ material?