SOFEM

KENYA/JAPAN

SOCIAL FORESTRY EXTENSION MODEL DEVELOPMENT PROJECT

SOCIO-ECONOMIC AND RESOURCE SURVEY

OF

KITUI DISTRICT

by

Muok, B.O., J.Kamene, K.Kemmochi and
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September 1998

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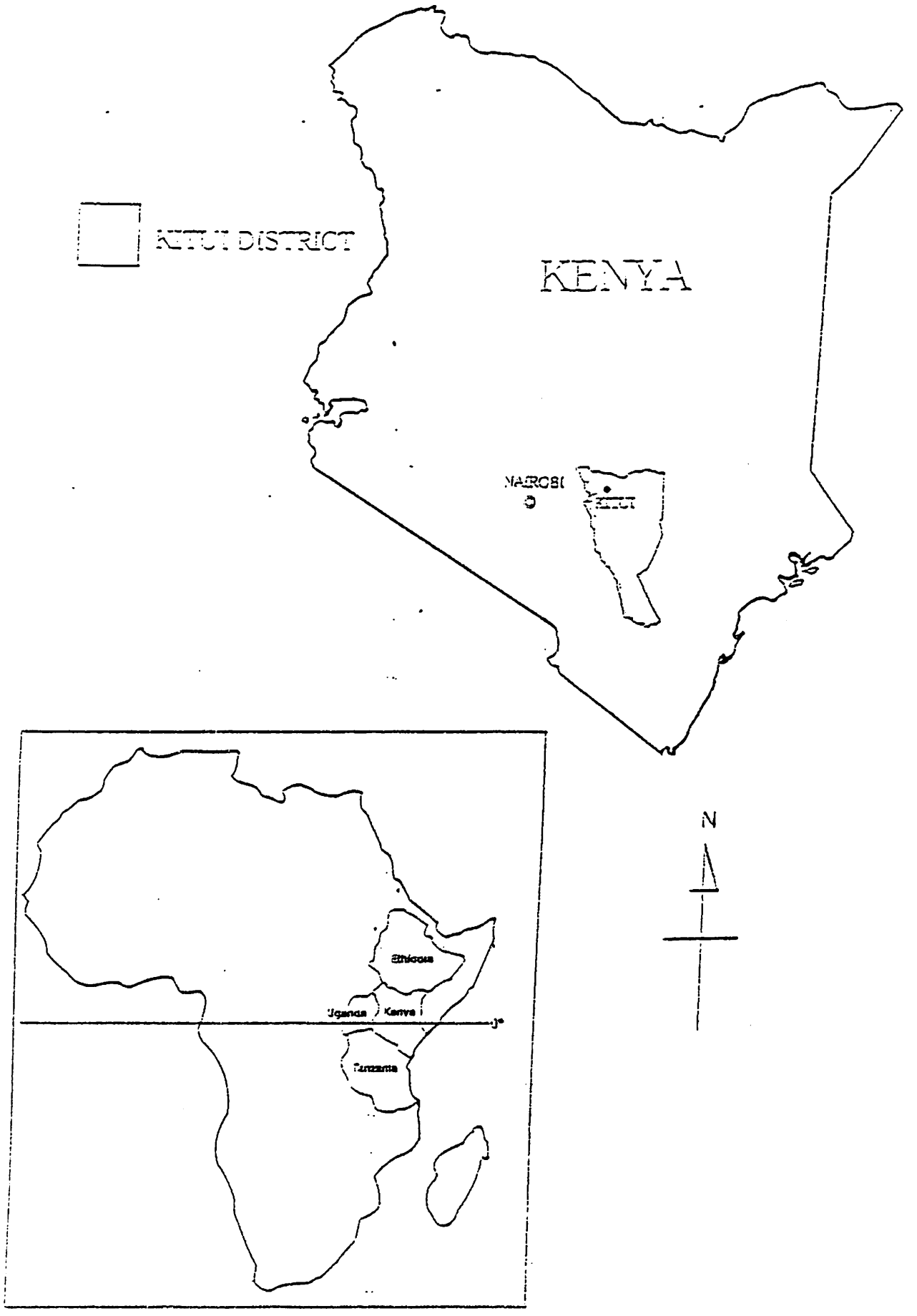

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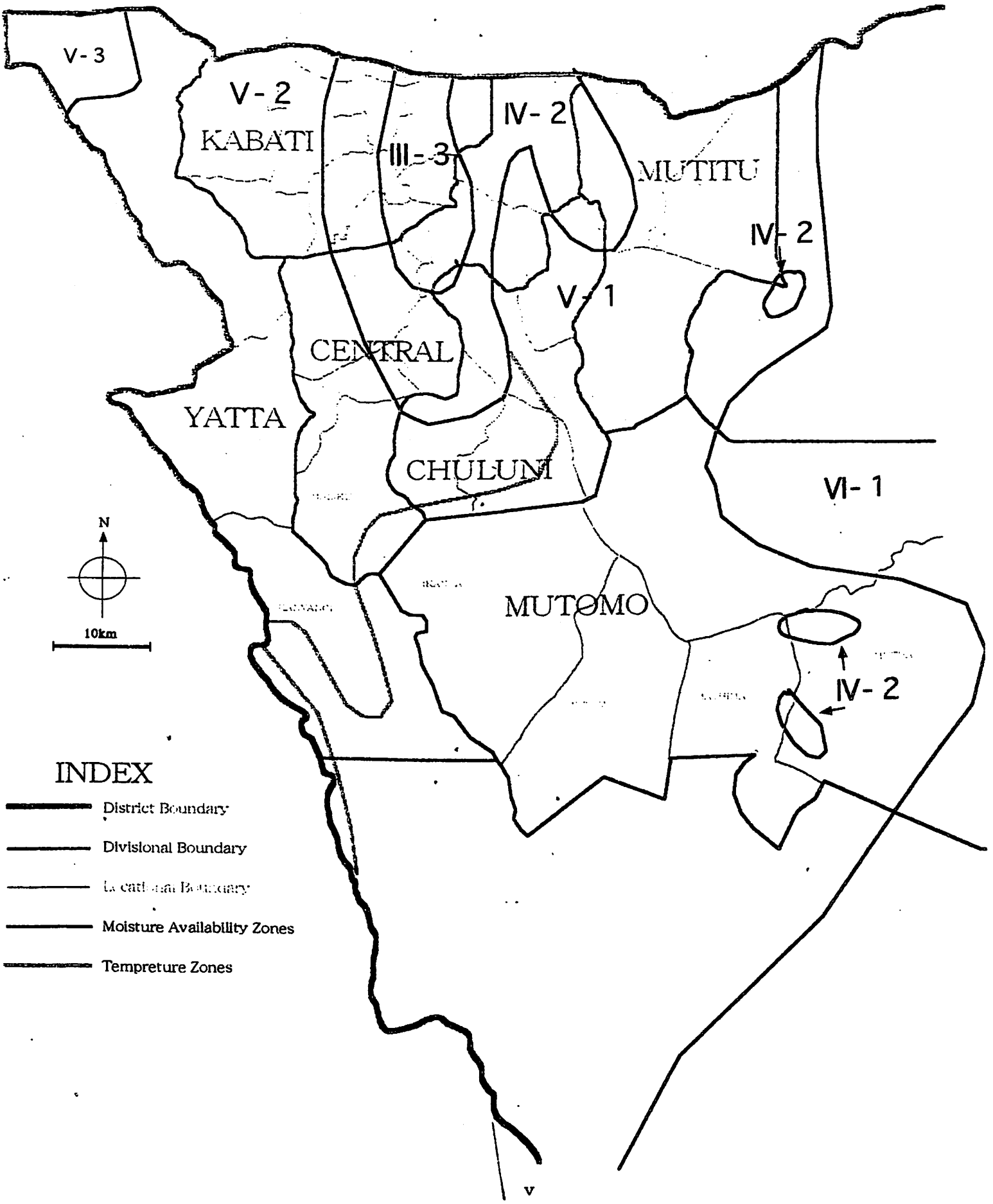

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Summary

This is a report of general socio-economic and natural resource survey conducted in Kitui District, Kenya. The survey was conducted by Social Forestry Extension Model Development Project (SOFEM) in semi-arid areas. The survey was conducted in four divisions namely: Mutomo, Kabati, Chuluni and Central. The main objective of the survey was to gather information on the target area for use in the planning and implementation of the project. The specific objectives of the survey was four fold:

1. To develop a criteria for stratification of the farmers;
2. Identify appropriate entry points;
3. Establish the key issues the project should focus on;
4. Understand the social make up of the community (i.e. their culture and taboos as relates to tree planting).

A total of 90 households were interviewed covering four divisions, 22 locations and 71 sub-locations. One to two households were randomly selected from every sub-location.

The average size of homestead was estimated at 11.3 persons of whom 8.9 persons were residents. Male female ratio is 47% and 53% in a sample of 1017 people. Males who are mostly heads of households are the main decision makers on matters of land use constituting 49.9%, joint decision making by both husband and wive was done by 32% of the respondents. Female decision makers cpstituted 14% mostly in situations where they are widowed/ divorced or the husband do not live at home. According to the survey 54% of the respondents had formal education of which the majority had primary education. The mean farm size per household is 22.8 ha, Mutomo has the highest mean farm size 57 ha. followed by Kabati 19.1 ha, while Chuluni and Central have a mean farm size 12.3 ha and 8.6 ha, respectively. The land ownership system is mainly freehold except Mutomo where land demarcation is yet to begin though land owners already know their boundaries.

Maize is the most common crop grown by sampled household followed by cow peas and pigeon peas. Other crops grown on smaller scale are beans, green grams, sorghum, millet, finger millet, cassava, sweet potato and vegetables such as pumpkin and kales. There are no major cash crops in the sample area except for small scale growing of tobacco, cotton, castor oil, sun flower, sisal and sugar cane. The agricultural extension services are rarely received by the respondents. The main farm input is manure recorded in 77.8% of the sampled households, few farmers 18% applied commercial fertilisers and pesticides. Food security situation is very poor with majority (93.3%) of the sampled households recording food deficit, they partly meet the deficit by buying (73.3%) and the rest through food relief from government and church organisation . It was the view of most respondents that the relief food was too little to meet demands of the households. The main problem

facing farming activities were pest and diseases, drought and lack of seeds in descending order.

All the sampled household keep one or more types of livestock. Poultry is the most common, kept by 92.2% of the households followed by goats (63.7%), cattle (62.2%) and donkey (61.1%). Kabati and Mutomo are leading in number of cattle with 80.9% and 73.3%, respectively, while Central and Chuluni lead in number of goats 73.9% and 77.3%, respectively. Mutomo is leading in percentage of bee keepers (73.7%). Donkeys are mainly used as a mode of transportation mainly for water, fuelwood and grains. The main livestock production problems were identified as pest and diseases 72.%, dry season fodder 44.4% and water scarcity 23.3% of the households. Dry season fodder is more severe in Central and Chuluni divisions while water scarcity is more severe in Mutomo and Kabati divisions.

All the sampled households have planted at least one tree species. Majority (75.5%) have planted fruit trees. This is followed by *Senna siamea* (63.3%), *Azadirachta indica* (24.4%), *Grevillea robusta* (22.2%) and *Leucaena leucocephala* (21.1%). Only 27.7% of the households had tree nursery of which (64%) privately and (36%)group owned . The highest source of trees planted in the area is from Social Forestry Training Project (SFTP). Involvement in community tree planting is not common. Forestry extension services in the area is inadequate with the highest percentage of those who received extension services being from SFTP. The others were not visited or rarely visited by extension agents. The preference on tree species confirmed the already species planted, with the majority (78.9%) preferring to plant fruit tree species, *Senna siamea* (50%), *Grevillea robusta* (31.1%), *Eucalyptus* sp. 27.8% and *Azadirachta indica* 17.8%. The most widely practised tree care is weeding done by 71.9% of the sampled households, protection against animal (68.9%), termite damage (60.7%) and watering (58.4%). Spot weeding of the individual trees is widely practised by the farmers, protection against animal damage is done by spot fencing while termites were mainly controlled by use of local materials like wood ash and application of chemicals. Watering was mainly by surface application and inserted bottles. Use of waste water from the kitchen and construction of microcatchment though mentioned was not widely practised. There are no major taboos related to tree planting and utilisation except for some few cases such as *Croton megalocarpus* which some people believe cause conflict if planted in home steads. Main forest products with ready market are charcoal and fruit. Most households get fuelwood from their own land spending an average of 1.3 hours in single trip for fuelwood collection. Fuelwood scarcity is more severe in Kabati division where average time spent in fuelwood collection is 1.8 hours while Mutomo showed least time spent in fuelwood collection of 0.8 hours. The major problems of tree planting were identified as termite damage, water scarcity, animal damage and lack of seedling in descending order.

The main water sources mentioned are seasonal rivers such as Thua, Tiva, Kalundu, Mutendea, Nzeeu and Kauwi. There are sub-surface dams and water pans scattered in

different areas. These sources do not provide sufficient water to meet the needs of the local people, especially during the dry seasons. Roof catchment is increasingly gaining significance as source of water during the rainy season, sub-surface water in sandy river beds play a crucial role in meeting water requirement during the dry seasons.

The main cash generating activities of the sampled households are crop and animal sales, and income from employed members of the households (both casual and permanent employment). The major expenditures are purchase of food items, paying of school fees and medical expenses.

In addition to government ministries and department operating in the district, there are several NGOs in the districts providing various services. The services range from water provision, school development, health care, environmental conservation, social services and agriculture. Linkages and collaboration with such organisations may have a potential to extend SOFEM activities to the wider residents of Kitui. The major infrastuctural problems identified are poor road conditions, inadequate health facilities, poor telecommunication network and electricity.

1.0 INTRODUCTION

1.1 Position and size

Kitui District is situated in Eastern Province of Kenya and it borders Machakos District and Makueni District to the west, Mwingi District to the north, Tana river District to the east and Taita District to the south. It lies between latitudes 0° 3.7' and 3° 0' south and longitudes 37° 45' and 39° 0' east. The total area is approximately 20555 km^2 including 6309.01 km^2 occupied by uninhabited Tsavo National Park (Map 1).

The district is composed of 8 divisions namely Central, Kabati, Yatta, Chuluni, Mutomo, Mutitu, Mwitika and Ikutha (Table 1). The survey was conducted in four divisions namely: Mutomo, Kabati, Chuluni and Central which are ear marked as target divisions for the implementation of SOFEM Project.

Table 1 Area of the district per division

Division	Area in km^2
Central	765.48
Chuluni	539.20
Mutito	614.45
Mutomo	5287.42
Yatta	1166.14
Kabati	795.69
Mwitika	3249.35
Ikutha	1829.01
Tsavo National Park	6309.01
Total	20555.74

Source: Kitui District Development plan 1997-2001

The divisions are divided into 38 locations and 134 sub-locations (Table 2).

Table 2: Administrative units by division

Division	Number of locations	No. of sub-locations
Central	7	25
Chuluni	4	17
Mutito	3	12
Mutomo	5	20
Yatta	3	7
Kabati	9	27
Mwitika	3	12
Ikutha	4	14
Total	38	134

Source: Kitui District Development plan 1997-2001

1.2 Topography

The district lies between 400m and 1800m above sea level and generally slope from west to east. The soils in the district have developed from basement sedimentary rocks which vary from one place to another. In the divisions surveyed, soils range from red clay, red sandy loam/shallow stony soil to yellow sandy loam/black clays .

1.3 Climate

The district experiences two rainy seasons with long rains in April to May and short rains in November to December. The dry periods are June to September and January to February. The amount of rainfall follow the topographical features of the landscape. The hills in Central Kitui and Western parts of the District receive 500-760 mm per year. The Eastern and Southern lowlands receive less than 500 mm per year.

The agroclimatic zone in the four divisions surveyed range from zone III-2 to zone V-2. Mutomo division is mainly represented by agroclimatic zone V-1 with isolated areas, mainly hills, around Kavisuni and Mutha where zone IV-2 could be identified. Majority of the areas of Kabati division, lie in agroclimatic zone V-2 and zone III in the upland areas such as Matinyani, Musengo and Mutonguni locations. Three main agroclimatic zones are represented in Chuluni division. Zone V-1 was in Thua location, parts of Mbitini and Kisasi locations. Zone V-2 was identified in parts of Kisasi and Mbitini locations while Nzambani locations is mainly a zone IV-2. Central division has diverse climatic zones ranging from zone III-2 to V-2. Agroclimatic zone III-2 is mainly found in Changwithya west and Changwithya east location which are the highland parts of the district. Mulango and parts of Miambani locations are mainly lying in zone IV-2 while other parts are in zone V-1. Zone V-2 is mainly found in Itoleka, Katulani and Maliku locations.

1.4 Demography

The 1989 population census recorded a population of 412,528 people in the district growing at a rate of 3.3% per annum. The 1997 population projections was placed at 537,465 persons which is to reach 613,478 by the year 2001. The population density as per 1989 and 1997 are indicated in table 3. The number of rural house hold per km^2 is Central (35), Mutomo (57), Kabati (22) and Chuluni (40) (GoK, 1997).

Table 3. Kitui district population density by division

Division	1989	1997
Central	107	132
Chuluni	143	187
Mutito	10	13
Mutomo	8	10
Yatta	28	37
Kabati	122	160

Source : GoK 1997.

1.5 Social Forestry Activities in Kitui

The Government of Kenya through the Kenya Forestry Research Institute (KEFRI) and Japanese Government through Japan International Corporation Agency (JICA) have been implementing Social Forestry Training Project in Kenya since 1987 in two phases of five years each. The project focused on training both at the national level at Muguga National Centre and grassroots level at Kitui Regional Centre, respectively. At Kitui the project was also involved in technology development for tree planting in semi-arid areas.

As a result of the final evaluation conducted at the end of SFTP it was recommended that the significant achievement realised in technology development on station should undergo further verification and refinement and be made into practical technical package and made available for extension agents and local people. It was further recommended that to achieve the intended goal the project should go into another phase with extension being the core component of the proposed phase. This led to the inception of The Social Forestry Extension Model Development Project in semi arid areas in Kenya (SOFEM)

SOFEM is based in Kitui KEFRI Regional Centre and is scheduled for a period of 5 years. The overall goal of this Project is to equip the inhabitants of semi-arid areas of Kenya with appropriate techniques to plant and manage trees through establishment of farm forests by the local people in the semi-arid parts of Kitui district. Due to lack of adequate information on the project area, a socio-economic and resource survey was considered necessary in order to gather basic data that would help to decide on the suitable approaches and interventions to be taken upon launching the project.

1.6 Objectives

Objectives of the survey were:

1. To develop a criteria for stratification of the farmers.
2. Identify appropriate entry points.
3. Establish the key issues the project should focus on.

4. Understand the social make up of the community (i.e. their culture and taboos as relates to tree planting).

2.0 METHODOLOGY

2.1 Preparatory workshop

One week preparatory workshop was conducted prior to the main survey. The objectives of the workshop were to form the survey team, familiarise the team with basic socio-economic and resource survey methodologies, test and review the pre-designed questionnaire and plan the details of the survey. Two resource persons were invited from Egerton University, Participatory Rural Appraisal (PRA) programme to conduct the workshop.

2.1.1 Survey Teams

Four teams were formed consisting of Japanese experts and Kenyan counterparts from both Kenya Forestry Research Institute (KEFRI) and Department of Forestry (FD) (appendix I). At least one member in each group could speak the local language (Kikamba) and acted as a translator. Each of the group members was allocated a specific duty ranging from the actual interview, recording , general observation to photography.

2.1.2 Preparation and pre-testing of the questionnaire

During the workshop a draft questionnaire was presented which was reviewed by the participants. The questionnaire was then tested on five farmers. Each of the teams presented their experiences after which the questionnaire went a further review depending on the difficulties that were reported by the groups in adminstering the questionnaire.

2.1.3 Sampling technique

The interview was conducted in four divisions (Mutomo, Kabati, Chuluni and Central) (Map 2). One division was covered at a time with each team going in different specified direction. Clustered random sampling technique was used. Each location in a division constituted one cluster. Sample homes were then selected randomly from each location.

2.2 Interview

Interviews were conducted using a pre-designed semi-structured questionnaire (appendix II). A separate checklist was made to record some points that were not covered in the questionnaire (appendix III). All the survey members met weekly to share their experiences and review any problems that were encountered in administering the questionnaire. A total of ninety (90) interviews were conducted covering four divisions, 22 locations and 71 sub-locations. The survey was conducted from 11/3/1998 to 26/3/1998.

behalf. The older lady (*Ngungu*) is normally the decision maker. For extension purposes advice should always be given to the decision makers and implementors.

3.1.3 Education level of the households

Over half of the sampled households (54.1%) have obtained formal education. Those who have a minimum of primary education are 38.6% while secondary education are 10.3%. Those with tertiary education are 4.1% while those who have attended adult literacy class accounts for 1.6% of the sample population. Though the average population have some form of education, closer scrutiny shows that over 60% of those with some education have primary education. This is the lowest level of formal education and at this level many people may not be able to comprehend technologies written in technical language and not comfortable with the use of either English or Kiswahili. The extension activities should consider simplifying the language use for preparation of extension materials while at the same time use more pictorial representations.

3.2 Land and land tenure

3.2.1 Farm size

The area of the farm was recorded either from the area given in the tittle deeds or by farmer's estimation. Where both were not available then the interviewer estimated the area with guidance from the farmer. In some farms where the land area was large and not possible to see the extent it was difficult to estimate and was considered as a source of error but the interviewers were expected to estimate to the best of their ability.

The mean farm size is 22.8 acres with a range of 0.8 acres in Central division to 250 acres in Mutomo. Out of the total surveyed land area, 33.3% is cultivated while 66.7% is uncultivated and used as grazing land. Mutomo division had the largest land area per household with an average of 57.0 acres of which only 20.2% is cultivated while 79.2% is used as grazing land. Central division has the larger portion of its land cultivated (65.1%) with 34.9% being left as grazing land (Table 5).

Table 5 Size of sample farms (acres) and uses

	Division				
	Sample mean	Mutomo	Kabati	Chuluni	Central
Average land area (acre)	22.8	57	19.1	12.3	8.6
Cultivated area	7.6	11.5	7.9	5.9	5.6
Grazing land	15.1	45.4	11.3	6.2	3

Majority of the farmers have defined grazing land (84.4%) and only 15.6% have not set land for grazing (Central division 6.7%, Chuluni 5.6% and Kabati division 3.3%. Where the land area per household is small as in Central and Chuluni divisions farmers have little land to set aside for grazing. In such a case of land scarcity other systems of livestock keeping could be more attractive, such as tethering or zero grazing which does not require large land areas. Fodder for zero grazing can be planted together with crops, for example, Nappier grass on terraces and *Leucaena* intercrop with crops.

The available land may have effect on the willingness of the farmers to plant trees. Where there are large parcels of land as in Mutomo, the farmers may not have problems in setting a side a portion of their land for planting trees. On the other hand, where land is scarce as in Central and Chuluni divisions the farmers may not have enough land for planting trees. In such a case it may be necessary to introduce tree planting technologies that can be integrated with crops in space or time sequence. Utilising niches which are not normally used for crop production, such as along the borders may be considered.

3.2.2 Settlement pattern

There has been very little immigration in to the four divisions with 72.2% of the sampled households being those who settled in their present land from within the same location. Only 3.8% of the trial households have settled from other districts (mainly Machakos).

Only 10% of the sampled households inherited the land where they have settled from their ancestor. The remaining households have immigrated from other place. A part from the old settlements of over 40 years, which accounted for 30%, the majority of new settlements were between 1971-1980 which accounted for 25.6% and took place mainly in Kabati and Central division (Fig. 1). It is still not clear why there was a high rate in settlement in the 70s than other decades. One theory that could be advanced is that more people opted for a more sedenterized agriculture after the severe drought that was experienced in the 70s. Study of the time line of the area could yield more information. Settlement policy of the 1960's and 1970's encouraged people to move new areas as land was available or prices were minimal but since land has become scarce only those who purchase can now more.

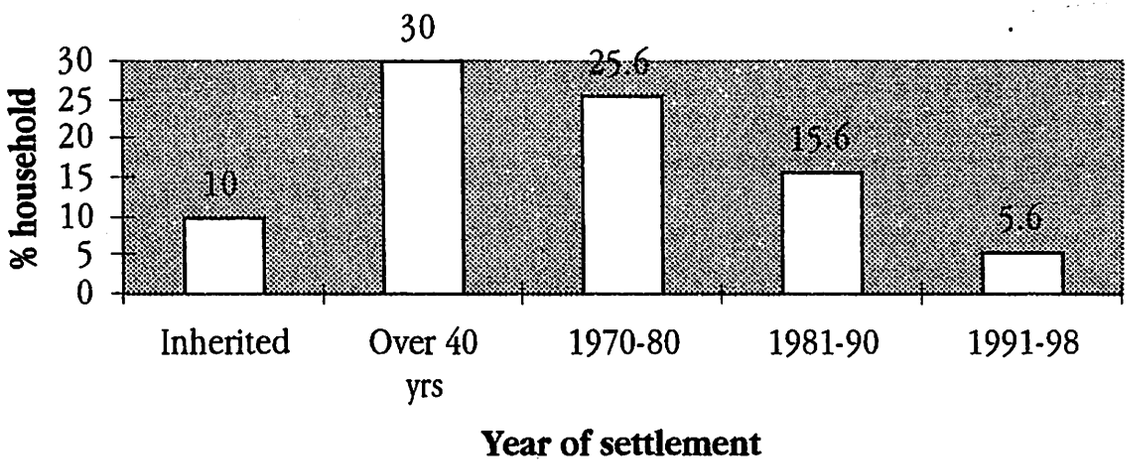

Fig. 1 Year of settlement

3.2.3 Land tenure system

Two land ownership systems were identified as common in the sampled ared. The land is either held under free hold as is the case of Kabati, Chuluni and Central where over 90% of all the household sampled hold land under freehold, or the land is not legally demarcated but the individual owners know their land areas and prescribed boundaries known to all neighbours through some traditional arrangements. The latter case was common in Mutomo where all the households sampled owned land this way.

3.3 Land Use

The main land use system is small scale crop farming and livestock production. Farming is mainly food crops for domestic consumption.

3.3.1 Crop farming

With 80% of the farmers having 10 acres or less of land under cropping, the farmers may be classified mainly as small scale farmers. According to Iida er al. (1989) small scale farming have average farming area of 10 acres and less. The main crop cultivated is maize, which all the sample households planted. This was followed by cow peas and pigeon peas which were planted by 93.3% and 84.4% of the households, respectively. Green grams and Sorghum was planted by 58% of the households each. Other minor crops in descending order are cassava, millet, sweet potatoes, pumpkins, finger millet, bananas and vegetables.

Only 24.4% of the households planted cash crops. Tobacco and cotton accounted for 11.1% and 6.7%, respectively. Other cash crops planted are sugar cane mainly in central, and Chuluni divisions, castor oil, sisal and sunflower all of which were planted by about 3% and below.

3.3.1.1 Extension services

Fifty eight percent of the surveyed households get some form of advice on farming. Out of these, 50% got advice from the Ministry of a Agriculture extension agents. NGOs (mainly Action Aid) and local administration offered advise to 11% of the households each. The frequency of visits by various extension agents is very low. Of the 58% household who get some advice, 46% received only rare visits or went to the extension agents for advice when in problems. Action Aid extension agents were the most regular visitors to the farmers with weekly visits but only operated in Mutomo division. This has, however changed drastically since they are currently winding up their activities in the division. Ministry of Agriculture who are the main extension agents in the sampled area only visited rarely or only gave advice to farmers who visited their offices. The situation in the sampled area indicated inadequate extension services which is quite irregular and can not be relied upon by the farmers. In the absence of regular extension services farmers may only be relying on their neighbours who may be practising some better technology to improve their farming practises.

3.3.1.2 Farm inputs

The level of farm input may show is an indicator the farmers are willing to invest in the farm. It may also show the level of awareness by the farmers on modern farming systems as well as constraints in the farming system. Assessment was done to determine the use of common farm inputs including fertiliser, manure, pesticides and other inputs. The survey has revealed that 81% of the farmers interviewed applied at least one or more of the above farm inputs. Out of these, 77.8% of them apply farm manure to improve soil fertility, 30% apply pesticides to control diseases and pest. Only 18% use fertilisers on their farms.

It is worth noting that quite a majority of the farmers apply farm manure on their farms. Farm manure is locally available at minimal cost to the farmers. This can be a ready entry point in an effort to improve and sustain soil fertility in the farm. Further studies could include; source application rate, and improvement of the quality of the manure.

3.3.1.3 Soil erosion and soil fertility

The question of land fertility according to the farmers own assessment indicated that the majority (73.3%) of the farmers think that their land is moderately fertile, 18.9% indicated that the land is fertile with only 7.8% indicating that the land is of low fertility. The interpretation of this finding is tricky and need to take other parameters into consideration beyond. The fact that one responded that the land is moderately fertile should be interpreted to mean that moderately is a relative term that can also apply that it is poor or even fertile depending on the point of comparison. This could be supported by the observation that 77.8% of the same farmers applied manure

to improve soil fertility showing that the land is relatively of low fertility and need some nutrient supplement in form of manure.

The level of awareness on soil erosion as a problem was quite high with 96.7% of the household confirming that soil erosion was a problem on their farms and were taking some measures to control it. Only 5.6% of the households did not have any soil conservation structures on their farms while the rest 94.4% had one or more soil conservation structures. The most common structure was bench terrace which were constructed in 76.6% households farms. Of the farmers having bench terraces, 53.3% had not planted anything on their bench terrace, 37.7% planted grass on the terrace, 2.9% planted trees while 5.7% planted grass and trees on the terrace. Other soil conservation structures included; check dams (15.6%) and cut-off drains (8.9%).

Soil erosion control is one other area where the farmers were already doing something and any intervention should consider current farmers' practice and the constraints and possible improvement. One area of improvement may consider planting of appropriate trees with grass on the terrace to stabilise them.

3.3.1.4 Crop Production

The quantity of crops produced in 1997 in all the sampled household per crop were recorded as maize 63185 kg, beans 18268 kg, pigeon peas 7633 kg, cow peas 11625 kg, finger millet 203 kg, millet/sorghum 6848, green grams 1534 and cassava 2720. The average production per household per crop type is given (Table 6). The figures for 1996 are not incoporated because of mass crop failure in that year due to prolonged drought.

Table 6: Average crop production per household per division in 1997 (kg).

	CROP TYPE							
Division	Maize	Bean	Pigeon peas	Cow peas	Finger millet	Millet/ sorghum	Green gram	Cassava
Mutomo	**572**	**28**	**50**	**123**	**9**	**173**	**69**	**25**
Kabati	**527**	**382**	**102**	**98**	**1**	**24**	**2**	**0**
Chuluni	**966**	**112**	**106**	**95**	**0**	**62**	**0**	**0**
Central	**746**	**237**	**73**	**207**	**0**	**69**	**8**	**102**

3.3.1.5 Crop sales 1997

Sales from crops were low for 1997 and with the absence of main cash crops, crop sales were mainly small sales of food crops to generate income to meet some urgent financial needs for the households such as school fees and

medical expenses. Maize led in the sales followed by beans, sorghum and green grams (Fig. 2)

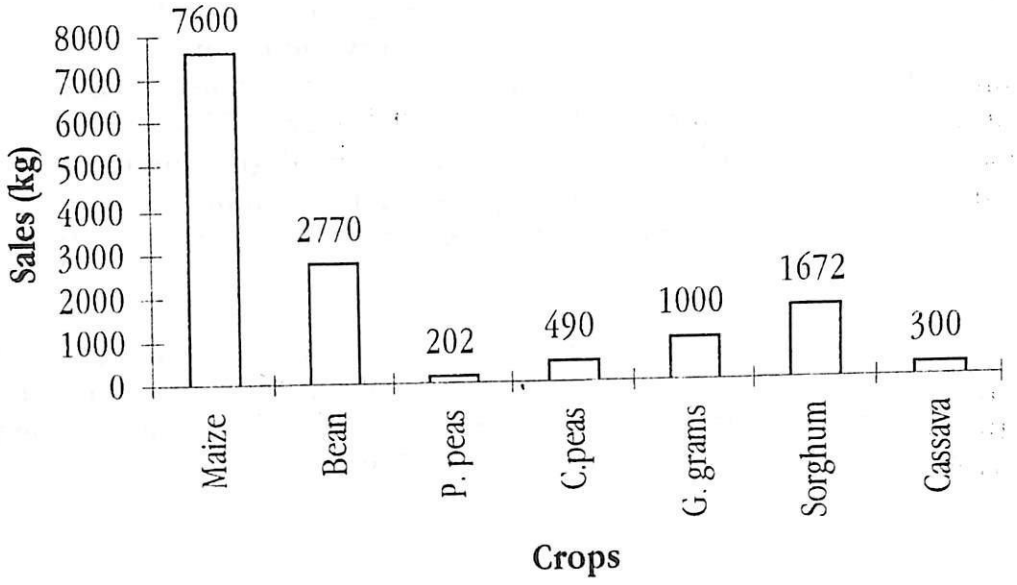

Figure 2: Crop sales

The average earning from crops (Table 7) shows that Kabati division is leading interms of earning per household and number of people who sold crops while Mutomo division had the lowest earnings.

Table 7 Average crop earning by division.

	Average sales per household (kshs)	% households that sold crops
Kabati	5035	43
Chuluni	2423	38
Central	2565	30
Mutomo	1901	31

3.3.1.6 Food Security

Food security in the area is very poor with 95.6% of the respondents indicating that there is food shortage and only 4.4% had enough food throughout the year. To bridge the gap in food deficit 93.3% of the households buy food items. 73.3% received relief food from government and other bodies, especially church organisations. Though the percentage of those who receive relief food may look high the respondents indicated that the contribution it made in household food security was insignificant when each household is given two kg of maize in two weeks. This amount is often less than a day's requirement per household. Twelve percent of the

respondents had food reserve for use during off seasons while 5.6% got some food as gifts from relatives and friends (Fig. 3).

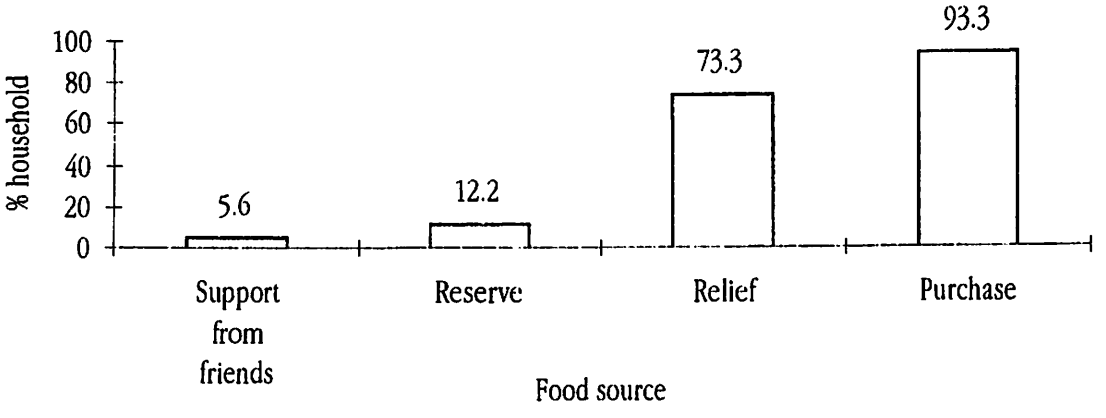

Figure 3: Food source during off seasons

All the respondents were of the opinion that some form of intervention should be undertaken to improve the food security situation in their respective areas. Good soil conservation measures was the highest ranked intervention measure suggested 37.8% of the households followed by application of manure/fertilisers (27.8%), supply of water 20% and provision of improved seed variety (17.8%). Others interventions suggested are early planting, improvement of extension services, restriction of sales, good land preparation, provision of capital, storage facilities, mobilisation of community labour and use of oxen plough.

The issue of most households selling crops cheaply soon after harvesting and buy later at exorbitant price was found to be a recurrent phenomena which need attention since it affected adversely the food reserve in the area. Social forestry practices that involve planting high value trees that can generate income and tree species of fruit and food value can contribute to food security situation.

3.3.1.7 Purchase of food

As observed in section 3.3.1.6, purchase of food is the main source to bridge the deficit of food during the off seasons. The main food items purchased are maize, beans, pigeon peas and cow peas. Maize was the leading food item purchased with 70600 kg purchased, followed by beans 19523 kg, pigeon peas 3562 kg and cow peas 4459 kg. The amount of maize and beans purchased exceeded the harvest showing a situation of food shortage. The deficit in maize as indicated by the difference between production and purchase was 7415 kg.

3.3.1.8 Problems of Crop Production

The problems identified by the farmers to limit crop production could be grouped into several categories. Pest and diseases and drought are the most frequently recorded with 51.1% and 36.7%, respectively. Lack of seed, labour and soil fertility were also frequently identified with 31.1%, 25.6% and 18.9% respectively. Other problems identified were poor extension services, lack of capital, land scarcity, animal damage and poor market outlet (Fig.4).

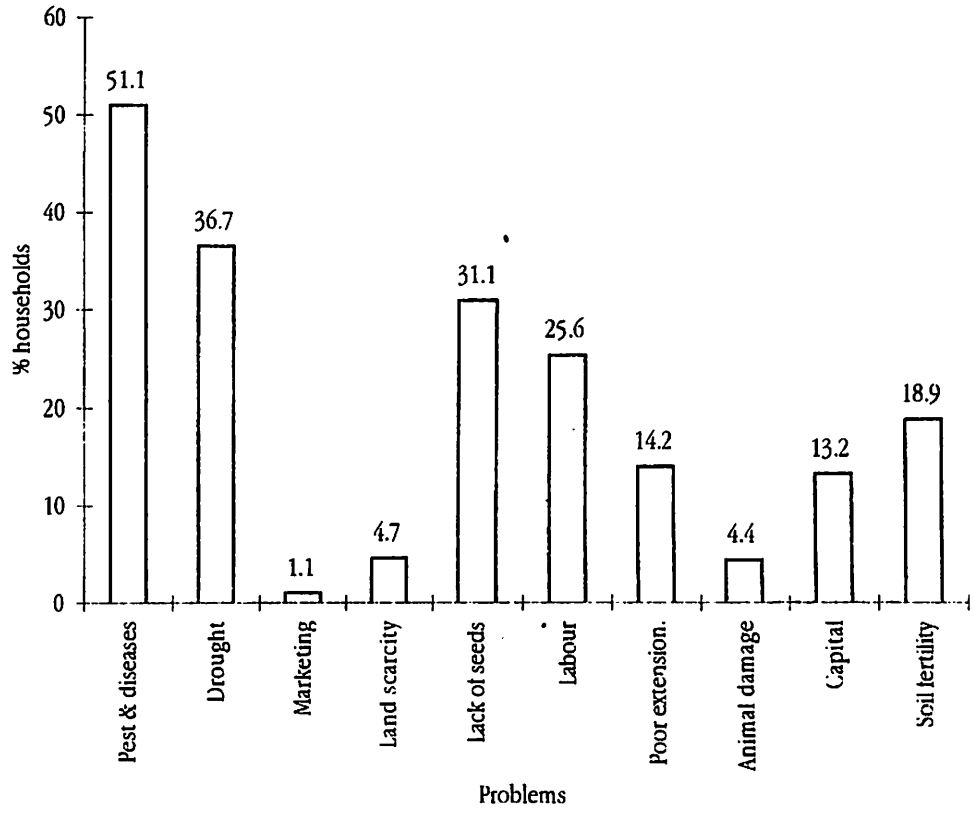

Figure 4: Crop production problems as percentage of households

3.3.1.9 Suggested solution to crop production problems

Where pest and diseases was mentioned as a problem, the majority (63%) suggested application of pesticide as the only solution while the other 37% did not have any solution to the problem. Most farmers had no solution to drought problem with only 7.8% suggesting water supply for irrigation as possible solution. This could be due to the fact that drought problem has persisted to the extent that the local people have accepted it as part of their normal life.

Lack of seed for planting was observed in two perspectives, as to be due to poor harvest and unreliability of rainfall. Because of poor harvest, farmers do not have enough reserve to be used as seed for the next season. At times when farmers have seeds, these could be lost when all the crops fail due to

rain failures. The farmers felt that they should get supply of improved seed variety during the planting season, if possible in the local markets. Animal traps and scares was the only suggested solution to animal damage.

3.3.2 Livestock farming

3.3.2.1 Type of animals

All household interviewed keep one or more types of livestock.
Poultry is the most common type livestock kept with 92.2% of the household sampled rearing them. This was followed by goats, cattle, donkey and bees. Sheep is not widely kept in the sampled households with only 5.6% of the households keep them (Table 8).

Table 8: Animal numbers in the sampled households and percentage keepers per type.

	ANIMAL TYPE					
	Cattle	Goats	Sheep	Poultry	Donkey	Bee hive
Number	**310**	**567**	**15**	**1588**	**92**	**378**
Percentage keeper	**62.2**	**63.7**	**5.6**	**92.2**	**61.1**	**45.5**

The breakdown per sample division showed that Kabati and Mutomo divisions are leading in number of households keeping cattle with 80.8% and 73.3% respectively (Table 9).

Table 9: Percentage households keeping different types of livestock per division

	LIVESTOCK TYPE					
Division	**Cattle**	**Goats**	**Sheep**	**Poultry**	**Donkey**	**Beehives**
Mutomo	**73.3**	**68.4**	**5.3**	**84.2**	**63.2**	**73.7**
Kabati	**80.8**	**61.5**	**15.4**	**96.2**	**73.1**	**30.8**
Chuluni	**45.5**	**77.3**	**0**	**91**	**54.5**	**54.5**
Central	**47.8**	**73.9**	**0**	**95.6**	**52.1**	**30.4**

Central and Chuluni had few cattle keepers, however, there is no much difference in goat numbers between the divisions, Chuluni and Central have slightly higher percentage of goat keepers than Mutomo and Kabati though the average number of goats in the two division (Kabati and Mutomo) are higher (Table 10). There was no differences in households keeping poultry, all divisions showed high poultry numbers. The percentage of donkey keepers is higher in Mutomo and Kabati compared to Central and Chuluni divisions. The high percentage of households keeping donkey in Mutomo

and Kabati may be explained by the more severe water shortage in the two divisions compared to Chuluni and Central divisions. Donkeys are commonly used for water transportation.

Mutomo division lead in the percentage of bee keepers. The large tracts of land and natural vegetation in Mutomo is favourable to bee keeping than in other division where the land area is smaller and bee keeping may be hazardous to residence living in close environs.

The results on the average number of livestock per division (Table 10) shows that Mutomo division is leading in the average number of cattle, goats, donkeys and beehives per household.

Table 10 Average number of livestock by division

Division	Cattle	Goats	Sheep	Poultry	Donkeys	Beehives
Mutomo	5.5	9.5	0.2	15.3	1.6	10.6
Kabati	3.6	5	0.5	15.9	1.0	2.6
Chuluni	3.2	5.8	0	15.3	0.9	3.8
Central	1.8	5.6	0	23.7	0.7	1.6

3.3.2.2 Livestock sales

Livestock sales is one of the major income earners in the sampled households. The total amount earned from livestock sales for 1997 is Ksh 604828 from selling 67 cattle, 297 goats and 286 birds (Table 11).

Table 11: Livestock sales

	Number sold	Amount (Ksh)	% of total
Cattle	67	385430	63.7
Goats	297	215050	35.6
Poultry	286	4348	0.7
Total		604828	

Income from cattle sales accounted for 63.7% of the total income from animal sales. This was followed by goat sales which accounted for 35.6%. Poultry sales accounted for less than 1% of the total sales. Though the sales from cattle and goats account for higher percentage of income from livestock than poultry it was not clear from this study who has access to the money raised from cattle and goats and for what purpose money is used. Some of the venues income generated from sales of livestock are spent include paying for school fee, purchase of food and medical bills.

Average earning from livestock sales (Table 12) shows that Mutomo division had the highest earnings from livestock sales and highest percentage of household who sold livestock. The average earnings from livestock sales per household was higher than the average earnings from crop sales (Table 7).

This finding indicate that livestock sales is the main source of income in the surveyed area.

Table 12 Average earning from livestock sales by division.

Division	Sales (Kshs)	% household that sold livestock
Kabati	5076	73
Chuluni	4055	59.1
Central	5239	65.2
Mutomo	15908	84.2

3.3.2.3 Livestock keeping method

Two main methods of livestock keeping were was identified in the sampled households. These were free range grazing (47.8%) and tethering (50%). Other minor methods recorded were zero grazing and paddocking with 2.2% each.

Mutomo and Kabati division recorded more livestock keepers who are using free range grazing than tethering while in Central and Chuluni more livestock keepers use tethering than free range grazing (Fig. 5).

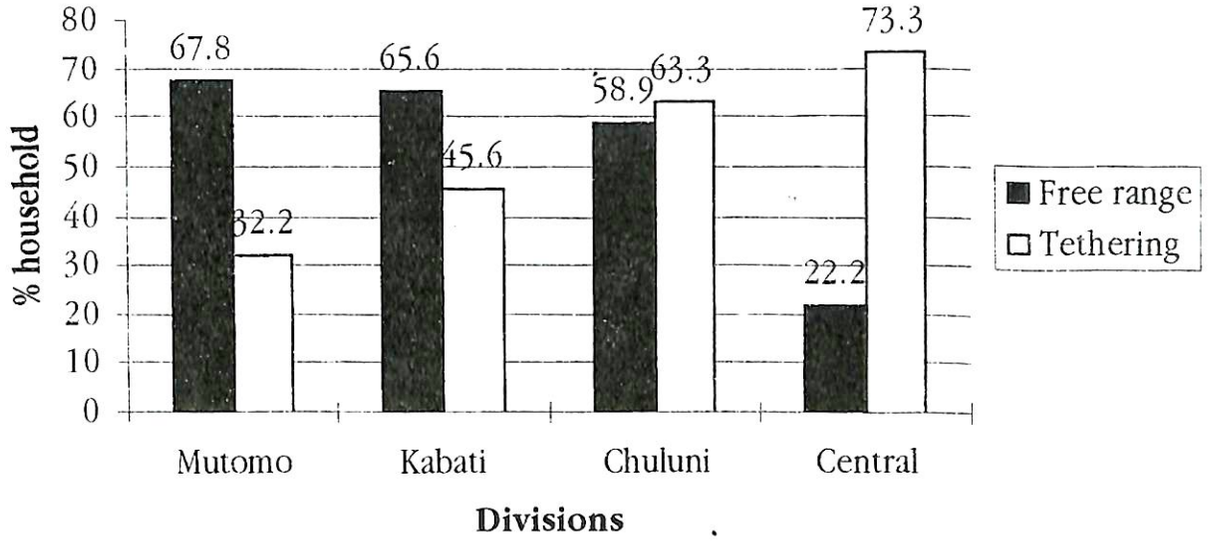

Fig. 5 Percentage of households using free range and tethering methods of livestock keeping

The difference in livestock keeping methods between Mutomo and Kabati on one side and Central and Chuluni on the other could be explained by the differences in land pressure. As indicated earlier Mutomo and Kabati areas, both of which are predominantly zone IV and V, still have relatively tracts of larger land per household compared to Central and Chuluni divisions. Where the land area is smaller there is tendency for farmers to cultivate most

of the available land leaving smaller grazing land for animals to graze freely, hence, most people will tend to tether their animals around their compound and along public land such as road sides and markets.

3.3.2.4 Uses of Livestock

Different livestock types are kept for different reasons which range from , ploughing, manure, icome, transport and domestic use for milk and meat The main reasons for keeping the cattle were for ploughing and milk production, while goats were kept for sale and milk production. Sheep was kept mainly for sale while poultry were kept for household food and sale. Donkeys are kept 100% for transport though a few households (5.5%) used them for ploughing too(Table 13).

Table 13: Reasons for keeping different livestock types

	LIVESTOCK TYPE (as % keepers)					
Reasons for keeping	Cattle	Goats	Sheep	Poultry	Donkey	Bees
Milk	**69.6**	**73**				
Plough	**82.1**				**5.5**	
Manure	**23.2**	**20.6**		**2.4**		
Sale	**39.3**	**79.4**	**100**	**83.1**		**70.7**
Transport					**100**	
Household food		**39.7**	**40**	**96.4**		**90.2**

The use of livestock manure is not the main reason for keeping animals but a by - product. In the area where there is severe water shortage and poor transportation, donkeys become very important asset to the local people as a mode of transport mainly to carry water but and seldom for transportation of fuelwood and grains.

3.3.2.5 Constraints to livestock production

Pest and diseases, dry season fodder shortage and water scarcity were identified by the respondents as the major problems in livestock farming accounting for 72.2%, 44.4% and 23.3%, respectively, of the sampled households. Other minor problems identified were theft and bee stings. The extent of fodder scarcity presented as percentage of sampled households per division is shown(Fig. 6). Central and Chuluni division are leading in percentage household facing fodder scarcity. The high fodder shortage in the two divisions could be explained to by the land scarcity. As explained else where in the text when land become scarce most of the available land is put under crop production and very little is left for and natural vegetation which is important for livestock grazing and fodder.

In contrary to fodder scarcity, water problem is more severe in Mutomo and Kabati compared to Chuluni and Central division. Livestock production depend on availability of both water and fodder and the scarcity of either affect the quality and quantity of livestock.

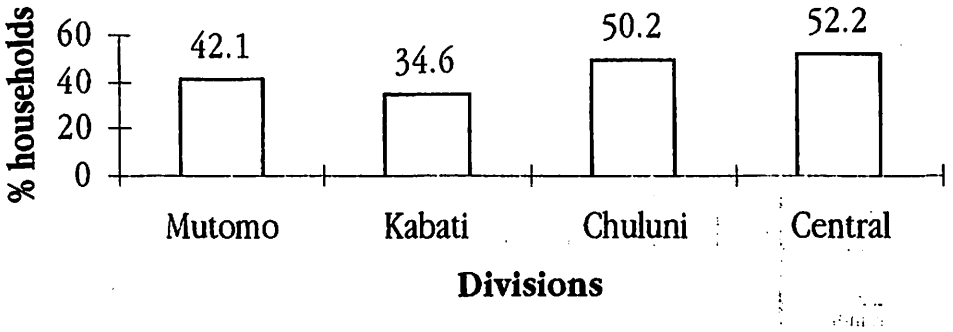

Fig. 6: Percentage households having fodder shortage per division

3.3.2.6 Suggested solutions to livestock farming problems

Of farmers who had problems with pest and diseases, 95.4% use veterinary medicine or get advice from veterinary officers nearby. Those who use herbal medicine and other traditional remedies were only 4.6% while 4.3% used a combination of traditional remedies and veterinary medicine.

The way farmers cope with fodder shortage varied with 37.5% suggesting planting of fodder trees, 40% buy fodder or hire grazing land, 25% use crop residue while a smaller percentage of 2.5% and 5% practice zero grazing and storage of pods, especially of *Acacia tortilis*, respectively. The project has potential of assisting the farmers to reduce fodder shortage by promoting the splanting of fodder trees in the most fodder scarce divisions of Central and Chuluni.

The main solution suggested by most respondents for water problem is to sinking of river bed wells.

3.3.3 Afforestation and forest resources

3.3.3.1 Species planted and planting niches

Trees planted

All except one sampled households have planted one or more tree species. The species planted range from fruit trees (commercial and wild) to other indigenous and exotic tree species. The species planted and percentage of the sampled households is as shown in Table 14.

Table 14: Tree species planted in sampled households and purpose of planting

	Where planted (%)					Uses										
	%HH	cpd	Border	Farm	W/lot	Shade	Fodder	F/wood	Fence	Ornamental	W/break	Medicinal	Fruit	Poles	Timber	Beads
Fruit trees	75 .6	69 .1	2.9	85.3									100			
Senna siamea	63 .3	73 .7	17.5	35.1	1.8	59.6		49.1			5.3			3.5		
Grevillea robusta	22 .2	60	20	30	5	40		25							35	
Leucaena leucocepholia	21. 1	26 .3	15. 8	36.8		5.3	42.1	5.3			15.8					5.3
M. volkensii	8.9	35 .5	50	12.5		12.5	25								75	
Azadirachta indica	24.4	27.3	4.5	31.8		31.8						86.4				
Croton megalocarpus	13.3	66.7	33.3			75		16.7						8.3		
Tamarindus indica	12.2	36.4		63.6									100			
Jacaranda mimisifolia	12.2							18.2		45.5	36.4					
Eucalyptus sp	6.7	33.3	66.7					50			50					
Senna spectabilis	10	88.9		11.1		88.9					11.1					
Thevetia peruviana	13.3	91.7	8.3			16.7				83.3						

Fruit trees are the most commonly planted tree species followed by *Senna siamea.* While fruit trees are mainly planted to provide fruits *S. siamea* is planted for varied reasons, the main ones being shade and fuelwood. *S. siamea* shade value is reflected in the fact that 73.7% of all S. siamea trees are planted within the compound. While the benefits for shade trees within the compound does not need to be over emphasised in semi-arid condition where day temperature are normally high, it is not clear why *S. siamea* is so widely planted where as there could be some species that can provide shade such as *Croton megalocarpus* and *Schinus molle,* etc. To try to explain this past forestry promotion activities which probably promoted the species, its adaptability to semi-arid conditions, low susceptibility to termite damage and low palatability to animals which damage planted trees could be the probable reasons.

Both domestic or commercial fruits and wild fruits were planted. The domestic (commercial fruit trees) planted are mangoes, citrus, white supporter, pawpaw, avocado, bananas, cashewnut, Morus alba, loquarts and guava. The popular wild fruit trees were *Tamarindus indica, Balanites aegyptiaca, Berchemia discolor, Adansonia digitata, Vitex doniana* and *Vangueria rotundata.*

Commercial fruit trees are more widely planted than wild fruit trees constituting 67.8% and 24.4%, respectively, of those who planted fruit trees. Fruit trees were mainly planted in farms and homestead compounds, constituting 85.3% and 69.1%, respectively. The two niches shows that fruit trees are highly valued by the farmers so they plant them in farms where they can take care of them together with crops or in the compound where they can easily take care of the planted trees individually by applying operations such as spot weeding, clearing, pruning, bottle watering etc.

Importance of planting fruit trees can be understood from their contribution to income generation and thus general welfare and to food security in semi-arid areas where crop failures are common. Wild fruit/food trees play important role in providing food security in semi-arid and arid areas where during severe drought situation fruits, leaves, barks and even roots of some species are important source of livelihood and survival strategy. Since farmers already plant fruit trees, promotion of planting of fruit trees could be one of the area of focus with almost assured success.

Azadirachta indica (Neem, Mwarubaine), *Grevillea robusta* and *Leucaena leucocephala* are planted at almost equal proportions by households (24.4% and 22.2%, and 21.1%, respectively). Each of the three species are planted for varied reasons. *Azadirachta indica* is mainly planted for its medicinal value (86.4%), a smaller fraction 31.8% also planted it for shade in addition to its medicinal value. *Grevillea robusta* is mainly planted for shade and fuelwood while *Leucaena leucocephala* is mainly planted for fodder with a few households planting it for fuelwood.

Species that were planted mainly for ornamental purposes include *Thevetia peruviana , Terminalia mentalis , Tecoma stans, Delonix regia* and *Spathodea nilotica* and were therefore, planted mainly on the compound. *Thevetia peruviana* is the most common of the ornamental trees. Other species that are commonly planted in compound mainly for shade *are Croton megalocarpus, Ficus benjamina* and *Senna spectabilis.*

Species used for fencing were *Euphorbia tirucalli* and *Commiphora* spp. Many farmers interviewed did not consider the establishment of the two species as tree planting. The farmers may be holding the idea that tree planting involve the use of seedling only while the two species are established by use of cutting. This may make some farmers not to readily comprehend their tree nature. *Caesalpinia dictata* is also a common fencing shrub especially in areas of relatively higher rainfall such as Zones III, and IV. Dead fencing material consisted mainly of the Acacias and this was the most common fencing around farm lands.

Species that were planted for fodder *were Leucaena ,Terminalia brownii, Balanites aegyptiaca , Melia volkensii* and *Acacias..* The prominent ones were *Leucaena* and *Melia volkensii.*

3.3.3.2 Decision on tree planting

The male heads of households are the main decision makers on matters of tree planting as recorded in 45.6% of the cases studied. This was followed by cases where the husband and wife jointly make decision as recorded in 21.1% of cases (Fig. 7). Wives mainly made decision where the man was not a regular resident in the home, such as employed husbands, widows and divorced women. In 12.2% of the cases anybody in the household was free to make decision on tree planting. While male heads of households were the main decision makers on tree planting the system was not as rigid as in some

societies such as the Luhyas, of western Kenya where it was a taboo for women to plant trees when the husband is still alive.

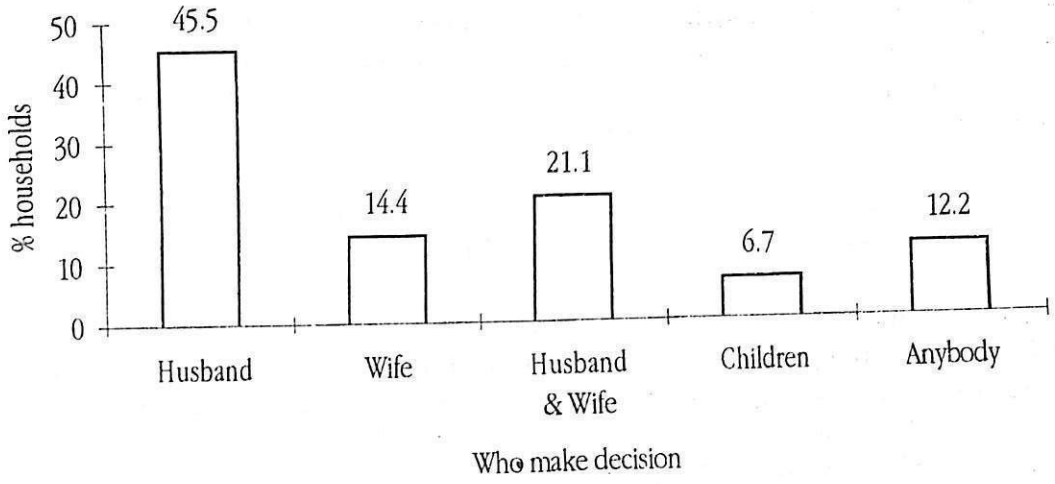

Fig. 7 Decision making on tree planting

3.3.3.3 Year started planting

Tree planting among the sampled households was very low before 1970 with only 5.6% and 10.1% planting between the decades 1950 - 1960 and 1961 - 1970, respectively. The next two decades show an up surge in tree planting with the peak being in 1981 - 1990 when 44.9% of the households started planting trees (Fig. 8)

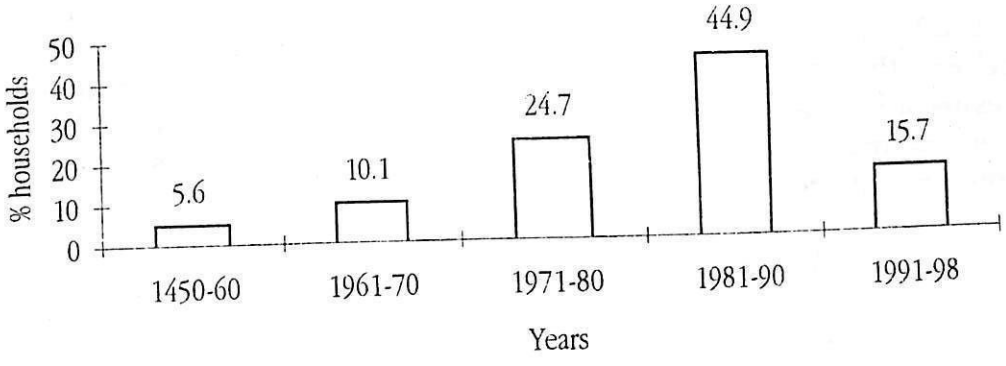

Fig 8: Year when the sampled households started planting trees.

The two decades 1970's and 1980's correspond to the decades when there was strong government effort on promotion of tree planting by local people which involved starting of chief's nurseries to supply seeds at locational, declaration national tree planting week, the starting of rural afforestation extension services (RAEs) in forest department and establishment of permanent presidential commission on soil conservation and afforestation.

These efforts sensitized many people living in rural areas to become conscious of environmental issues especially deforestation and the need to plant trees.

3.3.3.4 Tree Nursery and source of seedlings for planting.

The question on households having tree nurseries showed that 72.3% did not have tree nurseries while 27.7% had tree nursery which were either individually or group owned. Of those who have tree nurseries 64% were individual nurseries while 36% were group nurseries. The result showed some level of people's involvement in seedling production though the numbers . There is need to raise seedling production because seedling distribution through government central nurseries are being faced out in favour of facilitation for small scale seedling production by individuals/groups. The small scale nurseries must take over and play a leading role in seedling production to sustain tree planting activities.

The source of seedling for planting was varied with the highest source being JICA (SFTP) accounting for 27% of those who have planted trees. This is followed by individual private nurseries constituting 18%. The other important sources are commercial nurseries 15.7%, school nurseries 14.6% and group nurseries 13.5% (Fig. 9), Forest department which is the mainly forestry extension agent contributed only 7.9%. Some farmers planted seeds directly while others collected wildings and planted.

The contribution of SFTP for the last 10 years in support of small scale nurseries and seedling distribution has play a significant role in tree planting in the district. A part from seedling distribution many of the school nurseries, and group nurseries which accounted for high percentage as source of seedlings for local planting were also supported by SFTP.

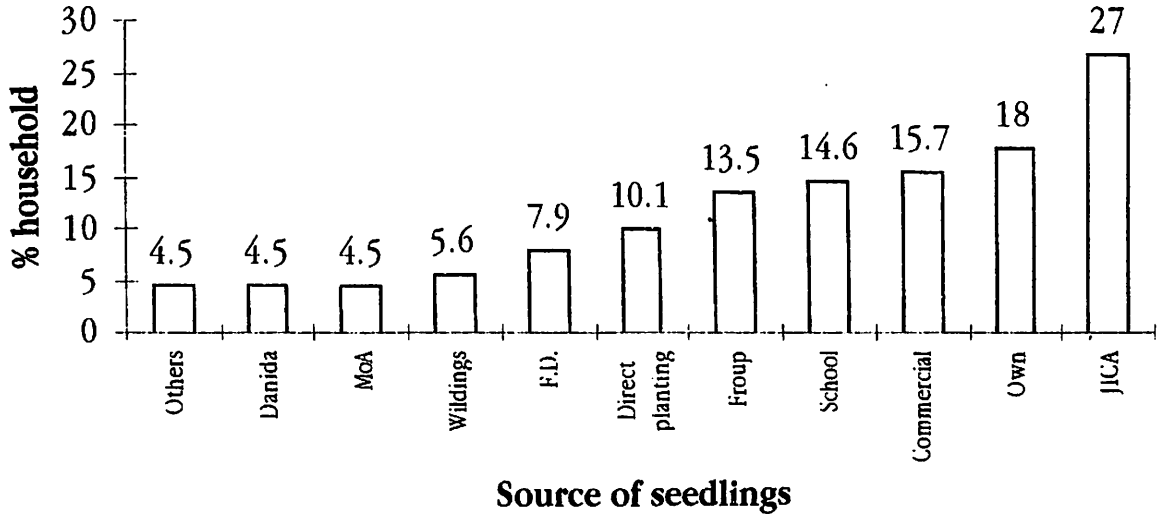

Fig. 9: Source of seedlings for planting.

Ministry of Agriculture were more instrumental in providing fruit tree seedlings. Many of the wildings were of fruit trees collected where the seeds disposed after eating the fruits later germinated.

About 52.8% of the farmers interviewed have at least bought some seedlings. It was not clear which tree seedlings were bought but there is some indications that farmers can be willing to buy seedlings if they are convinced that the investment will pay in the short or long term.

3.3.3.5 Community tree planting

Community tree planting activities is one of the methods of involving local people in tree planting. Though community tree planting activities may conceptually appealing it was not very successful, especially, on project land (Muok *et.al.*, 1997), however, it can served as a good way of promoting awareness. The results showed that 18.9% of the respondents participate in community tree planting activities. Community tree planting could be more appealing in areas where there is land scarcity and landlessness such that some people can only have access to forest product through the communal forestry. It is however, unlikely to be popular in a district such as Kitui where average land area per household is still relatively large and individually owned.

3.3.3.6 Extension Services

More than half(54.4%) of the sampled household have not received advice from extension agents while 46.6% have been visited by one or more extension agents from different organisations. The highest number of the respondents have been visited by SFTP extension agents accounting for 39%, Ministry of agriculture, 36.6%. Forest department and various NGOs constituted 17% each. Advice from administration constituted 4.9% while all the rest combined contributed for 14.6%.

The frequency of visits by extension agents was very low with majority of the households (36.6%) visited only rarely. Those who received annual visits constituted for 24.4%. Weekly and monthly visits accounted for 17% and 14.6% respectively. Ministry of agriculture only had rare visits which many respondents felt were inadequate to address various land use problems facing the farmers.

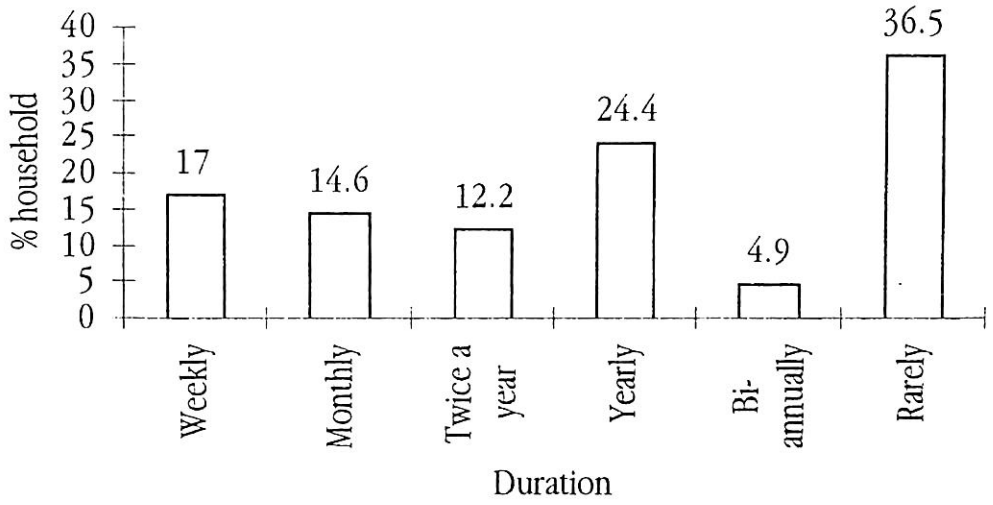

Fig. 10: Frequency of visit by extension agents

The fact that 61% of the households were visited annually or rarely shows inadequate extension services in the area. The majority who had advice from JICA were given during the annual seedling distribution programme where project officers through local chiefs called a meeting where the farmers would be advised on tree planting after which seedlings were distributed (Muok, *et. al.*, 1997).

Training as a forestry extension tool can, play an important role in changing people's attitude and gaining new knowledge. The survey showed that only 13.3% of the sampled household had somebody who had been trained in forestry related activities. Out of those who received training 58.3% were trained by ministry of Agriculture, 25% by SFTP through residential training, 8.3% by forestry department while 33.3% were trained by other organisations. The training from ministry of agriculture though may seem substantial, only concentrated on agricultural activities with the only forestry related activity being planting of fruit trees. The proportion of people who have received training in the sampled are quite low and more farmers training may still be required in the future.

3.3.3.7 Tree species preference

The respondents were asked to name species that they would prefer to plant and after scoring the number of respondents against the trees, the species priority rating was set according to the number of respondents.

From the results obtained fruit trees are the leading with 78.9% of respondents preferring to plant fruit trees. Among the fruit trees are *Mangifera indica* (Mango), *Citrus* sp, *Persia americana* (Avocado), *Carica papaya* (pawpaw), White supporter, *Psidium guajava* (Guava) and *Musa* sp. (Bananas). Non - fruit trees preferred by the respondents are *Senna siamea* preferred by 50% of the farmers, *Grevillea robusta* 31.1%, *Eucalyptus* 27.8% and *Azadirachta indica* 17.8% (Table 15).

Table 15: List of species and farmers' preference

Species	%HH
Fruit trees	78.9
Senna siamea	50
Grevillea robusta	31.1
Eucalyptus species	27.8
Azadirachta indica	17.8
Terminalia mentalis	14.4
Melia volkensii	7.8
Dovyalis cafra	6.7
Jacaranda mimosifolia	4.4
Leucaena leucocephala	4.4
Croton megalocarpus	4.4
Tamarindus indica	3.3
Casuarina equisetifolia	3.3
Senna spectabilis	3.3
Acacia polyacantha	2.2
Cuppressus lusitanica	2.2
Acacia tortilis	1.1
A. senegal	1.1
A. geradii	1.1
A. nilotica	1.1
Fagara chalybea	1.1
Prosopis juliflora	1.1
Zyzygium cuminii	1.1
Tecoma stans	1.1
Bougonvillea	1.1

In the past, promotion of fruit trees has been the work of ministry of agriculture with foresters mainly promoting trees for other uses such as timber, fuelwood, fodder, etc. The survey has shown that farmers are more willing to plant trees that they can translate into direct benefit in terms of food and cash generation in the shortest time possible. Tree planting activities may stand a better chance of succeeding if fruit trees are promoted along side other useful tree species. This can be used as an indirect incentives to make farmers plant more trees.

While the priority on planting *Azadirachta indica* was expected because of its medicinal value, the reason for preference on the other three species is not clear. As indicated earlier *Senna siamea* is widely planted in the area. This could be due to its drought tolerance, important uses or as a result of past extension activities. *Grevillea* and *Eucalyptus* both are highly susceptible to termite damage and it is thought that this could make them less preferred by farmers but again this was not the case. This can be attributed to farmer's observation of the good performance of the species in moderatelly and humid areas and expectation that they will perform the same in ASAL conditions.

The list of preferred species cannot be assumed to be exhaustive. It could be that the species preferred are those that the farmers have been exposed to in the past thus creating a bias to newly introduced of species. It should also be clear in mind that people's taste and preference may change from time to time depending on the change in technology and prevailing economic conditions. The results can be used as a guideline while such survey should be carried out from time to time whenever there is a reason to believe that the people's preference may have shifted. Some questions that need to be asked is whether the project is going to respect the farmers choice of species, especially where some of the species that the farmers prefer has problems such as *Grevillea robusta* and *Eucalyptus* both of which are susceptible to termite.

3.3.3.8 Tree care

Most common care given to trees is weeding which was scored in 71.9% of the households where trees are planted. The most common weeding method applied is spot weeding. Clear weeding was practised by a small number of households. SFTP recommends clear weeding as the best method to ensure survival of planted trees since it is more effective in reducing competition from weeds. Many farmers still prefer spot weeding as opposed to recommended clear weeding which would ensures higher survival of seedlings. The possible reason is that clear weeding requires more labour and thus, expensive to the farmers.

Another type of care is protection against animal practised by 68.9% of the sampled household and protection against termite damage which was practised by 60.7% of the households. The most common method of protection against animal identified is by spot fencing. Protection against termite damage was mainly by use of local materials such as wood ash and also by application of termite control chemicals.

Watering was also a common care given to planted trees with 58.4% of the households practising some method of watering. Among the methods of watering applied are surface flooding and bottle watering. Surface flooding was the most common with 15.6% using the method. The second method is bottle watering used by 8.9% of the households sampled. Bottle watering is one of the watering methods experimented by SFTP and found to significantly improve seedlings survival and establishment. The main problem is whether many farmers will be willing to water their trees especially in dry areas when water scarcity is so severe and the available water may not even be enough for domestic use. Due to this problem SFTP recommended use of water microcatchment. This is not to say that bottle watering should be discouraged, especially for the farmers who can afford or near water sources. During very dry years, bottle watering is the only solution for seedlings survival. Surface flooding on the other hand should be discouraged since it is not only wasteful but also may cause wilting of plants if applied as it causes loss of underground water by capillary action

while at the same time on a hot days itend *'cook'* the tender stems of seedlings.

Large planting holes and pruning are practised by 53.9% and 30.3% of the households respectively. The most common hole size used by farmers in planting tree is 30cm x 30 cm. A few farmers used 60cm x 60cm with even small number using 15cm x 15cm which was the smallest hole size recorded. SFTP has recommended the use of 45cm x 45cm as the optimum hole size to take care of the cost of pitting and need for large hole to collect rain water (Muok, *et. al.*, 1997).

Other less common seedling care practised are: application of manure and construction of water catchment practised by 6.7% and 5.6% of the households, respectively. Water microcatchment is the main method recommended by the SFTP for introduction to the farmers. The survey has shown that the recommendation has not yet reached many farmers.

The first two operation (weeding and protection) are very important to tree establishment in semi-arid conditions. Competition from weeds and termite are the main causes of low establishment of planted trees (Muok *et.al* ., 1997). Watering is an option that can be considered where water is available but in most semi-arid conditions where water is scarce alternative sources could be considered such as use of recycled water from the kitchen.

3.3.3.9 Trend of natural vegetation

Majority of the respondents (90%) indicated that natural vegetation in their respective areas is on the decrease. Only 7.8% of the respondents indicated an increase while 2.2% felt the vegetation is neither decreasing nor increasing. The survey has shown that the local people are already aware of the fast decreasing extent of natural vegetation in their areas. This decrease is mainly due to expansion of the agricultural land and over exploitation of the existing vegetation for timber, fuelwood and overgrazing animals. There is need to intervene on the destruction of the existing vegetation by promotion of tree planting on the farm and improved management of the existing vegetation.

3.3.3.10 Taboos on tree planting and utilisation

The survey did not identify any widespread taboos related to tree planting and utilisation with 88.9% of the respondents indicating that there are no major taboos related to tree planting and utilisation. Only 11.1% mentioned some taboos. The taboos can be categorised into two groups with group one being taboos that limit planting of some tree species while the second group limit cutting of some species. Two species were identified in the first category one being *Croton megalocarpus* which is believed to invite bad omen, when planted in a home compounds, resulting in frequent conflicts between members, poor prosperity and deaths. The other species is ***Muvou*** (Kamba) which is believed to invite diseases. In the second group two species were

also identified, *Ficus* sp. and *Mathembwa* (Kamba) which should never be cut. However, widespread cutting of ficus is visible individually that the taboo may be loosing its meaning among the present generation.

The first category which limit planting of certain tree species may be a limitation in promoting the planting of the respective species. This, however should not mean that the affected species are not planted but this should guide the extensionist to be more cautious when promoting the species and only start with those who are willing to avoid causing conflicts with the community. For example, though a taboo exist on planting of Croton megalocarpus, still 13.3% of the households planted the species (Table 10).

In general the taboos identified were not wide spread and only mentioned by a small percentage. It need to be mentioned that extension agents should be on the look out in case there is such species that was not mentioned and also to bear in mind that people's culture are always dynamic and a species that was once not identified with any taboos can with time have some taboos attached and vice versa.

3.3.3.11 Forest products and marketing

Product sold in 1997

The level of forest products that is marketable is one of the ways of gauging the profitability of forestry as an enterprise. When there is market value to forest products, farmers will be willing to invest their scarce resources in forestry activities.

The survey identified forest product sold as fruits, charcoal, honey, timber, beehives and furniture. Charcoal is the most commonly mentioned product sold by 24.4% of the households. This was followed by fruits of different species, both wild and commercial fruits, sold by 12.2% of the sampled household. Commercial fruits sold include *Mangifera indica* (mango), *Persea americunum* (avocado), *Psidium guajava* (guava), *Musa* sp. (banana), *Citrus* sp. (orange) and white supporter. Wild fruits included *Tamarindus indica, Berchamia discolor, Vitex doniana, Sclerocarya birrea , Ximenia americana* and *Vangueria rotundata.* Other product sold as a percentage of household respondents of they survey are honey 6.7%, timber 4.4%, pole and posts 3.3% and beehives 2.2%.

The survey has identified charcoal and fruits as the major forest product with available market. For tree planting to be economically feasible there is need to develop the two products to address processing and marketing bottlenecks.

Products bought in 1997

Fuelwood(charcoal and firewood) are the most commonly bought product with 17.8% of the sampled households buying either charcoal or firewood from neighbours, road side or local markets. Those who bought furniture

were 8.9% of the sampled households, timber 4.4%, poles and posts 3.3%, honey 2.2% and seedlings 1.1%. The fact that charcoal is the highest bought indicate that the use of charcoal is high which may be the cause of over exploitation of the natural woodland and subsequent decrease in the naturalwoodland reported in this report.

3.3.3.12 Tree planting problems and solutions

Problems of tree planting

Nine major problems were identified that limited tree planting in the sample area. The problems listed in the order of importance are termite damage, water scarcity, animal damage, lack of seedlings, pest and diseases, inadequate technical advice, water salinity, lack of seeds and lack of tools. The level of importance was determined by the number of households who indicated the problem (Fig. 11).

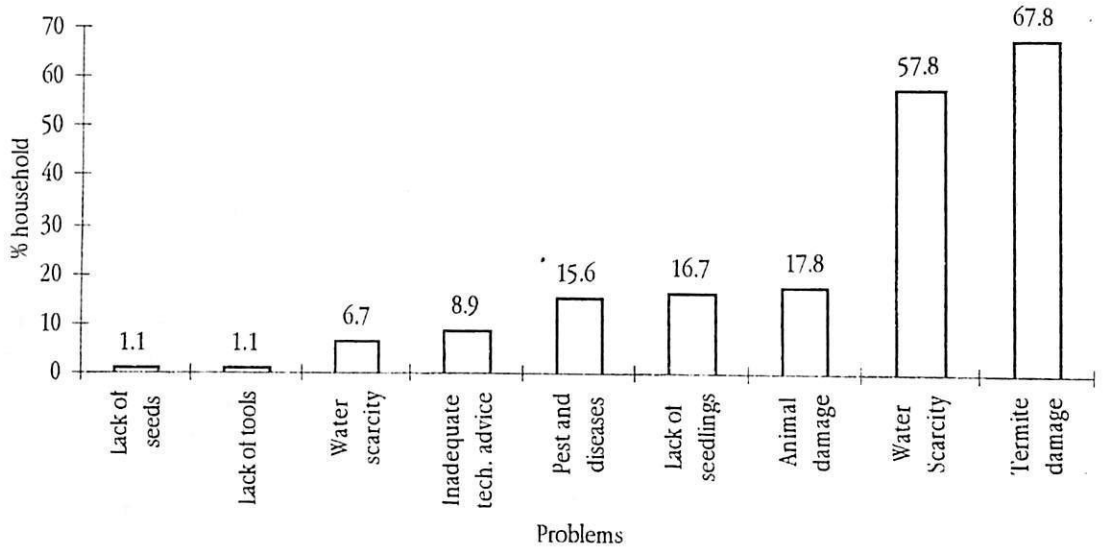

Fig. 11 Tree planting problems as a percentage of the households

Termite damage and water scarcity still remained the major limiting factor to tree planting in semi-arid areas which should not be ignored.

Solutions to tree planting problems

The main solution for water scarcity is watering as suggested by 73% of those who mentioned it as a problem, while 5.8% suggested use of recycled kitchen water, 2% suggested use of water catchment to collect rain water. As previously observed the knowledge on use of microcatchment is still low which is reflected in the few number of households who suggested it as solution to water scarcity.

Of those who had termite problems, 41% suggested use of insecticide for control, 29.5% suggested use of local material such as plant extract, ash, urine and planting repellent plant species around the main species. The local methods of termite control need to be verified and if possible improved upon so as to be more effective in termite control. Use of chemicals especially with the resource-poor farmers may be costly and unsustainable as well as being environmentally unfriendly.

Possible solutions suggested by the farmers for lack of seedlings are starting own nursery and buying seedlings, solution suggested for lack of seeds is to carry out local seed collection.
Control of animal damaged is mainly by fencing, main fencing method is spot fencing. Reports indicate that spot fencing has proved effective in protecting young seedlings in other areas of the country.

Solutions suggested for the problem of pests and diseases are 78.6% is use of chemical control, while 21.4% suggested use of local control material such as ash. Time is needed for studies to be done on the efficacy of the traditional methods in controlling pests and diseases. Traditional controls may offer a cheaper alternative of controls which resource poor farms can afford.
The farmers who lacked tools, borrowed from their neighbours, while solution for water salinity problem was suggested. Inadequacy in technical services had two solutions suggested 62.5% of the respondents suggested training, while 37.5% suggested frequent visit by extension agents. Training of farmers has the potential of greater multiple effects because trained farmers may themselves act as extension agents to their neighbours. A survey conducted on past trainees of social forestry training project showed that over 60% have passed the knowledged gained to their neighbours (Kamene, 1997).

3.3.3.13 Fuelwood situation

Source of fuelwood

Majority (88.9%) of the households sampled get fuelwood from their own land, spending an average of 1.3 hours in collection time. Another 10% get fuelwood from neighbours' land and spend an average of 1.4 hours, whereas 5.6% buy fuelwood. Kabati division is hardest hit by fuelwood shortage with people spending an average of 1.8 hours in firewood collection. Central division followed with average of 1.4 hours spent, followed by Chuluni with an average of 1 hour spent. Mutomo division had the shortest time spent in fuelwood collection with an average of 0.8 hours.

Fuelwood related problems

Fuelwood related problems were recorded in 64.5% of the sampled households. These problems could be grouped into two category, scarcity and poor quality. Problem of fuelwood quality contributed for 3.4% of the identified fuelwood problems, two possible solution for the problem are planting species of better fuel quality and to debark the wood as was done for

Euphorbia tirucalli to reduce smokiness. *Euphorbia tirucalli* has very poor fuel quality and when it is used as in Kabati division is a sign that fuelwood scarcity has reached an alarming proportions.

The suggested solution to fuelwood scarcity were varied with the highest percentage, 50%, suggesting planting of trees. Other suggestions included purchase of fuelwood mentioned by 16.1% of the households, cutting and drying of trees for use as fuelwood 8.9%, use of alternative energy source 7.1%, and good management of woodland 1.8%. The rest did not have any solution to suggest.

Cooking facilities

Use of traditional three stone cooking stove is the most common among the sampled households with 94.4% using it. The other cooking facilities which were recorded as a percentage of the sampled households are improved jiko, 14.4%, ordinary jiko, 13.3%, paraffin 8.9% and other miscellaneous types such as gas stoves contributing for 3.3%.

The high level of use of traditional three stone cooking stove which is highly inefficient shows that there is low awareness in energy conservation and the need for it. This indicate that more fuelwood is used than necessary if more efficient stoves are used. This contributes to more vegetation being destroyed than otherwise when improved stoves are used. This is one of the areas that need urgent attention if the amount and rate of destruction of the natural vegetation is to be reduced.

3.4 Water Resources

3.4.1 Water sources

Water is a basic necessity both for domestic, tree planting and livestock use in dry lands. Earlier in the text water was mentioned to be among the top limiting factors to tree planting in the sample area. A part from its obvious importance in tree growth, time spent in searching for water takes a significant amount of farmers' time which otherwise could have been spent doing other productive work.

The survey sought to identify the major water sources, evaluate amount of time spent in searching for water and identify major water related problems. The major sources of water identified are seasonal rivers such as Thua, Tiva, Kalundu, Mutendea, Nzeeu and Kauwi. There are also sub surface dams and water pans scattered in different areas. These sources do not provide sufficient water to meet the need of the local people especially during the dry season. Most of the pans and dams dry up during prolonged droughts.

Roof catchment is increasingly gaining significance, especially during the rainy seasons with 53.3 % of homesteads getting water from roof (Table 12). Use of sub-surface water in sandy river beds play crucial role in meeting

water requirements in the area for all uses. At times this is the only source of water especially during the dry seasons. Eighty percent of the households get their water requirement from river bed

The survey revealed that a substantial amount of the farmers' time is spent searching for water. The average distance travelled in searching for water per division is indicated (Table 16). Conversion factor for the purposes of this survey was 4km= 1 hour of walking. During the dry seasons the water table on seasonal rivers and streams get low and people have to spend a lot more time to fill their containers. From the survey results it was observed that farmers water seedlings only when they can get water within a short distance.

From the survey results it was observed that farmers water seedlings only when they can get water within a short distance. With such a severe water scarcity tree planting technology being introduced should add least to the farmers' water burden. The technology should not be high water demanding.

Table 16: Water sources and distance

		Dam		Riverbed		Roof catchment		Rock Catchment		Bore hole		Spring		Stream	
		%	Average distant	%	Average distant	%	Average distant	%	Average distant	%	Average distant	%	Average distant	%	Average distant
Domestic	Rainy season	13.3	1.5	32.2	2	53.3	0	3.3	4.3	5.6	0.8	3.3	1	11.1	0.8
	Dry season	6.7	4.8	80	5.1	2.2	0	4.4	2.3	6.7	2				
Livestock	Rainy season	16.7	2.3	37.8	2	4.4	0	1.1	1	2.2	1	3.3	0.4	11.1	0.6
	Dry season	5.6	4	74.4	4.1			1.1	8	4.4	6				
Seedlings	Rainy season	1.1	0.1	10	1	2.2	0	1.1	1						
	Dry season			45.6	3	1.1	0	1.1	1	2.2	2.3				

The main transportation system for water is by donkey which play a significant role as mode of transportation in the district.

3.4.2 Water related problems

Rainy season

The main water related problems during rainy season was identified as dirtiness of the water due to high soil deposition in the rivers. This results in frequent out break of water bone diseases like cholera, dysentery and amoebiasis. There was also a case of some rivers becoming salty during the rainy seasons though this was rare. The farmers try to control the problem of diseases by boiling the water before use.
The problem of dirty water is caused by soil erosion which shows that vegetation on the catchment areas have been destroyed leaving the soil to be

washed down the water course by surface runoff which is ultimately deposited in the rivers. Tree planting in private lands and catchment areas like hill tops may be an important contribution to controlling the problem.

Dry Season

The main problem of water during the dry season is the distance involved in searching for water which as indicated earlier, consumes substantial amount of the farmers time. Another common problem mentioned is water becoming salty thus damaging the seedling and at times killing seedlings watered with such water. No solution has been mentioned by the farmers for saltiness but for distance most farmers opt to sink bore holes, buy water from vendors while others requested for some support to purchase water pump for their bore holes.

3.5 Economic situation

3.5.1 Sources of income

Sale of farm produce, employment and livestock sales are the main sources of income earners among the sampled households. Other sources of income include sale of charcoal, honey, bricks and baskets (Table 13). The most common income generating activities in Mutomo division is livestock sale, for Kabati, Chuluni and Central division the most common income earner is farm produce sales (Table 17).

Table 17: Source of income as percentage by households

	Charcoal	Farm produce	Permanent employment	Casual labour	Livestock	Honey	Basket	Bricks	Others
Average	4.4	73.3	42.2	36.7	30	4.4	2.2	1.1	1.1
Mutomo	2.2	12.2	7.8	8.9	11.1	2.2	0	0	0
Kabati	1.1	23.3	12.2	7.8	2.2	1.1	0	0	0
Chuluni	1.1	18.9	10	6.7	1.1	0	0	0	0
Central	0	18.9	12.2	13.3	15.6	1.1	0	0	0

3.5.2 Source of expenditure

The main sources of expenditure were identified as food purchase recorded by 97.8% of the households sampled, school fees 65.5%, medical expenses 54.4% and clothing 12.2%. Other minor expenditure sources were recorded by 6.7%. The fact that food purchase was recorded by a high majority of the households sampled as the major source of expenditure shows the severity of food shortage in the sampled area.

3.6 Common diseases

The common diseases identified in the sampled area are malaria and water bone diseases such as dysentery, cholera and amoebiosis. Malaria was mainly observed to be caused by stagnant waters and bushes which provide a breeding ground for malaria causing mosquitoes. Other diseases mentioned include nutritional diseases such as kwashiokor and scabies among children. Tuberculosis (TB) and HIV/Aids were also identified.

3.7 Infrastructure and infrastructure related problems

The district infrastructure is generally poor with the main problem being poor road conditions as mentioned by all the respondents. It is estimated that tarmac road in the district only cover a distance of 27 km. The rest of the roads are murram which are washed away break during the rainy seasons making some areas of the district inaccessible. The average distance from the homestead to the main road with public transport was estimated at 3.4 km. The estimate can be misleading and can only be used as a rough guideline Most of the household sampled were near the main road network because of poor accessibility caused by rains. On solutions to poor road conditions as recorded by 86.7% of the households said the government should repair them, while 13.3% suggested formation of community organisation under the area chief to repair roads in their respective area. With the poor roads few public transport are available during rainy season, few available hike the fare. This forces many people to walk long distances on normal travelling routines and donkeys being used increasingly for transportation work.

Average distance to the nearest market, administrative office, hospital and secondary school average ranged between 5 - 6 km. Primary school is the nearest with average distance of 1.5 km. Poor health facilities was not only identified in terms of distance covered but also unavailability of drugs in the local health centres.

The other problems identified are telephones which are inadequate and electricity is only found in big centres. All these facilities are required for meaningful development to take especially in the fast growing centres.

3.8 NGOs operating in Kitui

Most of the government line ministries are represented in the District and are involved in implementation of government policies in line with their mandates. Various NGOs engaged in various development activities and services such as provision of water, education, health are also present in the District. Table 18 show the organisation and their activities.

Table 18 NGOs operating in the sample area

Name of the organisation	Location	Activities
1. World neighbours	Yatta, Matinyani and Mulango	Health, farmer training
2. Christian children fund	Changwithya West, Tiva	Child sponsorship, food security, sanitation
3. Kenya Energy Non-Governmental Organisation	Central, Yatta, Kabati	Environmental conservation, Agroforestry, energy technology
4. Church of the province of Kenya	District wide	Health, tree nursery, water, agricultural development
5. Maendeleo Ya Wanawake	Chuluni, Central, Yatta, Kabati	Health, social development
6. Action AID	Mutomo	Credit education, water, agriculture, health, Livestock development, agroforestry
7. Catholic Diocese	District wide	Health, School development, Agriculture, livestock, Food for work (FFW)
8. Kenya freedom from hunger council	Yatta, Mutomo	FFW, relief activities
9. Sahelian solutions	Central, Chuluni, Yatta, Kabati	Environmental conservation, Water, Health, School shambas

4.0 RECOMMENDATIONS

Some recommendations that can be drawn from the survey are listed below

1. Mutomo and Kabati Divisions, which are predominantly in zone IV and V, have a lot of similarities in many respects on one hand with Central and Chuluni divisions also having similarities. This could be the first classification with each division in each pair acting as a replicate treatment of the other for comparison

2. The surveyed area can be broadly classified according to the agroclimatical zones identified into four zones namely; III-3, IV-2, V-1 and V-2.

3. Farmers in each zone can further be classified according to some variables like farm size, education levels, level of farm input, level of tree planting and status of the trees planted, accessibility to extension agents, labour availability, distance to dry season water source, etc.

4. There is some available knowledge already with the farmers on soil conservation, soil fertility maintenance through manure application, and planting and tending of trees. The project should identify and build on the existing farmer practices. An emphasis on use of available resources for sustainability is also required. Since the project will deal with individual farmers, the entry points identified are in terms of technologies that farmers are already practising and how to improve on the existing practises.

5. Farmers' tree species priority which include fruit trees and other species which the farmers can realize direct benefit should be considered in future promotion of tree planting.

6. Since seedling distribution by the government and nongovernmental organizations is being phased out, there is need to facilitate seedling production by small scale nurseries to provide seedlings for planting. Current seedling production by the farmers is very low as revealed by the survey and may not be able to sustain an expanded tree planting programme.

7. Technology extension to farmers should address farmers needs like fodder in Chuluni and Central divisions, fuelwood in Kabati division, etc.

8. One of the major problem identified which limit tree planting is water scarcity. The project cannot provide water but instead, promoting technologies for harvesting rain water. Since many farmers are already watering their trees the project could also try to improve on watering techniques e.g. using bottle watering. In addition there are several organisation in the district which supply water so collaboration with such organisations can be of assistance to the farmers

5.0 CONCLUSION

The survey was conducted as planned with main problems being poor road conditions. The objective of the survey has been achieved and possible ways of stratifying the project area and farmers recommended. The farmers current practises in tree planting and general conditions of their areas have been identified. Farmers priority tree species have been identified and tree planting problems which can be addressed through technology development recorded.

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Appendix I Guideline on general observation

1. Map of the farm including homestead
   - Farm land
   - Grazing land
   - Homestead
   - Tree planting pattern
   - Indigenous trees
   - Exotic trees
   - Fencing materials (type)
   - Trees in farm and how managed

2 Tree management
   - Hole size
   - Type of weeding
   - Pruning
   - Copping
   - Protection
   - Type of watering

3. Construction materials
   - Houses
   - Stores

4. Terrain
   - Rocky
   - Hilly
   - Plain
   - Soil drainage
   - Soil colour

5. Type of erosion
6. Shifting cultivation.

Appendix II
GENERAL SURVEY QUESTIONNAIRE

Section A: General

1. Date of interview.....
2. Name of interviewer.....
3. Name of head of homestead.....
4. Interviewee(s).....
5. Division.....
6. Location.....
7. Sub-location.....
8. Slope: 1. Plain 2. Moderate 3. Steep
9. Agroclimatic zone.....Altitude.....
10. Latitude.....Longitude.....
11. Soil types: 1. Sandy 2. Loam 3. Clay 4. (Others specify).....
12. Natural vegetation: 1. Sparse 2. Moderate 3. Dense

Section B: Family structure

1. How many belong to homestead ?
2. Number of male members
3. Number of female members
4. How many people live in this homestead currently ?.....
5. How many are employed (wage/salary employment) ?
6. What are the ages of your homestead members who live here currently ?

   1). Less than 6 years.....
   2). 6-20 years .....
   3). Over 21 years.....

7. How many members of your homestead who currently live here have had

   1) Primary education
   2) Secondary education
   3) Tertiary education
   4) Adult literacy classes

8. Who make decisions in this homestead regarding land use ?

Section C: Farm information and settlement pattern

1. What is the total area of your land (ha./acre)?

2. What area is under cultivation (ha./acre)?

3. What is the size of your grazing area (ha./acre)?

4. When did you settle in this land.....

5. If migrated from else where, from where.....

6. What is the tenure system under which you occupy your land:

   1. Freehold 2. Unsurveyed 3. Communal

Section D: Crop farming

1. List the food crops you grow on your farm

   1.....
   2.....
   3.....
   4.....
   5.....

2. List the cash crops you grow on your farm

   1.....
   2.....
   3.....
   4.....
   5.....

3. From whom do you get advice on farming practices?

   1. MoA 2. NGOS 3. Administration 4. None 5. Others (specify).....

   How often do they visit your farm ?

Organisation	Frequency of visit 1. Weekly 2. Monthly 3. Quarterly 4. Twice a year 5. Yearly 6. Bi-annually 7. Rarely

4. Do you apply any of the following inputs on your farm

   1. Fertiliser 2. Manure 3. Pesticides 4. None 5. Others (specify).....

5. Is soil erosion a problem on your farm ?

1. Yes 2. No

If yes, do you have soil conservation structures on your farm

1. Bench terrace 2. Checkdams 3. Bench terrace with trees
4. Bench terrace with grass 5. Bench terrace with grass and trees
6. Cut off drain 7. Others specify.....

6. What is the fertility level of your land ?

1. Fertile 2. Moderately fertile 3. Poor

7. How much did you harvest (indicate unit, e.g. bags, debes, weight)?

Type	Quantity (Unit)	Unit price

9. Do you have food shortages during the dry seasons ? 1. Yes 2. No

10. What are your main sources of food during droughts ?

1. Reserve 2. Relief 3. Purchase 4. Support from relatives.

11. What quantity of food items did you purchase ?

Food item	1997	1996
Maize Beans Pigeon peas Cow peas Others		

12. Suggestions on how to solve problem of food shortage in the area.

.....

.....

.....

13. What is your major problem in crop production and possible solution

	Problem	Possible Solution(s)
1.	.....	.....
2.	.....	.....
3.	.....	.....
4.	.....	.....

Section E: Livestock production

1. Which livestock do you keep on your farm

Animals	Numbers	Benefits
Cattle		
Goats		
Sheet		
Poultry		
Donkey		
Beehive		
Others		

2. How do you keep your livestock ?

1. Free range 2. Zero grazing 3. Paddocking 4. Tethering

3. How much did you earn from livestock/livestock product sales in 1997

Type	Number sold	Amount

4. What problems do you encounter in livestock production and what solution can you
suggest for the problems.

Problem	Solution
----------	----------
----------	----------
----------	----------

Section F: Afforestation and Forest resources

1. Have you planted trees on your farm ? 1. Yes 2. No

   If yes, fill the table below:

Species	Where planted	Purpose of planting
	1. Compound 2. Border 3. In farm 4. Woodlot	

2. Who makes decisions regarding tree planting on your farm ?
3. When did you start planting trees on this farm ?

   1. 1950-1960 2. 1961-1970 3. 1971-1980 4. 1981-1990 5. 1991-1998
4. Do you have a tree nursery ? 1. Yes 2. No

   If yes, is it 1. Your own private nursery 2. Group nursery

   If group nursery name the group.....
5. Are you engaged in any communal tree planting activities ? 1.Yes 2. No
6. Where do you obtain seedlings for planting ?

   1. Group nursery 2. School nursery 3. FD 4. DANIDA 5. JICA 6. Own nursery 7. MoA 8. Commercial Nursery 9. Direct planting

   10. Others specify.....
7. From whom do you get advice on tree planting ?

   1. FD 2. JICA 3. NGOS 4. Administration 5. None 6. MoA

   7. Others (specify).....

   How often do they visit your farm ?

Organisation	Frequency of visit 1. Weekly 2. Monthly 3. Quarterly 4. Twice a year 5. Yearly 6. Bi-annually 7. Rarely

8. Has anybody in the homestead received training in tree planting ?

   1. Yes 2. No

   If yes, who trained ?

   1. JICA field seminar 2. JICA residential training 3. FD 4. MoA 5. Others

9. Did you purchase any of the seedlings that you have planted ?

   1. Yes 2. No

10. Which tree species do you prefer to plant ?

    1.....

    2.....

    3.....

    4.....

11. How do you care for your trees ?

    1. Large hole size 2. Weeding 3. Water catchment 4. Protection 5. Pruning 6. Watering

12. What are the natural tree species on your farm

Species	Use
.....	.....
.....	.....
.....	.....
.....	.....

13. What has been the trend of natural vegetation on your farm in the last 20 years.

    1. Increasing 2. Same 3. Decreasing

14. Do you have any traditional believes or taboos about tree planting, cutting and utilisation ? 1. Yes 2. No

    If yes, specify.....

    .....

    .....

    .....

15. What forest products did you sell in 1997

Product	Where sold	Quantity	Unit price	Amount

16. In what form do you sell/use the forest products

Product	1. Raw 2. Processed 3. Packaged

17. Did you buy any forest product in 1997

Product	Where bought	Quantity	Unit price

18. What problems do you face on tree planting tending and management. Can you suggest possible solutions ?

Problem	Solution
----------	----------
----------	----------
----------	----------
----------	----------

19. Where do you get your firewood

Place	Time spent
.....	.....
.....	.....
.....	.....
.....	.....

20. Do you have problem with obtaining firewood. What are the possible solutions to the problems ?

Problem	Solution
.....	.....
.....	.....
.....	.....
.....	.....

21. What kind of cooking facilities do you use ?

1. Three stone 2. Improved jiko 3. Paraffin stove 4. Others specify.....

Section G: Water resources

1. Where do you get water (tick appropriate)

Water source	Free	Purchase	Distance	Transport
Rainy season a) Domestic b) Livestock c) Trees/nursery seedlings				
Dry season a) Domestic b) Livestock c) Trees/nursery seedlings				

***NB: 1 hour walk is approximately 4 km**

2. What water related problems do you experience and what are the possible solution.

(i) During rainy season

Problem	Solution
.....	.....
.....	.....
.....	.....
.....	.....

(ii) Dry seasons

Problem	Solution
.....	.....
.....	.....
.....	.....
.....	.....

Section H: Socio-economic information.

1. What are your main sources of income

   1..... 4.....

   2..... 5.....

   3..... 6.....

2. What were your major expenditure in 1997 and how much did you spend in each category.

   Category of expenditure

   .....

   .....

   .....

Section I: Health and nutrition

1. What human diseases are most common in your villages

Disease	Cause
.....	.....
.....	.....
.....	.....
.....	.....

Section J: Infrastructure and development

1. How far is the nearest hospital (km) ?
2. How far is the nearest primary school (km) ?
3. How far is the nearest secondary school (km) ?
4. How far is the nearest market (km) ?
5. How far is your home from a road that has public transport ?
6. How far is the locational office from your home (km) ?
7. List development institutions (both government and NGOs) operating in your area.

Institution	Activities
.....	.....
.....	.....
.....	.....

8. What infrastructure related problems do you face in your area ?

   .....

   .....

9. What are your suggestion infrastructure related problems ?

   .....

   .....

   .....

* ASANTE SANA KWA WAKATI WAKO *

Appendix III

Survey Team Members (March.1998)SOCIAL FORESTRY EXTENSION MODEL DEVELOPMENT PROJECT

Date	Team members	A		B	C		D	
	Member Division	B. Muok, *J.Kamene Mishima, Minami, Takeuchi	*Egerton Univ Lena N.K	B. Owuor, *E.Kitheka Sato, Noda	*E.Kyalo, A. Atanas, Yamauchi, Yamaguchi	*Egerton- Univ Onesmus	L. Rateng, O. Auka Kemmochi	* Egerton Univ Nicholas M.W.
9(mon)	Meeting (15:00)	B. Muok, *J.Kamene DFO Kitui A.M.Gondo Mishima, Minami	v	*E.Kitheka Sato	*E.Kyalo, A. Atanas, Yamauchi, Yamaguchi	v	L. Rateng, O. Auka Kemmochi	v
10(tue)	Meeting	B. Muok, *J.Kamene Minami	v	*E.Kitheka Sato	*E.Kyalo, A. Atanas, Yamauchi, Yamaguchi	v	L. Rateng, O. Auka Kemmochi	v
11(wed)	Mutomo(7:00)	B. Muok, *J.Kamene DFO Kitui A.M.Gondo Minami		B. Owuor, *E.Kitheka Sato,	*E.Kyalo, A. Atanas, Yamaguchi		L. Rateng, O. Auka DFEOMutomo J.K. Kamau Kemmochi	v
12(thu)	Mutomo(7.00)	B. Muok, *J.Kamene DFO Kitui A.M.Gondo Minami		B. Owuor, *E.Kitheka Sato,	*E.Kyalo, A. Atanas, Yamaguchi		L. Rateng, O. Auka DFEOMutomo J.K. Kamau Kemmochi	v
13(fri)	Meeting (8:30) (by Ms. Muhia, at the centre) compile the data	B. Muok *J. Kamene Minami	v	B. Owuor, *E.Kitheka Sato,	*E.Kyalo, A. Atanas, Yamauchi, Yamaguchi	v	L. Rateng, O. Auka DFEOMutomo E.I. Mutie Kemmochi	v
16(mon)	Compile the data	v		v	v		v	
17(tue)	Kabati (8:00)	B. Muok *J. Kamene Mishima Takeuchi	v	B. Owuor, *E.Kitheka Sato, Noda	*E.Kyalo, A. Atanas, Yamauchi, Yamaguchi	v	L. Rateng, O. Auka *DFEO Kabati J.S. William Kemmochi	v
18(wed)	Kabati (8:00)	B. Muok *J.Kamene, Minami	v	B. Owuor, *E.Kitheka Sato,	*E.Kyalo, A. Atanas, Yamauchi,	v	L. Rateng, O. Auka *DFEO Kabati J.S. William Kemmochi	v
19(thu)	Chuluni(8:00)	B. Muok *J. Kamene Takeuchi	v	B. Owuor, *E.Kitheka Sato,	*E.Kyalo, A. Atanas, Yamauchi	v	L. Rateng, O. Auka Kemmochi	v
20 (fri)	Meeting(9:00) Compile the data			v	v		v	
23(mon)	Compile the data	v		v	v		v	
24(tue)	Chuluni (8:00)	B. Muok *J. Kamene Takeuchi	v	B. Owuor, *E.Kitheka	*E.Kyalo, Yamauchi	v	L. Rateng, DFEO Chuluni Kyanze P.M	v
25(wed)	Central(8:00)	*J.Kamene, DFO Kitui A.M. Gondo, Takeuchi		*E.Kitheka, Ast.DFEO Central E.N.Oyugi Sato	*Froza, A.Atanas Yamauchi	v	L. Rateng, O.Auka DFEO Central E.I. Mutie Kemmochi	
26(thu)	Central(8:00)	B.Muok, *J.Kamene		B. Owuor Ast.DFEO Central E.N.Oyugi *E.Kitheka	*Froza, A.Atanas	v	L.Rateng, O.Auka, *DFEOCentral E.I. Mutie	