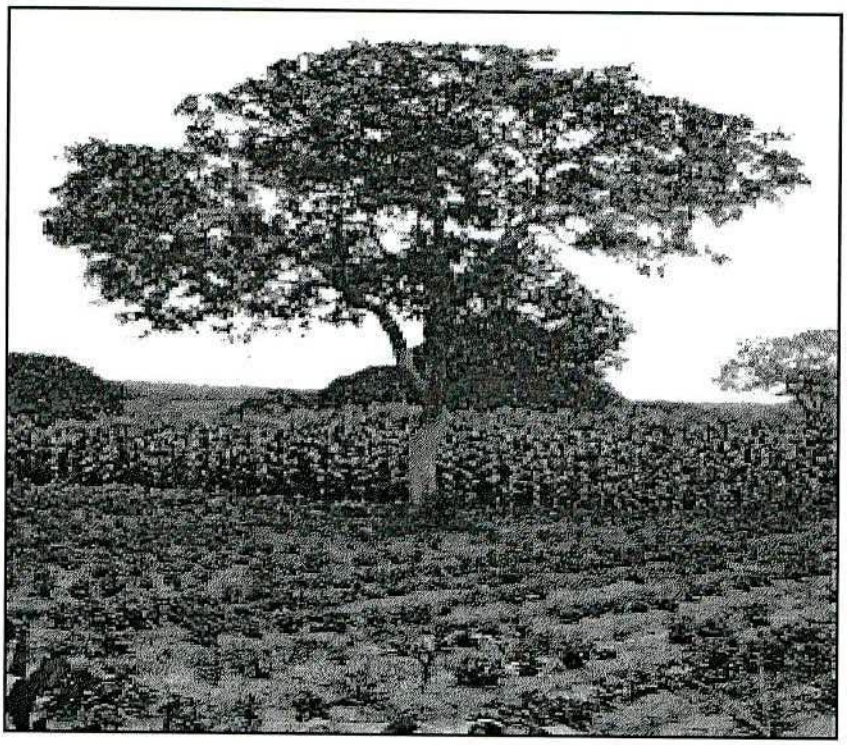
# Determination of Indigenous Trees and Shrubs with potential for Agroforestry in Teso Farming System

**Report for Katakwi District**



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## 1.0 Introduction

Traditional agroforestry practices have existed for a long time in Uganda although these practices have been rarely documented. In Northern Uganda it is common practice to intercrop *Cajanus cajan* with millet and simsim, while in Soroti and Kumi districts, *Tamarindus indica, Mangifera indica* and *Vitellaria paradoxa* are commonly retained or planted on farmlands (Djimbe and Hoekstra (eds), 1988).

Apart from the systematic placement of trees relative to crops and pastures on farms, rural people are often concerned about the fit of the whole agroforestry practice and trees in general into the larger landscape (Rochelleau, 1988). In many instances farmers have long experience and knowledge of local agroforestry practices and systems. For thousands of years, they have consciously maintained diversity, planted mixed fields systematically to achieve natural crosses, practiced selection and set up their own personal gene banks and far flung exchange systems for acquiring new genetic materials (Chambers, 1989).

## 1.1 Justification

Farmers' indigenous knowledge of tree shrubs and their management has evolved over time, based on local experience, using local resources and is adapted to local conditions. It presents detailed information of all aspects of land-use management. This knowledge is dynamic, undergoing change and development in response to changes in internal and external environment. Most of this knowledge, however, is not documented and gets lost over generations. At present many of the successful traditional systems are literally losing ground in the face of disruptive changes and increasing pressures on the people and their natural resources (Rocheleau, 1988).

The study of traditional methods by local communities is very important especially for the benefit of agricultural improvement and transfer of new technologies to farmers. Emphasis of farmer priorities, knowledge and innovative capacities plays a central role in the adoption of new systems. Besides, farmers are often conscious about throwing away older varieties and production strategies simply because they are presented with new packages. Understanding indigenous agroforestry practices will therefore benefit the identification of suitable and sustainable agroforestry systems in Teso. Documentation of this indigenous knowledge offers great opportunity not only for agroforestry development, but also modernization of agriculture in the region.

## 1.2 Objectives

The overall objective of the study was to identify the current and indigenous agroforestry systems that farmers are practicing with the aim of establishing important trees / shrubs for agroforestry development in the farming systems. The specific objectives of the study were:

1. To identify trees / shrubs commonly growing on key niches on farms, their propagation, management, uses and the factors determining their arrangement.
2. To study the role of trees in the farming system, identifying trees / shrubs used for major functions, their sources and availability.
3. To identify actors in agroforestry and assess the role of gender in decision making, division of labour and distribution of benefits from tree growing.
4. Determine indigenous tree / shrub species with potential for agroforestry and establish farmers' most preferred species for future planting.

## 2.0 Methodology

The study was done in three (3) phases. It started with a rapid rural appraisal (RRA) intended to narrow down the scope, to allow for more rigorous inquiry in a subsequent household survey. The preliminary findings of these two phases were then scrutinized at a stakeholders' feedback workshop. The information presented and discussed in this report is the outcome of this funnel-shaped process (see figure 1).

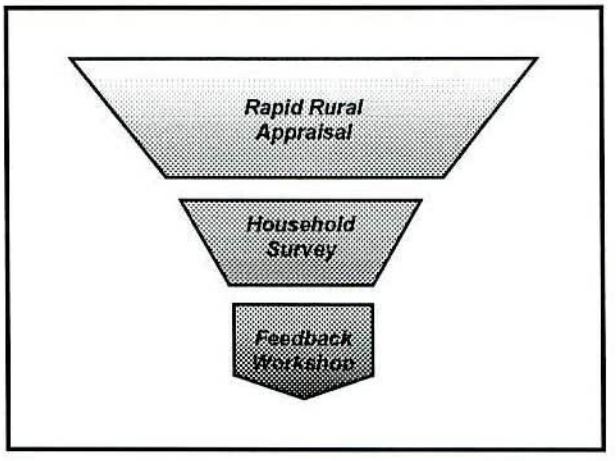



*Figure 1. Illustration of the study design*

## 2.1 The Rapid Rural Appraisals (RRA)

The purpose of the rapid appraisals was to identify candidate species that have potential for agroforestry in Katakwi district in the Teso farming system. In addition, these exercises provided appropriate methodology for: -

- Describing key features of the Teso farming system and establishing the role of trees in this system,
- Understanding traditional and current tree growing practices in the farming system and projecting future agroforestry trends in the system,
- Determining the status of agroforestry awareness, identifying key actors and studying the role of gender in tree growing and use.

### 2.1.1 Team composition and training

The RRA team comprised a multi disciplinary team of researchers from the Forestry Resources Research Institute (i.e. two foresters, a socio-economist and an agroforestry technician) and Katakwi District agriculture and forestry staff. The entire team had eight to ten people including two women. Each focus group was facilitated by at least 2 research team members.

The district field staff were given one-day training, which equipped them with the background to the exercise and its objectives. They were introduced to RRA methodologies focusing mainly on the tools that were to be used in this particular study. Many field staff, however, had prior experience with these tools.

### 2.1.2 Site selection

In consultation with the district agriculture, forestry and environment offices, the district was divided into 3 easily discernible agro-ecological zones (dry, middle and wet) based on climatic, soils and vegetation characteristics of the areas. One sub-county was randomly selected to represent each agro-ecological zone (see table 1).

In each selected sub-county, one parish was identified considering ease of group mobilization. Considering low variability within sub-counties, the gauged subjective selection of units at this stage to have minimal effect on the findings. Thus, RRA exercises were carried out in 3 parishes.

(see table 1). Informants were mobilized from several villages within the parish. One village in the parish hosted the exercise at a convenient venue.

| Ecological zone | County | Sub-county | Parish |
|---|---|---|---|
| **Dry** | Usuk | Katakwi | Aliakameri |
| **Middle** | Kapelebyong | Kapelebyong | Nyada |
| **Wet** | Amuria | Kuju | Wila |

*Table 1. Distribution of study sites for the rapid appraisal*

### 2.1.3 Focus group composition

Four focus groups, of 10 people each, were organised prior to the exercise. These were youths (12- 18 years), women (19 – 49 years), men (19 – 49 years), elders (50 years and above). The arrangement of informants into these particular groups was intended to provide gender responsive information across generations. Group members were drawn from different households.

### 2.1.4 Tools used

Three tools of rapid rural appraisal were used to achieve the objectives of the exercise, and included focus group discussions, semi structured interviewing and preference ranking. The focus groups enabled gathering of information specific to particular interest groups and to ensure active participation in peer environment. Semi structured interviews facilitated rapid but flexible data capture during the interviews, while preference ranking was instrumental in prioritization of responses.

### 2.1.5 The field exercises

One day was assigned for the rapid appraisal in each parish. Prior arrangements were made by the local extension staff to organize the groups and identify venues. On arrival, the research team introduced themselves to the gathering and explained the purpose for the RRA. After the groups were assigned facilitators, separated and got down to discussions, mostly in the local language. Information was outlined on flip charts and details taken down in field notebooks. Information was checked before the groups dispersed. The exercise lasted about three hours.

### 2.1.6 Summarizing the data

The information collected from the field was summarized and entered in computer. Rankings were converted to ranking points to determine important species and priorities. Responses with highest rank (1) were awarded maximum (5) points; while those with lowest rank (5) were awarded lowest (1) points on a scale of 1 to 5. A response not mentioned among the first 5 priorities by a focus group, was awarded zero (0) points for that particular group. As a primary criterion, priority responses were determined from total ranking points accumulated from all focus group discussions. The number of quotations (times a response is mentioned on a particular item) was considered as the secondary criterion.

## 2.2 The household survey

The rapid appraisal provided useful insights and sharpened the focus of the study to critical issues and short-listed species. The information from the RRA, however, falls short of providing sufficient basis for determining species for agroforestry promotion. Thus, the follow up household survey was designed to:-

- Verify hypotheses drawn from the information collected in the RRA and find out the degree to which these findings can be generalized on the entire district.
- Refine upon and fill gaps in the information gained from the RRA.
- Address areas that require quantitative information, which could not be gathered comprehensively through the rapid appraisal.

### 2.2.1 Coverage

The survey covered the three agro-ecological zones of Katakwi district. Each county represented an agro-ecological zone. In the wet and middle belts, two sub-counties were randomly selected in each of Amuria and Kapelebyong counties respectively. In the dry belt, which covers a larger geographical spread, three sub-counties were selected in Usuk county. In each of these selected sub-counties, two (2) parishes were selected and a village in each visited. Within villages, ten (10) randomly selected households were targeted. Overall, the survey reached 119 farming households in 14 parishes and 7 sub-counties in the district. (see figure 2 and table 2).

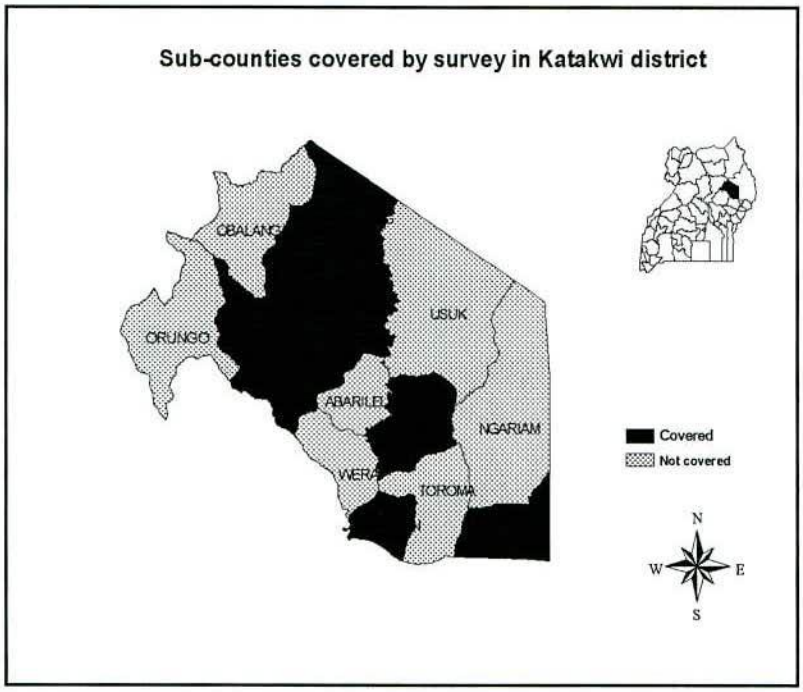



*Figure 2. Map showing sub-counties covered by the survey*

| Ecological zone | County | Sub-county | Parishes |
|---|---|---|---|
| Dry | Usuk | Katakwi | Aliakameri, Abela |
| | | Kapujan | Orimai, Kokorio |
| | | Magoro | Omasia, Kamenu |
| Middle | Kapelebyong | Kapelebyong | Nyaada, Amaseniko |
| | | Acowa | Angolebwal, Aakum |
| Wet | Amuria | Kuju | Alere, Amilmil |
| | | Asamuk | Obur, Odoon |

*Table 2.1 Distribution of study sites for the household survey.*

Within households, the head or deputy responded to the interview on behalf of the household. It was common, however, for male household heads to consult their spouses and / or children e.g. on aspects of fruit and firewood utilization and preferences.

### 2.2.2 Household data analysis

The data was coded and entered in MS-Excel worksheets on computer. Careful cleaning was possible using the auto filter function. The data was exported to SPSS for analysis, which involved descriptive statistics and cross tabulation. The results are mostly tabulated, but on some items presented in graphs.

## 2.3 Stakeholders' feedback workshop

The stakeholders' feedback workshop the last stage in the survey process. This workshop held on 30th May 2003, at the Katakwi District Community Hall, targeted departmental heads directly involved in the natural resource management (Agriculture, Forestry, Environment) and the secretariat for production. Participants also included field extension staff, farmer representatives, NGO collaborators.

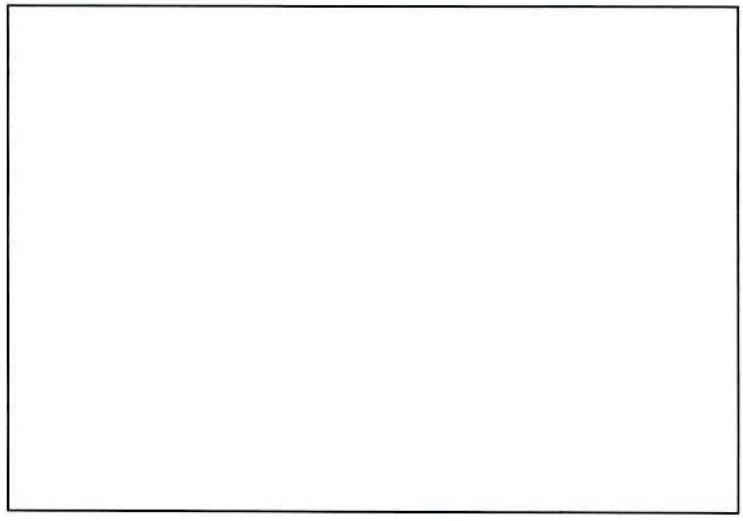


*Figure 3. Stakeholders feedback workshop at Katakwi Community Hall.*

The workshop presented an overview of preliminary survey results to stakeholders in agroforestry in the district and generated discussion on the extent to which the results were in harmony with the local situation. The workshop evaluated the potential of candidate indigenous species for agroforestry and zeroed in on those with highest potential in the Teso farming system.

## 3.0 Results

The results of the study are presented in five sections. The first and second sections describe key features of the Teso farming system and tree growing practices in this system respectively. The third explains the role of trees in this system, while the fourth presents priority indigenous species for each role and the criteria for selection. The last section of the results addresses future prospects for agroforestry in the Teso farming system.

### 3.1 Key features of the Teso farming system

For the scope of this study, description of the farming system considered major land types and land use activities, farming systems (crop and livestock) and aspects of fruit growing.

#### 3.1.1 Land types and land use activities

Agroforestry involves integration of trees with other land use activities. Thus, a clear understanding of these activities is a pre-requisite for identifying appropriate agroforestry options for any location. The land types in Katakwi were described according to vegetation, soils, wildlife and land use. Most common are woodlands, swamps, croplands, settlements and open water (see Table 3).

| Dry | Middle | Wet |
|---|---|---|
| Woodlands | Woodlands | Croplands |
| Swamps | Swamps | Woodlands |
| Croplands | Croplands | Swamps |
| Open water | Settlements | Rocky areas |
| Settlements | Open water | Settlements |

*Table 3. Main land types in the 3 agro-ecological zones.*

Woodlands are characterized by clay soils with tall grasses, trees and patches of bush. In the drier areas, the soils in this land type are sandy, supporting shorter grasses. Woodlands are habitat to a variety of wildlife and useful grounds for hunting and grazing. In the middle belt, these areas are used for charcoal burning and firewood collection. They are also major sources of building poles, wild fruits, medicines and grass for thatching.

Swamps in many areas comprise a combination of both tall and short grasses (e.g. Epirio, Apuuna, Esege, Emeo, Ikorom) growing on sandy and black clay soils which are seasonally flooded. Other

vegetation comprises a mixture of tall trees and thickets. There are many anthills as well as earthworm moulds especially in the wet belt. Brick making, collection of firewood and medicines, rice cultivation, grazing livestock, hunting (e.g. antelopes and birds) and fishing (catfish and lungfish) are common activities here. In the wet belt, cultivation of vegetables in swamps widely occurs during the dry season. These areas are also sources of construction material like poles, fibres, thatch, water and serve as a recreation site for children (swimming).

Croplands are characterized numerous gardens and a mixture of tall and short non-thorny trees and scattered shrubs on black clay, loam and sandy soils, graveled in some areas. In the dry belt these soils tend to sandy, supporting a variety of grasses (e.g. Asisinit, Elagor, Epirio, Ebiyat). The main activities include crop cultivation, tree growing, livestock grazing and hunting. In drier areas, charcoal burning and firewood collection also occur here.

Built up areas or settlements comprise mainly the homesteads, trading centres, mission buildings, schools and roads. In the wet belt, these areas are of minimal agricultural importance. The soils here are sticky and difficult to plough. The activities include domestic work, trading, animal husbandry and tree growing.

Other common land types include open water and rocky areas. Open water mainly includes dams with silted water and floats. They are mostly used for watering livestock and fishing. Rocky areas on the other hand, are characterized by numerous rock out crops, caves and scattered tall trees and grasses with a variety of wild life. The main activities carried out here include stone quarrying, livestock grazing, collection of firewood and materials for making crafts. The women use these areas for drying food stuffs and water collection. These areas also vantage points for hunters.

### 3.1.2 Farming system types

The study of farming system types addresses three components; cropping systems, livestock management and fruit growing.

#### 3.1.2.1 Cropping systems

The main crops in the district are cassava, groundnuts, sorghum, millet and cow peas. Others are green grams and sweet potatoes (see table 4a). There is little variation in the types of crops grown in the middle and wet belts. However, cassava, which is the main crop in these two belts, is of less priority in the dry belt. Millet on the other hand features more prominently in the drier areas of the district. Most crops are grown both as a sole crop or inter cropped in different combinations (see table 4b).

| Dry | Middle | Wet |
|---|---|---|
| Groundnuts | Cassava | Cassava |
| Millet | Groundnuts | Groundnuts |
| Sorghum | Sorghum | Millet |
| Cassava | Cow peas | Cow peas |
| Sweet potatoes | Green grams | Sorghum |
| Green grams | Sweet potatoes | |

*Table 4a. Main crops grown (ranked)*

| Crop | Companion crops | Main cropping |
|---|---|---|
| Cassava | Beans, C/peas, G/grams | Sole crop |
| Groundnuts | Maize, C/peas, G/grams | Inter crop |
| Sorghum | C/peas, G/grams | Inter crop |
| Millet | Maize, Sorghum | Sole crop |
| Cowpeas | Maize, Beans, G/nuts | Inter crop |

*Table 4b. Common crop combinations*

### 3.1.2.2 Livestock management systems

Cattle, goats and poultry are the major types of livestock in the district. The population of sheep and pigs is relatively lower. There is little variation in types of livestock kept in the different agro-ecological belts. However, methods of feeding the livestock vary according to livestock type, season and agro-ecological belt. Table 5b summarizes key aspects of the livestock management system in the district.

The local cattle are herded or tethered and watered communally. They are kept in kraals near the homes. Bulls are usually castrated. Crossbreed cattle are tethered in the homestead. Goats, sheep and pigs are mostly tethered but are also left to feed free range during the dry season. Poultry (chicken, turkeys, ducks and pigeons) are let to feed by free range and kept in chicken houses or kitchens.

| Dry | Middle | Wet |
|---|---|---|
| Cattle | Goats | Cattle |
| Goats | Cattle | Goats |
| Sheep | Poultry | Poultry |
| Poultry | Pigs | Sheep |
| Pigs | Sheep | Pigs |

*Table 5a. Main livestock types kept (ranked)*

| Livestock | Feeding methods | Housing |
|---|---|---|
| Cattle (Local) | Herding, Tethering, | Kraal |
| Cattle (Cross) | Tethering | Cow shed |
| Goats | Tethering, Free range | Kitchen, Verandah |
| Sheep | Tethering, Free range | Kitchen, Verandah |
| Pigs | Tethering, Free range | Shed, Outside |
| Poultry | Free range | Poultry house, Trees |

*Table 5b. Livestock management systems*

### 3.1.2.3 Major fruits in the farming system

Fruit growing is an important part of Teso farming systems. The important fruits (from on-farm and off-farm) in Katakwi include *Mangifera indica, Citrus spp., Artocarpus heterophyllus, Carica papaya, Psidium guajava* (exotic), and *Viterallia paradoxa, Vitex doniana, Tamarindus indica, Ximenia americana, Carissa edulis* (indigenous). Table 6 lists important fruit types by zones.

| Dry belt | Middle belt | Wet belt |
|---|---|---|
| **Exotic** | | |
| *Citrus spp.* | *Mangifera indica* | *Mangifera indica* |
| *Mangifera indica* | *Citrus spp.* | *Citrus spp.* |
| *Carica papaya* | *Passiflora edulis* | *Carica papaya* |
| *Psidium guajava* | *Carica papaya* | *Psidium guajava* |
| *Artocarpus heterophyllus.* | *Artocarpus het.* | *Artocarpus het..* |
| **Indigenous** | | |
| *Tamarindus indica* | *Vitex doniana* | *Viterallia paradoxa* |
| *Viterallia paradoxa* | *Carissa edulis* | *Vitex doniana* |
| *Carissa edulis* | *Ximenia americana* | *Carissa edulis* |
| *Vitex doniana* | *Tamarindus indica* | *Tamarindus indica* |
| | *Viterallia paradoxa* | *Ximenia americana* |

*Table 6. Main fruit in the 3 agro-ecological zones in order of importance*

## 3.2 Tree growing practices

Tree growing practices are dynamic and evolve over years. Thus, to understand the existing practices in Teso, a historical perspective into past and present practices is necessary. During the RRA, this study explored the trends that tree growing in the Teso farming system has taken in the last three decades.

### 3.2.1 Tree growing practices before the 1970s

The retention of trees in homesteads is an old tradition in Teso. On clearing a piece of land, a settler usually retained some tree(s) as symbolism for his claim on that land. Trees were also left along boundaries for demarcation. These trees doubled as windbreaks and provided various tree products. It was also common to plant trees in graveyards in memory of the deceased.

Due to low human population, swamps covered large areas in the landscape. These were originally virgin lands, but in the face of increasing population, became locations for communal grazing and watering of livestock. Trees were retained in many swamps to provide shade for livestock and herdsmen.

Forests formed a large part of natural vegetation cover. These were inhabited by wild game and were important hunting grounds. As human population set in, there was increased dependence on these areas for firewood, medicines and poles for building. Eventually, forested areas gave way to human settlement and agriculture. The surviving portions remained under enormous pressure for charcoal and brick burning.

Traditionally, trees were retained in public places for shelter during cultural festivals and clan meetings. The colonial administration also promoted trees growing in public places (offices, schools, missions and markets). Many administrative headquarters (e.g. sub-county, county) were identified from *Milicia excelsa* plantings promoted by Semei Kakungulu, a senior colonial chief. Besides demarcation and ornamental functions, these trees provided shade and served as windbreaks. Trees were also planted along roadsides for the same purposes, in addition to acting as boundary markers and landmarks to travelers.

### 3.2.2 Changes in tree growing practices and utilization

In the 1970s there was free access to tree products both on and off the farm. But as population increase set in and tree products attained commercial value, there is increasing privatisation and restrictions on access to important trees like *Vitellaria paradoxa*. Also, some common tree species e.g. *Melia azedrach* and *Mangifera indica* have in the last decade or so, taken on commercial value due to increased need for cash by households. To some extent, tree ownership has been individualised even within households.

The period between 1980 and today has seen escalation in timber harvesting due to increased construction of permanent houses and urbanisation. Charcoal burning has become rampant due to availability of an urban market for charcoal parallel to insecurity, which has aggravated poverty by depriving the population of alternative sources of income.

Trees were conserved in cultural sites (airiget) in the past, but for the last two decades these sites have been tampered with. This has been attributed to disregard for cultural beliefs and the breakdown of cultural ceremonies as a result of poverty and distortion of the social system by insecurity. The entry of a western culture has also eroded some of the old Ateso traditions.

### 3.2.3 Changes in tree coverage and species diversity

Tree coverage and species diversity has reduced significantly in the last three decades as a result of human settlements and agriculture. Communal cotton production in the early 1970s led to clearing of large areas for cultivation. The reduction in livestock population due to cattle rustling and insecurity, forced people to turn to crop cultivation for subsistence, thus raising need for opening more cropland. The increased incidence of bush fires especially in the 1980s coupled with the introduction of settlement camps in the 1990s due to insecurity also led to massive tree destruction.

| Dry belt | Middle belt | Wet belt |
|---|---|---|
| Agriculture | Agriculture | Human settlement |
| Insecurity | Charcoal burning | Agriculture |
| Charcoal burning | Human settlement | Charcoal burning |
| Brick burning | Insecurity | Firewood |
| Wild fires | Wild fires | Timber harvesting |
| Animal browse | Medicinal use | Wild fires |

*Table 7. Factors contributing to loss of tree cover in the district.*

The commercialisation of tree products (e.g. shea nuts and timber) has also led to over exploitation. The other factors are charcoal burning (resulting from increased poverty), timber harvesting using wasteful methods and wild fires. The increased use of modern medicine has led to neglect for medicinal trees and shrubs. Some species e.g. *Ximenia americana* face natural extinction due to difficulty in their propagation. Other endangered species include *Prosopis africana, Albizia spp., Fagara chalybea* and *Vitellaria paradoxa.*

### 3.2.4 Current tree growing practices in the farming system

Though tree-growing practices are seen in context of the wider landscape, this study had particular interest in the on-farm situation. It is evident that deliberate planting of trees on-farm is not common as retaining trees already growing on-farm. The lack of planting materials is cited as a key hindrance to tree planting on-farm. However, the attitude that trees are "God given" and grow naturally also persists.

For various reasons though, there are marked patterns in the types of trees retained in various locations on the farm. This section explores locations on-farm where trees are commonly found and reasons for this distribution.

| Dry belt | Middle belt | Wet belt |
|---|---|---|
| Woodlands | Woodlands | Croplands |
| Homesteads | Croplands | Degraded areas |
| Swamps | Farm boundaries | Farm boundaries |
| Farm boundaries | Homesteads | Homesteads |
| Croplands | Swamps | Woodlands |
| Degraded areas | - | Public places |

*Table 8. Locations where trees are commonly grown.*

### 3.2.4.1 Tree growing in croplands

Most crop gardens have trees left scattered on them. The common species on croplands include *Vitellaria paradoxa, Tamarindus indica, Vitex doniana, Piliostigma thoningii, Albizia coriaria, Mangifera indica, Terminalia macroptera, Ficus spp., Senna siamea* and *Vitex doniana.* Many of these trees are retained after clearing the land, to provide shade for crops and / or fruits. They also act as windbreaks and improve upon soil fertility. Building poles and firewood are the other benefits from trees on croplands.

### 3.2.4.2 Tree growing along farm boundaries

Trees are commonly retained along external farm boundaries as boundary markers to prevent land disputes. The species common along farm boundaries include *Piliostigma thoningii, Vitellaria paradoxa, Combretum collinum, Ficus spp., Terminalia macroptera, Janthropha carcus, Grewia mollis, Thevetia peruviana* and *Euphorbia can.* Tree survival and growth rates are claimed to be higher in boundary plantings, relative to other locations on-farm. Both internal and external boundary plantings serve as windbreaks and control soil erosion to the benefit of adjacent gardens. In addition, they provide a source of building poles and firewood near / within the homestead.

### 3.2.4.3 Tree growing around homesteads

Trees are planted in homesteads more than other parts of the farm. This location is preferred to others for easy supervision and management of the trees. Species common around homesteads mainly include fruit trees like *Mangifera indica, Tamarindus indica, Vitellaria paradoxa, Vitex doniana, Carica papaya, Psidium guajava and Citrus spp. Melia azedrach, Euphorbia can.* and

*Terminalia macroptera* are also common in homesteads. Trees in homesteads serve as windbreaks, ornamentals and provide shade, fences / hedges, firewood, poles and fruits.

### 3.2.4.4 Tree growing in swamps

Trees are retained in swamps to conserve the watersheds and enable rainfall formation. The most common species on swamps include "Ecomai", *Albizia coriaria, Acacia spp., Piliostigma thorningii, Combretum molle, Ximenia americana* and *Markhamia lutea.* Trees in swamps provide shade (for livestock and herdsmen), firewood and a habitat for various bird and animal species. Swampy areas have various fruit and medicinal tree and shrub species growing on them.

### 3.2.4.5 Tree growing in other parts of the landscape

Hilly areas, forested areas and roadsides are the main areas off-farm where with fairly high tree cover. Roadsides aside, the trees in other locations are mainly part of natural vegetation. They provide a multitude of tree products and services ranging from firewood, poles, medicines, shade and windbreaks.

Forests have trees and shrubs growing as part of natural vegetation. These areas are considered communal areas for hunting. These trees provide firewood, medicine and building poles to the community. In addition, forests are used for grazing livestock and serve a big role in environmental conservation. The forests, however, are massively degraded due to charcoal burning.

Trees are also commonly planted or retained along roads and paths to provide shade, fruits and building poles and also serve as landmarks to guide travelers. The most common tree and shrub species along roads are *Ficus natalensis, Ficus platyphylla, Tamarindus indica, Vitex doniana* (dry belt), *Mangifera indica, Markhamia lutea, Melia azedrach, Milicia excelsa, Combretum collinum* and *Thevetia peruviana* (wet belt).

In hilly areas, trees are particularly important for soil conservation. Hardy trees like *"Ewoke", Garchinia buchananii, Hymenocadia acida* (middle belt), *Vitellaria paradoxa, Combretum collinum, Diospyros mespilformis, Crossopteryx febrifuga,* and *Carissa edulis* (wet belt) are retained in hilly areas because there is little agricultural activity there due to poor soils.

## 3.4 The role of trees in the farming system

Understanding the importance attached to various tree products and services is important in prescribing agroforestry trees for a farming system. Due to variations in physical and socio-economic factors, this often varies between locations and social groups. This section analyzes the role of trees in different ecological zones and gender groups, and describes the nature of each role.

### 3.3.1 Role of trees in different agro-ecological zones

The provision of firewood, building poles, medicines, fruits and shade are the most important uses of trees in the district. It is evident that main uses of trees in the three agro-ecological zones do not vary significantly (see table 9a). Apparently though, the importance of fruits features in the wet and middle belts but not in the drier areas. On the other hand, the importance of trees as sources of timber is recognized in the dry belt only.

| Dry | Middle | Wet |
|---|---|---|
| Firewood | Poles | Firewood |
| Poles | Firewood | Poles |
| Medicinal | Medicinal | Medicinal |
| Timber | Fruits | Fruits |
| Shade | Shade | Shade |

*Table 9a. Role of trees by agro-ecological zones (ranked).*

| Men | Women | Youths |
|---|---|---|
| Poles | Firewood | Poles |
| Firewood | Medicine | Firewood |
| Timber | Shade | Medicine |
| Medicine | Poles | Windbreaks |
| Shade | Windbreaks | Fruits |
| Fruits | Timber | - |

*Table 9b. Role of trees to different gender groups (ranked).*

### 3.3.2 Role of trees by gender

It was hypothesized that gender impacts on the importance different categories of people attach to trees. Though there was consensus that poles and firewood are the main tree products in the farming system, women, unlike other groups indicated firewood as the higher priority of the two (see table 6b). Women ranked poles relatively lower than men and youths. All three groups recognized the medicinal importance of trees, though women ranked it higher relative to other groups. The role of fruits was ranked low in all groups. The provision of timber was ranked fairly highly by men, but not mentioned by the youth groups. Women and youth groups (but not the men's groups) ranked windbreaks among major roles.

### 3.3.3 Trees as a source of firewood

Firewood is the only source of energy in most rural households in the district. It is used mainly for cooking, but also lighting and warming the house at night and for keeping vigil at funerals. Some households light a fire in the kraal at night to generate smoke to keep off mosquitoes. Commercially, firewood is used for charcoal burning and metal fabrication. It is also sold in trading centres and / or used for distilling "waragi", a local potent gin.

Rangelands are the main sources of firewood for household. Their importance as sources of firewood is less in the dry belt where dependency is mainly on forests and on-farm sources. The purchase of firewood was only indicated as a major source in the dry belt.

| Agro-ecological zone | Respondents (%) | | |
|---|---|---|---|
| | Experiencing shortage | Purchasing firewood | Planted trees for firewood |
| Dry belt | 75.9 | 41.5 | 11.1 |
| Middle belt | 77.8 | 36.0 | 7.7 |
| Wet belt | 65.5 | 33.3 | 18.5 |
| **District** | **73.6** | **38.1** | **12.1** |

*Table 10. Availability, purchase and planting of trees for firewood*

Most (65%) of the households that purchase firewood do it at least once every month. The frequency of purchasing firewood tended to be higher in the middle belt, where 80% of the households purchasing firewood buy it on a regular monthly basis.

Interest in planting trees for firewood is low especially in the drier belt. Dependence on naturally growing trees is a major reason for farmers not deliberately planting trees for firewood. The other factors include drought and lack of knowledge on propagation of some firewood species and / or planting materials. Land shortage is also a hindrance in the middle belt.

### 3.3.4 Trees as sources of poles

Poles are used in various sizes depending on the purpose. They are mainly used in hut construction as support for mud walls and roofing. Poles are also useful in constructing

shade for resting, shelters for bathing, kraals, making local bridges and slabs for latrines. They are also used to make granaries for food security and racks for drying simsim. Other uses of poles include making parts of musical instruments, ox-carts and handles of tools e.g. hoes, axes, etc.

The main sources of poles to households are the range lands (47%) and woodlands / forests (30%). 39% of households depend mainly on on-farm sources for poles especially individual land holdings (31%). The contribution of range lands towards household pole supply is higher in the middle (71%) and wet belts. In the dry belt, however, on-farm sources and forests feature more importantly.

| Agro-ecological zone | Respondents (%) | | |
|---|---|---|---|
| | Experiencing shortage | Purchasing poles | Planted pole trees |
| Dry belt | 68.6 | 64.7 | 36.0 |
| Middle belt | 79.3 | 48.3 | 38.5 |
| Wet belt | 64.5 | 25.8 | 42.9 |
| **District** | **70.3** | **49.5** | **38.5** |

*Table 11. Availability, purchase of poles and planting of trees for poles*

Seventy percent of households surveyed faced a shortage of poles. A larger percentage of households in the middle belt indicated facing a shortage, relative to other parts of the district.

About 50% of the households visited purchase poles. This is apparently more pronounced in the drier part of the district than the wetter areas. 44% of the households that purchase poles buy at least annually. Up to 77% of these households indicated purchasing poles at least once every two years.

Most households do not plant trees deliberately for pole production. Only 39% of the households had planted trees purposely for producing poles. The percentage of households planting trees for poles was relatively higher in the wet belt (see table 11).

The lack of knowledge on the propagation of most pole species is cited as a key reason for farmers not planting trees for this purpose. The planting materials for pole species are also not readily available to many farmers especially in the middle and dry belts. The tendency to

depend on naturally growing trees for poles also explains the farmers' low enthusiasm towards tree planting for pole production.

### 3.3.5 Trees and shrubs as sources of traditional medicine

The medicines are mainly used for treatment of various diseases (e.g. headache, worms, measles) in both humans and livestock. Traditional medicine is usually used as "first aid" before a patient is taken to a clinic. Women use parts of various trees and shrubs for maternity purposes and for making "love portions" deemed useful in ensuring marital stability.

Range lands and forests are the main sources of medicinal shrubs and trees to most households. Dependence on on-farm sources for medicines is also prominent in the drier part of the district. 19% of households in the wet belt mainly purchase traditional medicines as opposed to acquiring from other sources. Purchase of medicines is of less priority in the middle belt.

| Agro-ecological zone | Respondents (%) | |
|---|---|---|
| | With medicinals | Planted Medicinals |
| Dry belt | 48.0 | 28.0 |
| Middle belt | 80.0 | 20.0 |
| Wet belt | 70.4 | 18.5 |
| **District** | **61.8** | **23.5** |

*Table 12. Availability, purchase and planting of trees for medicine*

62% of farm household visited has some medicinal trees and / or shrubs growing on their farms. The largest percentage of households growing medicinal trees and / or shrubs on-farm was in the middle and wet belts. Few (24%) of the households, however, indicated having planted medicinal trees deliberately on their farms.

Lack of knowledge on the propagation of medicinal species and the unavailability of germplasm are some of the main reasons for not planting medicinal trees on-farm. It is also believed that traditional medicines are abundant in the wilderness. There is also concern, in the middle belt, over the poor growth of medicinal species.

### 3.3.6 Trees as sources of fruits and food

One of the main roles of indigenous trees is their contribution to the local diet and household food security. A variety of fruits consumed in households, either eaten fresh or used to spice up millet meal. The leaves of some trees are eaten as vegetables. The sale of fruits provides an opportunity for generating cash income to some households. Some fruits (e.g. Shea nut) are used for extraction of oil used for cosmetic purposes and also sold for income.

The main sources of fruits consumed by households are range lands and individual farms. Forests are also an important source especially in the dry belt. The purchase and collection of fruits from other farms are minimal.

| Agro-ecological zone | Respondents (%) | | |
|---|---|---|---|
| | Experiencing shortage | Purchasing fruit | Planted fruit trees |
| Dry belt | 58.5 | 67.3 | 61.5 |
| Middle belt | 65.4 | 60.0 | 43.5 |
| Wet belt | 66.7 | 51.9 | 48.0 |
| **District** | **62.3** | **61.5** | **54.0** |

*Table 13. Availability, purchase of fruit and planting of trees for fruit*

Up to 62% of households indicated facing shortage of fruits. A slightly larger percentage of households in the middle and wet belts face a shortage of fruits, relative to the dry belt. On the other hand, a larger percentage of households in the dry belt purchase fruits compared to the other belts. Purchase of fruits is less pronounced in the wet belt. Overall, 62% of households buy fruits. Up to 33.8% of households purchase fruits at least weekly.

Planting of fruit trees was more pronounced in the dry belt. Up to (61%) of households in the dry belt had planted fruit trees on their farms, above the district average of 54%.

Through out the district, the main reason for not planting indigenous fruit trees is the tendency to rely on naturally growing trees. Also, many farmers do not know how to propagate indigenous fruit trees and lack the planting materials. In the wet belt, lack of market featured as another hindrance to indigenous fruit tree growing. Other factors included termites, long gestation period land shortage and drought.

### 3.3.7 Tree for shade and shelter

The use of trees for shade is common around homesteads. Trees are planted or retained to provide shelter from the sun during the hot season. Their location near the home has commonly resulted in shade trees doubling as ornamentals.

| Agro-ecological zone | % of farm-households | |
|---|---|---|
| | Shade trees on-farm | Planted shade Trees |
| Dry belt | 90.0 | 79.2 |
| Middle belt | 100.0 | 46.2 |
| Wet belt | 92.3 | 51.9 |
| **District** | **93.1** | **63.4** |

*Table 14. Availability and planting of trees for shade*

Most (93%) of the households have shade trees on their farms. In 63% of the households, shade trees have been deliberately planted mainly around homesteads. This practice is more pronounced in the dry belt, while interest in planting shade trees was lowest in the wet belt. The dependency on naturally growing trees for shade is the main reason for some farmers not deliberately planting shade trees. It is also indicated that lack of knowledge about propagation and unavailability of planting materials are the other major factors.

## 3.4 Important indigenous trees in the farming system

The determination of important trees and shrubs began by identifying priority species for each of the major roles during the rapid appraisals. These species were subjected to rating across key selection criteria in the household survey. This section presents priority indigenous trees and shrubs according to major roles.

### 3.4.1 Priority indigenous poles species

During the RRA, the study dug into the specific qualities of a "good pole". Apparently, there is no perfect pole, as quality of a pole depends on the purpose for which it is sought. Generally, however, poles are gauged basing on their strength (i.e. not breaking easily), straightness, flexibility against strong wind and resistance to termites and borers. They

should also be fast growing, attaining good size and coppicing well, in addition to serving multiple functions.

| Species | Ranking points | | Percentage preference* |
|---|---|---|---|
| | Total | Mean | |
| *Prosopis africana* | 519 | 4.36 | 74.8 |
| *Terminalia macroptera* | 354 | 2.98 | 9.2 |
| *Haeria reticulata* | 177 | 1.49 | 0.8 |
| *Crossopteryx febrifuga* | 176 | 1.48 | 1.7 |
| *Bridelia micrantha* | 167 | 1.40 | 2.5 |
| *Haeria reticulata* | 143 | 1.20 | 3.4 |
| *Pseudocedrella kotschyi* | 117 | 0.98 | 1.7 |
| *Combretum collinum* | 101 | 0.85 | 1.7 |

*** Respondents mentioning species as the best for the poles.**

*Table 15. High priority indigenous pole species*

The most important indigenous species for poles are *Prosopis africana* and *Terminalia macroptera*. 75% of the respondents indicated *Prosopis africana* as the best, while 9% opted for *Terminalia macroptera*. The other candidate indigenous species for poles are *Crossopteryx febrifuga*, *Haeria reticulata* and *Bridelia micrantha*.

- *Prosopis africana* produces strong poles that are resistant to borers and termites and are ideals for wall construction. The poles from this species do not grow straight and are not convenient for roofing. However, despite its coppicing fairly well, the tree is quite slow growing.

- *Terminalia macroptera* provides strong, straight poles that are also resistant to termites and borers. *Terminalia macroptera* poles are best suited for wall construction but can also do for roofing. The species is fast growing and coppices well.

- The poles from *Haeria reticulata* are considered average on several criteria. They are fairly strong, though susceptible to termite and borer attack, which renders them inappropriate for wall construction. The species on the other hand does not grow straight and its poles are difficult to use for roofing.

- *Crossopteryx febrifuga* produces strong poles, resistant to termites and borers. These poles, however, do not grow straight and are preferably used for walls rather than roofing. The tree though, is a slow growing species with average coppicing abilities.

### 3.4.2 Important indigenous trees for shade and shelter

The trees preferred for shade have large, wide spreading canopies, which do not shed leaves throughout the year. There is also need for shade trees to be fast growing, multi-purpose and not susceptible to caterpillar attack. The ability to withstand strong wind is another attribute of a good shade tree.

| Species | Ranking points | | Percentage preference* |
|---|---|---|---|
| | Total | Mean | |
| *Tamarindus indica* | 437 | 3.67 | 32.8 |
| *Vitellaria paradoxa* | 388 | 3.26 | 15.1 |
| *Ficus natalensis* | 379 | 3.19 | 39.5 |
| *Piliostigma thoningii* | 191 | 1.61 | 5.0 |
| *Vitex doniana* | 168 | 1.41 | 1.7 |
| *Terminalia macroptera* | 145 | 1.22 | 1.7 |

* **Respondents mentioning as best indigenous species for shade**

*Table 16. High priority indigenous shade species*

The most important indigenous shade species are *Tamarindus indica*, *Vitellaria paradoxa* and *Ficus natalensis*. About 90% of the respondents gave one of these three species as the best species for this purpose. General consensus was evident on *Tamarindus indica* and *Vitellaria paradoxa* rankings. Respondents did not concur on *Ficus natalensis* for shade. Though 40% felt it was the best species, others (16%) did not rank it among the priority 5 species for this purpose.

- *Ficus natalensis* grows a wide and compact canopy that withstands strong winds and does not shed leaves. The species is also not very susceptible to insect pests. *Ficus natalensis* on the other hand, attains great height, reducing its effectiveness as a shade tree.

- *Tamarindus indica* develops a wide canopy, compact canopy that withstands strong winds. The species also has numerous uses and grows to a short height, ideal for a shade tree. However, *Tamarindus indica* is quite susceptible to pest attack and shed leaves for some seasons.

- *Vitellaria paradoxa* has a wide canopy, which though not compact can withstand strong winds. This species is quite multipurpose and ornamental. It is, however, susceptible to pests and sheds leaves in some months of the year.

### 3.4.3 Important indigenous trees for firewood

Good firewood is determined from its ability to light easily and sustain a steady flame without producing lots of smoke. Producing embers that are used for ironing and preserving fire overnight is another attribute of good firewood. It should also be easy to split and not thorny.

| Species | Ranking points | | Percentage preference* |
|---|---|---|---|
| | Total | Mean | |
| *Combretum collinum* | 423 | 3.56 | 50.4 |
| *Combretum fragrans* | 281 | 2.36 | 10.1 |
| *Vitellaria paradoxa* | 279 | 2.35 | 20.2 |
| *Acacia hockii* | 190 | 1.60 | 5.0 |
| *Combretum molle* | 174 | 1.46 | 4.2 |
| *Bridelia micrantha* | 153 | 1.29 | 1.7 |
| *Tamarindus indica* | 125 | 1.05 | 2.5 |
| *Terminalia macroptera* | 111 | 0.93 | 2.5 |

* **Respondents mentioning as best indigenous species for firewood**

*Table 17. High priority indigenous firewood species*

The most important indigenous firewood species are *Combretum collinum*, *Combretum fragrans* and *Vitellaria paradoxa*. Over 80% of the respondents indicated one of these three species as being the best indigenous species for this use, especially *Combretum collinum*.

- *Combretum collinum* is a non-thorny species that dries, splits and lights easily and sustains steady flame for long. It produces embers and relatively little smoke.

- *Combretum fragrans* is also non-thorny, and dries and lights easily. Its firewood burns for long and produces a fair amount of embers and smoke. *Combretum fragrans* firewood however is difficult to break or split for use.

- The firewood from *Vitellaria paradoxa* is rated highly in terms of its ability to sustain steady flame for a long time and produce many quality embers. The species is not thorny though it is slow drying and difficult to split.

### 3.4.4 Important indigenous medicinal trees and shrubs

Good medicinal species need to be effective with no side effects and should preferably not be very bitter. The ability for this medicine to be preserved e.g. by drying is another important attribute in addition to being traditionally accepted.

| Species | Ranking points | | Percentage preference* |
|---|---|---|---|
| | Total | Mean | |
| *Fagara chalybea* | 429 | 3.61 | 50.4 |
| Abac | 339 | 2.85 | 21.0 |
| *Teclea nobilis* | 219 | 1.84 | 4.2 |
| Esuroi | 201 | 1.67 | 7.6 |
| *Carissa edulis* | 159 | 1.34 | 1.7 |
| Eyaratum | 121 | 1.02 | 4.2 |

* **Respondents mentioning as the best indigenous medicinal species**

*Table 18. High priority indigenous medicinal species*

The most important indigenous medicinal species are *Fagara chalybea* and Abac. Over 70% of the respondents indicated one of these to be the best medicinal species. The other candidate species for this purpose are *Teclea nobilis* and "Esuroi".

### 3.4.5 Important indigenous fruit species

The criteria for determining the quality of a fruit varies from one fruit type to another. Thus, a wide range of criteria pointed e.g. taste (sweetness or sourness), attractive colour, fleshiness and marketability are considered. The ideal fruit tree should also be resistant to pests (especially termites) and diseases, have a short gestation period and bear many fruits regularly. It should also be able to serve other functions in the seasons when it is not fruiting.

| Species | Ranking points | | Percentage preference* |
|---|---|---|---|
| | Total | Mean | |
| *Vitellaria paradoxa* | 563 | 4.73 | 84.9 |
| *Tamarindus indica* | 448 | 3.77 | 10.1 |
| *Vitex doniana* | 273 | 2.29 | 0.8 |
| *Carissa edulis* | 266 | 2.24 | 1.7 |
| *Ximenia americana* | 204 | 1.71 | 0.8 |
| *Bridelia micrantha* | 26 | 0.22 | 0.8 |

* **Respondents mentioning as best indigenous fruit species.**

*Table 19. High priority indigenous fruit species*

The most important indigenous fruit species are *Vitellaria paradoxa* and *Tamarindus indica*. Up to 95% of respondents indicated one of these two as the best fruit species. The other candidate species are *Vitex doniana* and *Carissa edulis*.

Most indigenous fruit species score highly on taste and ability to bear many fruits. On the other hand, many indigenous fruit species take long to fruit and have low commercial value (apart from *Vitellaria paradoxa* and *Tamarindus indica*). *Vitellaria paradoxa* has all attributes except that its takes long to fruit. *Tamarindus indica* and *Carissa edulis* scored low on juiciness and marketability, respectively, but are rated fairly highly on most criteria.

## 3.5 Opportunities for tree growing in the farming system.

As a way forward for on-farm tree growing in the farming system, the study considered the suitability of various locations or niches and other opportunities for promoting agroforestry.

### 3.5.1 Locations for future tree planting

The following section presents on-farm and off-farm locations identified as having potential for tree growing in future. These include swampy areas, homesteads, farm boundaries and public places.

| Dry | Middle | Wet |
|---|---|---|
| Swamps | Swamps | Homesteads |
| Homesteads | Homesteads | Croplands |
| Farm boundaries | Croplands | Farm boundaries |
| Cropland | Farm boundaries | Woodlots |
| Woodlots | | Public places |

*Table 20. Locations for future tree planting*

Swampy areas are identified as suitable for future tree planting because of the availability of water even in the dry season. Due to presence of water, termites do not attack trees growing in swamps. Tree growing in swamp is also considered an effective soil conservation approach. The suggested species for swamps include *Diospyros mespilformis*, *Ficus sur*, *Sclerocarya birrea (subsp. caffra)*, *Albizia coriaria*, *Acacia gerrardii*, *Acacia bussei* and *Pseudocedrela kotschyi*.

Tree planting in homesteads is regarded as an opportunity for future as trees are needed to provide shade and windbreaks to protect houses from strong winds. Trees will also be easy to manage and supervise near the homes. The soil in homesteads is fertile with a lot of humus from farmyard litter, which benefits tree growth.

| Dry | Middle | Wet |
|---|---|---|
| *Thevetia peruviana* | *Citrus spp.* | *Albizia zygia* |
| *Janthropha curcas* | *Carica papaya* | *Tamarindus indica* |
| *Tamarindus indica* | *Mangifera indica* | *Teclea nobilis* |
| *Melia azedrach* | *Tamarindus indica* | *Ficus natalensis* |
| *Gmelina arborea* | *Vitellaria paradoxum* | *Melia azedrach* |

*Table 21. Trees proposed for planting in homesteads.*

Tree growing on croplands is seen as providing multiple advantages. It is an opportunity for improving on soil fertility, while at the same time ensuring the trees of protect from damage. These trees in turn act as windbreaks to reduce wind throws. They are also to provide shelter and fruits to people working on gardens.

| Dry | Middle | Wet |
|---|---|---|
| *Terminalia macroptera* | *Vitellaria paradoxum* | *Citrus spp.,* |
| *Grewia mollis* | *Terminalia macroptera* | *Vitellaria paradoxum* |
| *Annona senegalensis* | *Combretum collinum* | *Mangifera indica* |
| *Mangifera indica* | *Anacardium occidentale* | *Markhamia lutea* |
| *Citrus spp.* | *Psidium guajava* | *Combretum collinum* |

*Table 22. Trees proposed for planting in croplands.*

Farm boundaries are also cited as ideal locations for future tree planting. The need for trees to act as windbreaks and boundary markers to avoid land disputes. The boundaries are in most cases unutilized and their use for tree growing is regarded as an effective strategy for optimal land use and environmental conservation. The suggested species include *Prosopis africana, Terminalia macroptera, Ficus natalensis, Jathropha carcus, Thevetia peruviana, Melia azedrach, Markhamia lutea, Senna siamea* and *Mangifera indica.*

Woodlots are suggested as a suitable location for future tree planting as a way of utilizing degraded lands and for swamp reclamation. The species proposed for planting in woodlots include *Markhamia lutea, Senna siamea, Thevetia peruviana* and *Combretum collinum.*

Future tree planting is also suggested for school compounds to provide windbreaks, fruits, shade for school children and act as a learning tools for children in science lessons. These trees will in future provide the schools with timber for construction of staff houses and classroom blocks. The trees also have an ornamental effect on the school compounds. Some of the species proposed for schools compounds are *Gmelina arborea, Milicia excelsa, Thevetia peruviana, Mangifera indica* and *Citrus spp.*

### 3.5.2 Opportunities for tree growing

The impetus to plant and manage trees lies in various factors that manifest a need to do so. This section presents factors pointed out as likely to compel farmers to plant trees on-farm in the near future. Though these factors varies between zones, there are some cross-cutting issues (see table 23).

| Dry belt | Middle belt | Wet belt |
|---|---|---|
| Soil fertility problem | Demand for tree products | Awareness about tree planting |
| Land availability | Technical staff (NGO, Extension) | Investment strategy |
| Access to urban market | Awareness about tree planting | Demand for tree products |
| Awareness about tree planting | Investment strategy | Land demarcation |

*Table 23. Factors encouraging planting of trees and shrubs on-farm*

#### 3.5.2.1 Demand and commercialization of tree products

The increase in population and subsequent demand for tree products (firewood, poles, fruits) is felt especially in the middle and wet belts. As population pressure continues to rise, the option of planting owns trees on-farm is increasingly seen as a coping strategy for farming households.

Related to increased demand is the commercialisation of tree products. Tree growing has potential to emerge as an option for supplementing household income. Increased urbanisation and improved access to urban market for charcoal, firewood and fruits further

facilitate this. And as tree growing takes on commercial importance, it is likely to be a viable investment for future benefits.

### 3.5.2.2 Land issues and soil fertility management

In the dry belt, the availability of land renders tree planting as a possible way of optimizing land. Many areas face soil infertility and agroforestry technologies that enhance soil productivity have high potential. Elsewhere, where population pressure is high, agroforestry techniques of tree management can enable harmonious interaction of tree with other components. Boundary planting is for instance a practical solution to land disputes.

## 4.0 Conclusion

## Appendix 1. List of tree and shrub species

| | Scientific name | Ateso name |
|---|---|---|
| 1. | *Acacia bussei* | EJELEL |
| 2. | *Acacia gerardii* | EMINIT |
| 3. | *Acacia hockii* | EKISIM |
| 4. | *Albizia coriaria* | ETEKWA |
| 5. | *Albizia zygia* | EBATA |
| 6. | *Annona senegalensis* | EBOLO |
| 7. | *Artocarpus heterophyllus* | EPENESI |
| 8. | *Balanites Egyptica* | ECOMAI |
| 9. | *Bridelia micrantha* | ERIECO |
| 10. | *Cajanas cajan* | EKILIMIITI |
| 11. | *Carica papaya* | EPAPALI |
| 12. | *Carissa edulis* | EMURIEI |
| 13. | *Citrus spp.* | EMUCUGA |
| 14. | *Combretum collinum* | EKULONY |
| 15. | *Combretum fragrans* | EKIMENG |
| 16. | *Combretum molle* | EKWORO |
| 17. | *Combretum molle* | EKWORO |
| 18. | *Crysopteryx febrifuga* | ETERAI |
| 19. | *Diospyros mespilformis* | EKUM |
| 20. | *Euphorbia can* | EPOPONG |
| 21. | *Fagara chalybea* | EUSUK |
| 22. | *Ficus natalensis* | EJINGA |
| 23. | *Ficus glumosa* | EBIONG |
| 24. | *Ficus sur (syn. dekdekena)* | EMIDIT |
| 25. | *Garchinia buchananii* | EKWALAKWALA |
| 26. | *Gmelina arborea* | PODO |
| 27. | *Grewia mollis* | EPARIS |
| 28. | *Haeria reticulata* | EMUTUR/ ETILING |
| 29. | *Hymenocardia acida* | ETEREGU |
| 30. | *Janthropha carcus* | EJUNGULA |
| 31. | *Mangifera indica* | EMUEBE |
| 32. | *Markhamia lutea* | EMIITI |
| 33. | *Melia azedrach* | ELIRA |
| 34. | *Milicia excelsa* | MVULE |
| 35. | *Passiflora edulis* | EMATUDA |
| 36. | *Piliostigma thonningii* | EPAPAI |
| 37. | *Prosopis africana* | EIKIIKI |
| 38. | *Pseudocedrella kotschyi* | EPUTON |
| 39. | *Psidium guajava* | EMAPERA |
| 40. | *Sclerocarya birrea* | EKAJIKAJ |
| 41. | *Senna siamea* | EGASIA |
| 42. | *Tamarindus indica* | EPEDURU |
| 43. | *Teclea nobilis* | EKUDEP |
| 44. | *Terminalia macroptera* | EKOBOI |
| 45. | *Thevetia peruviana* | ELIGOI |
| 46. | *Vitellaria paradoxa* | EKUNGUR |
| 47. | *Vitex doniana* | EKARUKEI |
| 48. | *Ximenia americana* | ELAMAI |
| 49. | *Antiaria toxicaria* | EWOKE |
| 50. | - | ABAC |
| 51. | - | ESUROI |
| 52. | - | EYARATUM |